THIS IS THE YEAR 71 FOR SUGARBEETS!
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4. Half the Battle (Or More!) for Better Beets
6. Phytotoxicity (Plant-poisoning)
7. Beware of the Broadcast Bandwagon
8. Wind, Sand and Weeds
9. The Typical Grower of Tomorrow—Today!
10. Here’s How . . . Timely Tips from the Territory
13. Hi Ten Gallery of Beet Growers
18. High Sugar Producers of 1970
20. Feed Forum—Barnes and his Beet Tops
21. Feed Forum—Evert and his Ewes
22. The Lorenzini Legacy
23. Fond Farewells to John Edmiston and Bob Barton

SPECIAL SECTION
(in the centerfold of this issue)
All About Mono-Hy, Great Western’s New Sugarbeet Seed

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This is the Year for Beets!

- It's off to a fast start—a real head-start—this year for sugarbeets.

The year began, appropriately, with early agreement by the grower associations and the company on terms of the 1971 beet purchase agreement. The announcement of the agreement on Jan. 14 also carried a heartening price statement by Richard W. Blake, executive vice president of the National Sugarbeet Growers Federation, and Robert R. Owen, president of Great Western Sugar. They said:

“We see a real possibility that total cash returns to growers for the 1971 crop could exceed $18.50 per ton of beets of long-term average sugar content, based on current sugar prices and market trends.”

That is news—the best of any year—for grower and company alike.

It is important to recognize, of course, that the statement turns on the two factors mentioned—sugar content and sugar prices.

But it is equally important to realize that in this year for beets more scientific stress than ever before will be brought to bear on sugar content. Mysterious as it may be in some years, sugar content will be under surveillance from two approaches this year and hopefully pinned down to provide more sugar per acre.

For that's now the name of the beet game... more sugar per acre—for higher returns, for lower overhead. It costs just as much to grow a crop with 14 percent sugar as one with 18 percent. But, of course, it takes a little more doing to come through with high sugar per acre—plus some luck, naturally.

The two main approaches to higher sugar per acre were charted at a company-wide meeting of all members of the Great Western agricultural staff in January (another feature of the fast start this year).

The first approach was through the proper application of nitrogen fertilizer, with a review of scientific evidence that excessive nitrogen inhibits the storage of sugar in beets, and with distribution to all growers of a special Production Bulletin devoted to the Reuss study on nitrogen and net income per acre.

The second approach was through the introduction in rationed amounts of the new sugarbeet seed, Mono-Hy, a true monogerm hybrid developed by Great Western seed technologists. Mono-Hy was offered to growers in most areas with prospects of higher sugar per acre on the basis of three years of field tests backed up by 20 years of scientific selection of vigorous strains.

In further explanation of the seed break-through, this issue carries a special section on the development of Mono-Hy sugarbeet seed. (This section may be removed from the center of the magazine to save for future reference.)

In addition, another special Production Bulletin on fumigation was issued to growers for guidance on control of nematode infestations.

To round out the meeting and to sum up the new technology, each member of the agricultural staff was supplied with a Technical Manual with the most concise and comprehensive information on sugarbeet culture ever assembled between two covers. It is a working and “walking” encyclopedia on beet crop practices. And it is available to growers to enhance their knowledge and to improve their returns from the crop.
Good weed control is vital in the growing of sugar beets today. Not only does reduction of weeds mean less field labor, it means better beets and cleaner ones at harvest time.

We have a set of rules and herbicide application rates worked out through field trials in my territory. While these rates and methods of control vary from area to area and farm to farm, the basic procedures still hold true.

Before we get into these rules, it is well to remember that the use of a pre-plant herbicide is half the battle in controlling weeds. The other half is good cultural practices. Here is what we learned from herbicide results:

Point 1: Taking soil samples is a must. Know the type of soil with which you are working, the percentage of sand, silt and clay, and the amount of humus. If a field has two or more types of soil, take individual samples for each type. These tests give a starting point as to the rate of herbicide to use.

I encourage my growers to start at this point trying one tank and increasing the rate of herbicide four oz. per acre. I use a four-oz. increase because, while there may be more chemical burn, I have never had a tonnage decrease with this rate increase. In my particular area I like to see a slight chemical burn on the beet plant to obtain the maximum weed kill.

Point 2: Know the exact amount of herbicide to be applied per acre.

If using a granular material, be sure the machine is calibrated to apply the same amount of material on each row. This is a simple procedure—tie a plastic bag over each row spout, drive a given distance, weigh the material and calibrate the amount of herbicide to be applied per acre.

When using a spray material be sure to check each nozzle to be certain each is discharging the same amount of liquid in a given time, at a constant pressure. I have seen new nozzles vary as much as 20%.

Point 3: Be sure to read the label. On the label of each chemical used today, the manufacturer states the rate and the depth to incorporate their material. If this were not a must recommendation for maximum weed kill, our research people and the chemical companies would come up with a simpler method of application.

Point 4: Spray fields solid with Ro-Neet where there is a bad weed problem.

I prefer to have a grower pull a harrow directly back of the sprayer and disk the ground as soon as possible—but never let the spraying operation get ahead of the disk more than three and one-half hours.

We find that by using two outfits, the sprayer and the disk at the same time, by the time the sprayer fills the disk will be caught up. Be sure the field has been worked as dry as possible before applying the herbicide.

On a field we are going to bed plant, I like to spray the field solid. We pull the harrow back of the sprayer and follow with the bedder, as we do with the disk in the flat plant overall method.

Half the Battle —(or more!)—
For Better Beets

By Abe Spurgin
Agriculturist, Alliance, Neb.
Bayard Factory District
The rate of Ro-Neet we use on this method is from 26 to 32 ozs. on a medium soil test. Use a lighter overall rate with this method because treated soil is placed on the ridge. This method worked exceptionally well in the Alliance area the past three years.

Point 5: Use your incorporators properly.

Be sure to check the Eversman mixing rods and be sure they are not worn to the extent they are not obtaining the proper incorporation depth. Check incorporation depth in field soil by measuring penetration depth.

If the ground is the least bit wet the incorporator will throw up damp soil. When this happens, I prefer to split the incorporator and the beet drill, making two operations. I ran a two-year check under these conditions to study the germination difference—using the incorporator and the drill together and using the incorporator alone and letting the top surface dry before planting. One year the germination was 32% better under the split operation and the second year it was 37%.

I like to see the beet drill kick up a little dust while planting beets. Another big reason for the split-operation, if the ground is as dry as it should be, is incorporation can be carried out at a much higher speed than is generally recommended for good planting. Much more dry ground can be covered in a given time, reducing the chance for wet ground due to spring rains. And remember, unless there is at least one-half-inch of rain, irrigate to activate the chemical.

Last but not least in favor of the two-operation method is its use on a field with different types of soil. Say the incorporator is calibrated at three mph to put on 26 ozs. of Ro-Neet, and there are three fields to be worked.

The first field calls for 26 ozs. of Ro-Neet, the second 24 ozs. and the third 20 ozs. The first field can be incorporated at three mph; the second will have a speed increase of 10% or three and one-third mph for an application of 23.4 ozs.; and the third will have a speed increase of 20% or three and six-tenths mph for application of 20.8 ozs. of Ro-Neet per acre.

This change of rate application can also be used on the overall flat planting or the overall ridge-incorporating method. Alliance growers have used this method for the past five or six years and it is amazing how some of these men have worked out the proper herbicide dosage for different spots in their individual fields.

Point 6: Postemergence follow-up. Under my particular conditions, it has not been possible to get adequate weed control with postemergence spray alone. Postemergence sprays are a must, however, in many cases to rid the row of weeds that escape the pre-plant herbicide. Time is most critical. A two-day delay in getting into the field can mean the difference between success and failure.

Point 7: Lay-by use of herbicide should have advanced faster in my territory. It is difficult to talk some farmers into spending money to control weeds which cannot be seen just after the beets are thinned. At this time it looks as though little labor will be needed to weed the field.

Excellent results have been reported in other agriculturists’ territories through use of lay-by herbicides, Eptam and Tueflan. It is not the early germinating weeds that hurt at harvest time. It is the weeds that germinate after thinning and weeding.

Many of these late weeds cannot be controlled by cultivation due to the size of the beets. If growers could control these weeds chemically in my territory, and I believe they can, the beets could be topped easier and there would be less harvest delays and perhaps more yield.

One last rule which can save much time and trouble is: Keep your machines in top mechanical and calibration condition so they are ready to operate correctly whether at planting time or harvest.

* At a recent sugarbeet workshop in the Nebraska District, from left, Herb Pearcy, agricultural superintendent at Wheatland, Wyo.; Abe Spurgin, agriculturist at Alliance; and Elton Peterson and Marc Shay, agriculturists in the Scottsbluff-Gering factory district.
Phytotoxicity, the injurious effect of chemicals to crop plants, is one of the major problems encountered by the GW growers in recent years. The problem was intensified after 1966 when the growers had to switch from Aldrin to organophosphorus insecticides (Di-Syston, Dyfonate, Thimet, etc.) for control of the sugarbeet root maggot.

What causes phytotoxicity in sugarbeets? The following can be factors responsible for damage to beet seedlings.

1. Chemical properties—Organophosphorus insecticides are, in general, more toxic to beet seedlings than chlorinated hydrocarbon insecticides (Aldrin, DDT, Heptachlor, etc.).

2. Insecticide-herbicide combination—When two different chemicals are applied together, the toxicity of the combination may increase to such a level that it injures seedling beets.

3. Application technique—When an insecticide is placed either in direct contact with seed or too close to the seed in high concentration, beet seedlings can be severely damaged.

4. Climatic and seedbed conditions—Any factors that would delay the germination process and subsequent growth of the seedling beets may intensify the damage to the seedlings. For example, a prolonged wet and cold spell after planting, under certain circumstances, causes damage to beet seedlings. The moisture activates insecticides while cold temperature slows down the germination and growth processes of beets.

5. Soil type can be a factor contributing to phytotoxicity if care is not taken when applying insecticides. There is often a high stand loss in light sandy soils than in the heavy clay loam soils. The insecticides tend to be rapidly taken up by plants in sandy soils and a slow response occurs with plants in the heavy soils.

6. Combination of two or more factors mentioned above.

The following suggestions are intended to avoid any future chemical damage to sugarbeets, particularly for those who have had problems in the past or who are not familiar with insecticides and application methods.

1. Calibrate application equipment as accurately as possible.

2. Never exceed recommended dosage.

3. Do not place a large dose of insecticide in direct contact with seed.

4. Always apply insecticide in a seven-inch band (except for broadcast treatment), using a band spreader attachment. The recommended dosage is for a seven-inch band treatment and not for any narrower band. A narrow band of one to two inches simply increases the probability of phytotoxicity without giving any better control of the insect.

5. Suggested application method for better insect control:

   a) Power incorporation is best under most conditions and is particularly effective where adequate soil moisture is available for seed germination. In the area where sugarbeets are normally irrigated up, as in the Big Horn Basin area, power incorporation would be the most desirable method. If power incorporation is not possible, follow the method described below under 5-b.

   b) Applying insecticides in a band either in front of the planter discs or behind the press wheels followed by light incorporation with scratchers would also provide insect control. Do not permit scratchers to penetrate the seed furrow too deeply. This method is more economical than the power incorporation method and would be particularly suited for conditions of limited moisture.

   c) The purposes for incorporating insecticides into soil are threefold: To protect the insecticides from the wind and sunlight for a prolonged residual control, to place the chemicals where they are needed and perform more effectively, and to disperse the insecticides to avoid phytotoxicity.

6. Apply the insecticide and herbicide at the same time, only if necessary. For example, make a preplant broadcast treatment of herbicide and apply the insecticide at planting time.

7. If both the insecticide and herbicide are to be applied at the same time, thorough incorporation is extremely important.
that Diazinon or Vapotox in combination with Ro-Neet were generally less injurious to beet seedlings than Thi-met, Di-Syston, or Dyfonate applied with Ro-Neet. New candidate insecticides, Furadan and Temik, were even less toxic to the seedlings than Diazinon in some tests.

8. If little moisture is expected after planting or if there is a lack of confidence in applying the insecticide at planting time, delay the application until the seedlings have emerged.

Under the normal conditions, there should be no phytotoxicity problem from the postemergence treatment. The postemergence soil treatment should be made as soon as possible after the first adult sugarbeet root maggot is seen. Light incorporation of chemicals with scratchers is again recommended in the postemergence treatment.

There is no one application method that is absolutely safe to beet seedlings under all circumstances. If the above suggestions are followed, however, the incidence of phytotoxicity will be greatly reduced. Some growers, after much experience, have found it possible to successfully apply insecticides and herbicides simultaneously.

The single most important step everybody should follow is "not to place too much insecticide near the seed." All that is needed to kill maggots is the recommended dose of insecticide dispersed in a seven-inch band; one to two inches deep in the soil when the power incorporator is used and lesser depth of about one-half inches if application is over the planted seed as in item 5-b above.

Beware of the Broadcast Band-wagon

By Jerry Reed  
Asst. Agricultural Manager  
Billings Factory District

● There is a trend developing toward broadcast application of herbicides which will no doubt change many of our spring cultural practices. A lot of "know how" gained from experience has proven to us what can and cannot be done with power incorporating a band application of a recommended herbicide. We generally know what results can be obtained when a certain rate of chemical is power incorporated to a specified depth.

There are many variables present when one must depend on good chemical weed control to produce sugarbeets. Now that broadcast application is becoming more popular another variable is being introduced into our program. Many times I have observed poor weed control when the herbicide has been incorporated with a disk, harrow, or roller harrow.

When you deal with rates of Pre Beta I liquid, for instance, and want to have a 4.5-lb.-per-acre active ingredient, you would have to apply 37 liquid oz. in a 7" band or 118 oz. broadcast. We are not talking very large amounts of material and any time the depth of incorporation varies from two to three inches or two to four, it is obvious the concentration of the herbicide in the soil will vary at the same ratio.

Our 1970 Plan II testing program in Billings showed an average of better than 90% control of all weeds under many varying soil and moisture conditions. This work was done with a power band incorporator with incorporation depth gauged to two inches.

Work done with broadcast application of material to date does not give as good a performance.

Each grower must carefully evaluate his own production program and weigh all the pros and cons of broadcast application versus band power incorporating. Less than optimum chemical weed control cannot be tolerated. Knowing that it is a necessity to reduce the need for field labor, and to do this there must be adequate chemical weed control, let us not leap headlong into broadcasting of chemicals on sugarbeets. We must be certain what rates to use, what specialized equipment will adequately incorporate the chemical, ground travel speeds, and the many other practices and procedures which have been developed through the years that have made power incorporating a success in the Billings area.

The Triple K soil preparation machine has been tested for two years at Billings for overall power incorporation of herbicides and has found very good acceptance. These tests showed very good results by using the Rotacrat Model RD, double roller on the Triple K on heavy soils driven at speeds from four to six miles per hour using 40 gallons of water with the herbicide sprayer. In fact, results were only exceeded where we used power incorporation. We contribute this to the thorough mixing of the chemical into the soil by the Rotacrat.
Wind, Sand and Weeds
(and success!)

By Bob Gray
Agricultural Supt., Imperial, Neb.
Sterling Factory District

The age of “Big” farming can cope with many of the problems in agriculture which a few years ago seemed insurmountable, but it has not eliminated the “pioneer.”

Ed Fuehrer of Imperial, Neb., is one of these pioneers. Ed has five center-pivot sprinklers, a 90-acre solid set system and uses gated pipe for flood irrigation on 380 of his 1,300 irrigated acres. He was a newcomer to dry beans and sugar beets in 1969.

His first beet crop was planted in the conventional manner under a center-pivot sprinkler. He used a light rate of Ro-Neet on light soil that presented a blowing problem. Even with a rotary hoe and “sand fighter” available, Ed could not cope with the persistent hard winds of last spring. He lost 140 of his 210 acres of beets.

The 70 acres he saved was custom harvested prior to the freeze. His yield was 14.6 tons per acre with 15.3% sugar. This was proof that a good crop could be grown on his sandy soil if he could control the blowing.

With the help of his sons, Mark and Kirk, Ed started working on a plan to help solve the problem—the conventional system wasn’t for him. After much deliberation and many changes of ideas and equipment, Ed put his 1970 crop in.

He did not plow the ground. First he cut the cornstalks and used a Lilliston disk with a packer-mulcher behind it. He went over the field two or three times with this equipment. This method left the stalks well-mulched into the upper three to four inches of soil.

The Nebraskan’s planter setup was unique. He set up a John Deere 1300 planter with colters in front, followed by double disk fertilizer openers, then a press wheel followed by the planter units. The planter units were adapted with plastic tubes extending down and just to the rear of the opener. The covering disks were set to widen the cleared area, rather than cover the stalks. This left the seed placed in a nearly trash-free area. The trash was left centered between the 20-inch rows, providing both wind and water erosion control.

Ed’s fertilizer program was split into three applications. He disked in 127 lbs. of nitrogen and 100 lbs. of phosphate, with sulphur and zinc added.

At planting, a “pop up” fertilizer was applied two inches below the seed. This consisted of 60 lbs. of a combination of 16-20-0, plus 0-46-0 and 0-0-6 with zinc. After emergence 30 lbs. of nitrogen plus sulphur were applied through the sprinkler system.

Last season Ro-Neet seemed “hot” on this sandy soil, even at light rates, and good incorporation was impossible with the system Ed used this season. He used Pyramin 80, Dowpon and TD 273 post on “bad” spots. This gave good control where applied on very small weeds but, as anticipated, left much to be desired on larger weeds. Sandburrs and red roots were his most prevalent weed problem.

He is working on a method of incorporation, in the limited working area, to get the volatile herbicide to stick. He is also trying band application of Pyramin and T.C.A. immediately after planting and then running the sprinkler to get the chemical into the soil.

Ed’s Lilliston cultivator was used many times over the field between emergence and lay-by. It worked well in the trashy conditions, but, as Ed says, “Weeds are the problem I have to whip. I have to find the herbicide that will work under my field conditions.

Considering the fact that his 1970 crop was hit by light hail in early June and was completely defoliated June 18, Ed’s 17-ton per acre beets looked pretty respectable. The sugar content was about 15%.

As Ed explains, “These practices aren’t for everyone but if a grower has sand and a sprinkler, it’s something to think about. This year I plan to use the same rig, but use a beet planter with a short seed drop rather than the 1300 units.”

A tip for anyone trying his system:
Keep the sprinkler water droplet size to a minimum. This helps keep down silting.

Ed Fuehrer, Imperial grower, sits at left behind his Lilliston cultivator while working in corn stalks to prevent soil-blowing. Martin Villareal operates the tractor, with Agricultural Development Manager John Edmiston and Agricultural Supt. Bob Gray at right.
The Typical Grower of Tomorrow —Today!

By Glen Zemanek
Agriculturist, Holyoke, Colo.
Sterling Factory District

The typical grower of tomorrow in eastern Colorado may require no more labor in his sugarbeets than he does for any other crops he raises, according to Karl Klute and Don Reuter, Holyoke area growers.

Karl and his brother, Art, raised 465 acres of beets in 1970 and plan to have about the same acreage this year. Don farms 480 acres, 200 of which are in sugarbeets.

While Karl is a relatively new grower of beets, Don grew beets in Texas prior to coming to northeastern Colorado. "Being realistic," Don said, "sugarbeets as a cash crop helped me become established here and I am going to be growing beets for years to come."

Their prediction on future labor requirements may seem far-fetched to some growers who think in terms of the large numbers of beet workers used in the past. However, it is well within the realm of attainment.

Fall plowing, herbicide weed control, mechanical thinners and other good farming practices are helping Holyoke area growers cut their field labor requirements.

Fall plowing is recommended on our heavy soils. Obviously soils which tend to pulverize or blow must be worked in the spring close to planting time.

Land preparation in the fall enables retention of winter moisture while exposing insect eggs to the weather. It also melloes the soil through freezing and thawing.

Probably the best reason for fall plowing is that it gives the grower a chance to make good use of his time and machines when the spring rush is on.

Another important factor is fall work enables the grower to take advantage of the earliest possible planting date. This early planting helps produce about one ton of beets more per acre than does spring plowing and the resulting later planting.

Karl and Art and Don are typical of Holyoke area growers who have completed their fall work and are ready for spring planting. They are ready to roller-pack and pre-bed their fields before using power incorporators to put on a seven-inch band of Ro-Neet while planting four to six seeds per foot.

Immediately after planting they will irrigate to activate the herbicide and then cultivate for weed and wind control.

Timely cultivations, with extensive hilling of beets in the rows, help reduce weed problems and reduce labor costs.

So with good farming practices and proper weed control Holyoke growers are continually cutting their costs of raising sugarbeets which in turn means greater profits.
Edward Meissinger of Kanorado, Kans., has one important goal in mind when he plants his 1971 beet crop: Raise 400 acres without field labor.

In 1970 Ed grew 385 acres of beets with a minimum of hand labor and demonstrated the dramatic effectiveness of herbicides. His 385 acres averaged 20.6 tons. How did Ed and his very able helper, Mike Ridnour, handle their 1970 crop?

Ed farms 1,000 acres which is planted to sugar beets, oats, corn, beans, and wheat. Ed is a firm believer in crop rotations and the use of herbicides on previous crops that precede his beet acreage.

Timing is another important factor in his management. By planting beans and oats in the crop rotation, Ed is able to do a lot of fall plowing and take some of the pressure off come spring planting time. Ed used Ro-Neet total coverage on all his acreage along with early planting, one to three irrigations, to assure desired and even stands for the use of his John Deere thinner which thinned all of the 385 acres.

Ed uses a sequence application of herbicides, pre-plant with Ro-Neet post-emergence with Betanal or Topcide, and a lay-by with Treflan. Betanal and Topcide was used on 200 acres because of some Kochia and a few pigweeds that escaped the Ro-Neet. Ed was very pleased with Betanal as a post-emergence herbicide. Treflan was applied to all the acreage. Some was applied behind the thinner before weeding and the other after the weeding. Ed says, “It is important to use these herbicides when needed and applied at the proper time.”

As far as hand labor, Ed housed nine people to weed the 385 acres one time over. Some of the fields were a “gift” to the labor because of the very light weed population.

Herbicides and the use of selective thinners are no strangers to Ed and Mike. Ed and Mike moved to Kanorado in 1969 from Buckeye, Colo., where they grew sugar beets and used herbicides and the GW thinner with much success.

Ed and Mike accomplished something last year which is the ultimate goal of everybody concerned with raising sugar beets—a high-quality product with the minimum amount of field labor through the use of selective herbicides and electronic thinning. Ed’s accomplishments are not yet good enough for him since he now plans to raise this year’s crop with absolutely no field labor.

—Everett Lage, Agriculture Kemp Factory District

Here’s How

Some timely tips from around the territory on how some growers get the job done under their own particular circumstances.

This was the second year as beet growers for Olin Wallin and his sons, Gary and Danny, of Imperial, Nebraska. In 1969 they applied Ro-Neet in a seven-inch band at planting time with fair results. This past season they used one-third gallon (two pounds) over-all coverage, then bedded up as they planted. The 1970 results were very satisfactory and presented a field that was conditioned for electronic thinning. It was such that several groups of labor “going by” stopped to see if they could work them.

Olin had labor he had committed his work to but did take time to do several acres with the John Deere and Monomat thinners.

As was the case in most of Chase County, Wallin’s beets did not escape the June hails and their effect on stand.

With the completion of harvest it was Olin’s opinion that the few machine thinned beets they had were better, on the average, than those hand thinned. “There were more beets and I know a lot better tonnage behind the machine than those worked by labor,” was Gary’s observation and he was the one who did the digging.

They haven’t committed themselves, but indications are strong that they will have some kind of electronic thinner on the Wallin farm in 1971.

—Bob Gray, Ag. Supt.
Imperial, Neb.
Sterling Factory District
Henry Rutz analyzes weed control.

Carl Iungerich of the Sheds area, Fort Morgan district, grew 165 acres of sugarbeets in 1970 with a minimum of labor. These beets averaged more than 18 tons to the acre. Carl decided early in the spring to eliminate as much field labor as possible. He began with careful seedbed preparation to insure proper conditions for electronic machine thinning. He used a pre-plant application of Ro-Neet, broadcast for full coverage, and worked it in with a mulcher. He harrowed twice to mix the herbicide completely. The result was a stand suitable for machine thinning that was practically weed free.

The Fort Morgan grower started this program in 1969 and was confident of his ability to carry it through in 1970. He used his John Deere electronic thinner on 155 acres last year. The remaining 10 acres were hoed by field labor. His final thinned stand averaged 95 beets per 100 feet of row. He attributes this stand to the careful work of Ruben Ruppel, who operated the thinner.

Edgar Pratt plants with a 12-row unit on pre-formed beds.

Carl said he weeded the fields primarily to improve their appearance since the weed population was not excessive. His opinion was the weeds that escaped the herbicide would not have interfered with the harvest or final yield.

Because of this past year’s experience, Carl plans to use the same program in 1971, to raise his sugarbeets with a minimum of field labor, or perhaps eliminate it altogether.

—Bill Jones, Agriculturist 
Fort Morgan Factory District

Edgar Pratt of Burlington, Colo., has been a leader in the herbicide field. When other people were skeptical and having mixed emotions about what herbicide and how much to use, he pioneered ahead taking the best information available from the GW Experiment Station. Combining this information with his own farming know-how, he stayed with the program. Thus, it has enabled him to raise 290 acres consistently with a 19.6 ton per acre yield, averaging 15.0% sugar for the past four years. He has been high-station or a close contender every year.

His success is no accident. He used 55.03 of Ro-Neet total coverage incorporated with a spring tooth harrow immediately for pre-plant. After the beets were thinned with his John Deere thinner and gone over once with his old reliable hand labor crew of nine workers, Edgar applies Trefflan total coverage at 1.5 pints per acre rate for lay-by incorporated in with a good ditching operation.

Getting “Big N” under control with the new soil-testing program will be the next step in Edgar’s program. This, with timely watering, will assure his success in producing a profitable crop of beets each year.

—Merle Worden, Agriculturist 
Burlington, Colo. 
Kemp Factory District
Edmund A. Golka of Nida Station, Hemingford, Neb., is an enthusiastic booster of chemical weed control preceding electronic thinning. His support for these modern beet-growing methods came from utilization of Ro-Neet broadcast for weed control and selective thinning with his new John Deere electronic thinner in 1970.

Ed gave his 174 acres of beets complete coverage Ro-Neet, except for one 27-acre field. One-half of his remaining 147 acres received five pints per acre of the weed-control chemical while three quarts per acre were put on the other half. He thinned his 174 acres with the mechanical thinner, and encountered problems only with the 27 untreated acres.

The Nebraskan had six Texas workers hoe the entire acreage at the $1.75 per hour rate. Chemical weed control and use of the electronic thinner helped him attain an average cost of only $3.14 per acre for all field work on the treated acreage.

The 27 untreated acres had to be hoed twice at the $1.75 per hour rate; resulting in an average cost of $31.30 per acre. The wide difference in the cost and ease of weeding treated beets against untreated ones made a believer out of Ed.

Altogether he has 580 irrigated acres on his farm. He also raises beans, alfalfa and corn. Last year he fattened 300 head of yearlings in the feedlot. He maintains a small cow and calf herd to pasture his beet tops and corn roughage.

Melvin Schauermann of the Hurley area, Fort Morgan, Colo., uses good farming methods to raise 20-ton sugar beets but he shares part of the credit with Texas field workers who have been with him for the past nine years.

Melvin started growing beets in 1956 with only 10 acres. Due to water problems he had 12-ton crops the first couple of years, later averaging 15- to 16-ton per acre.

In 1970 his 94 acres averaged the above-mentioned 20 tons—a point reached through steadily improving his farming methods. Melvin uses a five-year rotation which includes 20% of his land in beets annually.

While proper and timely use of water and fertilizer has helped, he says members of the Leon Gomez family have really pitched in to average more than 20 acres per worker hoeing the beets. And this average held up ever since Leon's family learned the ropes in the spring of 1962.

Melvin plants four acres of cucumbers, which he shares on a 50-50 basis with the Gomezes. This adds to their income and gives the whole family work until time to return to Texas just before school starts in the fall.

With this type of treatment the Leon Gomez family are expected back again this spring on the Schauermann farm. —Bill Jones, Agriculturist

Fort Morgan Factory District
Sugar beets are the only agronomic crop which has evolved and developed during the recorded history of man. By the time the main sugarbeet industry was developed in the United States, European plant breeders had developed sugarbeet varieties which allowed efficient and economical sugar extraction.

This very rapid evolution of sugar beets was greatly enhanced by the development of the polariscope which could be used to determine the percentage of sugar in a solution. By the early 1900's, sugarbeets, about as we know them today, were in existence. From the time the GW Agricultural Experiment Station was founded in 1910 by Asa C. Maxson, sugarbeet breeding occupied a portion of the efforts of the Station.

Sugar beet seed for the infant U. S. industry was supplied for the most part by European firms until after World War II. Some small quantities of domestic seed were grown in the U. S. during World War I and in the 1930's; during and since World War II, the whole U. S. industry has supplied its own seed.

In the early 1900's, efforts for the development of sugarbeet varieties in the U. S. were made, first, for adaptation of the European varieties to U. S. conditions and, secondly, toward development of the domestic sugarbeet seed industry so that the industry would not have to be dependent on European sources. Further, European firms failed to supply varieties with the disease resistance required in America.

The pedigrees of some Great Western varieties trace back to plantings made in 1910. The efforts in sugarbeet breeding or selection in the early years led to the development of several adapted varieties which were highly productive but lacked leaf-spot resistance.

Beginning in 1937, when Dr. H. E. Brewbaker joined Great Western, a concerted effort was made to develop varieties which had production as well as cercospora resistance to counter the periodic attacks of leaf-spot in the Colorado-Nebraska growing district.

Upon initiation of this rather ambitious project, European plant breeders, as well as a considerable number of American scientists, assured Dr. Brewbaker that development of a highly productive leaf-spot resistant variety was impossible. Scientific studies conducted by the Station, however, indicated that there was absolutely no adverse correlation of leaf spot resistance and productivity.

The leaf-spot resistance breeding program continued through the 1940's and culminated in the late forties and early fifties by the introduction of some very highly productive sugarbeet varieties which had enough cercospora resistance so that the epidemics of leaf-spot were no longer a factor in production in Colorado and Nebraska.

Breeding was also done for the production of varieties adapted to conditions where cercospora and curly top resistance were required. Bolting resistant varieties for the northern area were also produced.

In 1951, shortly after the introduction of these cercospora resistant varieties, new facilities were built at Longmont to house the Great Western Research Center group of scientists.

The next landmark in Great Western breeding history was the introduction of the monogerm character into the leaf-spot resistant varieties. Although Great Western plant breeders and other plant breeders had searched for a sugarbeet plant which had monogerm seed, beginning before 1910, none of the findings bred true for the character.

It was after World War II when two Russian scientists—Dr. and Mrs. V. F. Savitsky—came to America, that the monogerm character was found in domestic sugarbeet varieties. These monogerm beets did indeed breed true, and it was possible to use them in breeding programs. Through the use of the backcross technique, the monogerm gene was introduced into GW varieties; beginning in 1960, after only ten years of work, highly productive monogerm varieties were available for Great Western growers.

During this period of the development of leaf-spot resistant and monogerm varieties, corn breeders had demonstrated the great success which could be obtained through the hybridization of inbred lines. All through the years, beginning in the 1930's, a few inbreds were being developed by sugarbeet breeders in the U. S., but sugarbeet breeders were at a loss as to how they might eventually be used.

The discovery by Dr. F. V. Owen, a U. S. Department
of a character called cytoplasmic male-sterility which allowed the production of races of sugarbeets which were 100 percent male-sterile, cleared the way for the production of hybrid sugarbeets.

The plant breeders at Great Western, beginning in 1950, started the initiation of inbred lines on an extensive scale. During one year in the late 1950's, Great Western had about 10,000 inbred lines under consideration in the program, ones which they had developed themselves. At no time during the 1950's and 1960's did the number of inbred lines with which they were working drop below 6000.

Lines have been developed from widely varying sources because it is known that hybrid vigor is best expressed in hybrids between material from different sources. Great Western chose as its source material open-pollinated varieties which were adapted to the Great Western areas plus recognized varieties from all over the world.

The large problem confronting a plant breeder when so many inbred lines are available from which to select the eight or ten or twelve lines which may eventually be the parents of hybrids is the problem of sorting and making certain that the best ones are selected. The initial screening of inbred lines takes place in the inbred nursery which is planted to seed from self pollination. It includes selection for agronomic type as to the shape of the crown, freedom from sprangles, and root shape. Quite often, the inbred lines are tested for disease resistance even though the disease resistance of the source material is known.

The costly and time consuming part of the screening program is determining the ability of an inbred to produce superior hybrids. After an inbred line has reached a certain degree of uniformity and stability, generally after the third selfed generation, it is placed in a top cross test.

To get seed for the top cross test, the sugarbeets are interplanted with a particular red leaved, red-rooted beet which allows expression of this dominant characteristic in its hybrid. The seed harvested from the sugarbeets lines, when planted in the field, produces hybrid plants which can be identified by their red leaves.

The initial decision as to the performance of an inbred in hybrid combinations is the performance of this red beet hybrid. Plants from those lines which prove to have high combining ability with the red beet are increased for further study. The selection at this stage is generally at the intensity of five to seven per hundred lines tested.

Following selection from a top cross test, the inbred is further tested by crossing it with other inbreds. Thinning of the specific hybrid trials is particularly tedious inasmuch as the red hypocotyl or stem marker gene is used for identifying hybrids.

The next major test is the male-sterile test in which inbreds are hybridized with one another, utilizing cytoplasmic male-sterility. By this time, sufficient seed of the various inbred lines has been obtained, and the ones selected as being highly productive are increased toward the eventual commercial production of hybrids.

The criteria for selection in all hybrid trials are yield of beets, sugar content and processing quality, measured by a coefficient called "percent purity." Laboratory facilities are available at Great Western for determining thin juice purity, which is a juice purity comparable to the juice purity obtained in the factories.

The process involves purification of the juice with lime, the subsequent acidification and filtering and the eventual determination of the percent sugar on total dry substance. This coefficient is particularly important inasmuch as it is a direct measure of the factory extraction which can be expected from a particular variety or line. Hybrids are also tested for their storability, disease resistance and bolting resistance.

During and following male-sterile hybrid testing, the seed of selected lines is multiplied in the Oregon seed production area. Hybrids are also made on small acreages in Oregon. These small scale or, as we call them, semi-commercial hybrids are made with the same seed lots as will go into the production of commercial hybrids, and the performance of semi-commercial varieties should in every way be comparable to the performance of commercial hybrids.

Following production testing of the semi-commercial hybrids, commercial plantings of the best performing ones are made in the seed fields of Arizona and Oregon. Testing of the commercial varieties continues as a control on the quality of the seed.

Landmarks on the way to Mono-Hy
Figure 1 diagrams the method of producing a commercial hybrid variety of sugarbeets. This is called a four-way hybrid or a double-cross hybrid which is comparable to that used in hybrid corn production. As can be seen from the diagram, four inbred lines are required for the production of the four-way hybrids. Lines A and B are monogerm, "O" type, with line A being the male-sterile equivalent.

The hybrid between these two is male-sterile and serves as a seed parent in the commercial hybrid; the hybrid between lines C and D is produced by planting the two lines in alternate rows. The hybrid between C and D, which is multigerm, is mixed with the monogerm, A x B parent to constitute the stock seed for commercial production.

All the A x B seed, which is monogerm when harvested in the commercial field, will be hybrid and can be easily separated from the multigerm pollinator seed by using thickness grading with the cylindrical slotted screen. The production of hybrid seed is a rather simple process after the inbred lines have been selected.

During the past five or six years, Great Western has introduced hybrid seed which is called top cross hybrid seed. Hybrid vigor has been partially exploited during the period in which the complicated testing of lines has taken place for the production of four-way hybrids. Essentially, these top cross hybrids are hybrids between the monogerm, open-pollinated variety that was being grown and some of the better inbred lines.

The year 1971 is a landmark in the plant breeding efforts of The Great Western Sugar Company inasmuch as a sizeable quantity of new sugarbeet brands called Mono-Hy will be distributed to growers. Mono-Hy varieties are pure varieties which have shown superiority in trials and will be issued separately rather than being placed in blends. They are the product of 20 to 30 years of sugarbeet breeding work by The Great Western Sugar Company and only the beginning of better things to come. Our trials indicate that Mono-Hy A1, C1 and D1 are superior varieties and perhaps even adapted over wider areas than Great Western.

Great Western hybrid varieties will eventually be available to people other than growers of Great Western, and it is hoped that the fruits of this work can be shared with sugarbeet growers throughout the world.

Mono-Hy Proves Out in Field Performance

By Dr. Alvin W. Erichsen
Senior Plant Breeder
Great Western Research Center

- Hybrids that have proven to be superior in variety tests will be available to growers in limited quantities in most Great Western areas in 1971. The purpose of this article is to provide performance data on the new GW Mono-Hy varieties.

The hybrid GW Mono-Hy A1 is adapted to areas in Colorado, Nebraska and Kansas where the type A hybrid blends are suitable. In variety strip trials and in the USDA leaf spot nursery at Fort Collins in 1970, it was superior in leaf spot resistance to most other A-type hybrids. In Ohio variety tests in 1968, it was more susceptible to leaf spot than the highly resistant E-type varieties included in the test.

A summary of the performance of GW Mono-Hy A1 at Longmont, Fort Morgan and Gering in 1968, 1969 and 1970 is shown in Table I. In the table, the Mono-Hy variety is compared with the performance of the GW hybrid blend on the same locations and years. All data are recorded in percent of GW761-60R, which is genetically similar to the most recent A-type open-pollinated varieties grown in GW areas. The hybrid blend is made up each year by mixing several new hybrids together; the relatively small amount of remnant seed from the previous blend is also added. Consequently, improvement in the blend has been, and will continue to be, gradual. In contrast, GW Mono-Hy A1 is a single variety, and it will have the same genetic composition from year to year. Variation in its performance in trials was caused by differences in location and effects of changes in weather conditions from year to year or small experimental error which occurred in all experiments to some degree. The mean performance of a variety over several years and locations is much more reliable than performance at any single location and year.
Table I compares the varieties in root yield, sucrose content, thin juice apparent purity and recoverable sugar per acre (assuming immediate processing of the beets). Thin juice apparent purity shows what the purity of the factory juice will be after it is purified as much as possible prior to evaporation and sugar crystallization. It is important to have a high purity for efficient and profitable sugar extraction. Even small differences in purity affect processing considerably.

Recoverable sugar per acre calculations are based on the percentage of the gross sugar that can be extracted in a factory (assuming no pile storage) which, in turn, is determined by purity and sugar percentages. Recoverable sugar per acre is not necessarily a measure of the economic value of beets. Varieties having high root yields may have high recoverable sugar per acre even when sucrose and purity percentages are low. From such varieties, the processing costs per unit of sugar would be high.

The data in Table I clearly show that GW Mono-Hy A1 is superior to the type A hybrid blend in root yield and recoverable sugar per acre. The varieties are very similar in sucrose and purity percentages with possibly GW Mono-Hy A1 having the edge in sucrose content and the blend being slightly higher in purity. As expected, the blend has improved in performance since 1968 and should continue to improve.

In Table II, GW Mono-Hy A1 test results at Ogallala, Nebraska are summarized, along with four semi-commercial hybrids that have strong resistance to Cercospora leaf-spot. The area often has considerable leaf-spot, but in 1970, there was not enough to affect yields or sucrose percentages. The data are again presented in percent of the performance of GW761-60R. The general condition of the test was quite good, as was indicated by relatively low statistical measures of error variance. The data show GW Mono-Hy A1 to be an excellent variety for the Ogallala area under the test conditions in 1970. The semi-commercial hybrids 69MSH141 and 69MSH144 were about equal to GW Mono-Hy A1 in performance, and they have good leaf spot resistance. Semi-commercial hybrids are produced by the same method as commercial hybrids except on a smaller scale, and commercial productions of them should perform in the same way. The varieties 69MSH113 and 69MSH116 are E-type varieties which have strong leaf-spot resistance but are less productive than most A-type varieties when leaf-spot is not severe. As the more resistant A-type varieties become available, the area where E-type varieties are needed will be reduced and eventually eliminated in Colorado, Nebraska and Kansas.
GW Mono-Hy A1 was also tested at Goodland, Kansas in 1970 where it performed about the same as in Colorado and Nebraska (Table III). It was included in a semi-commercial test that is not as extensive as the general variety tests, but the results indicate the variety is adapted to Kansas as well as Colorado and Nebraska.

In Table IV, the new GW Mono-Hy varieties C1 and D1 are compared with the 1970 D-type blend. Results in the table are recorded in percent of A436, a multigerm variety originating in Europe that has been used as a check for several years. The GW varieties will be available to growers in their areas of adaptation on a limited basis.

The variety GW Mono-Hy C1 is a moderately curly-top resistant variety with strong bolting resistance and is adapted to the areas in Wyoming that are subject to curly top. Results in Table IV indicate it is a well balanced variety that will produce improved root yield, sugar content and purity. Curly top resistance in the variety should be adequate for the area except in extreme cases where it is unlikely that any variety could be productive. The variety GW Mono-Hy D1 performed well in Montana and Wyoming in 1970 and is an improvement over the D-type blend grown in the area. In comparing it to the blend, it will be somewhat better in root yield and significantly better in sugar content and purity. In tests conducted in 1969 and 1970, it had a lower bolting percentage than the component varieties making up the hybrid blend.

<table>
<thead>
<tr>
<th>Table III</th>
<th>GW Mono-Hy A1 Performance in the Type A Semi-Commercial Variety Test, Goodland, Kansas, 1970 (In % of GW761-60R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Yield</td>
<td>Sucrose Content</td>
</tr>
<tr>
<td>116.7</td>
<td>98.7</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table IV</th>
<th>Types C and D Varieties Montana and Wyoming Results, 1970 (In % of A436)</th>
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</thead>
<tbody>
<tr>
<td>Root Yield per Acre</td>
<td></td>
</tr>
<tr>
<td>Variety</td>
<td>Billings</td>
</tr>
<tr>
<td>GW Mono-Hy C1</td>
<td>96.4</td>
</tr>
<tr>
<td>GW Mono-Hy D1</td>
<td>96.5</td>
</tr>
<tr>
<td>GW Hybrid Blend</td>
<td>93.0</td>
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<tr>
<td>Sucrose Content (%)</td>
<td></td>
</tr>
<tr>
<td>Variety</td>
<td>Billings</td>
</tr>
<tr>
<td>GW Mono-Hy C1</td>
<td>120.1</td>
</tr>
<tr>
<td>GW Mono-Hy D1</td>
<td>114.4</td>
</tr>
<tr>
<td>GW Hybrid Blend</td>
<td>103.9</td>
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<tr>
<td>Thin Juice Apparent Purity (%)</td>
<td></td>
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<tr>
<td>Variety</td>
<td>Billings</td>
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<tr>
<td>GW Mono-Hy C1</td>
<td>102.7</td>
</tr>
<tr>
<td>GW Mono-Hy D1</td>
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<td>GW Hybrid Blend</td>
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<tr>
<td>Recoverable Sucrose per Acre</td>
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<tr>
<td>Variety</td>
<td>Billings</td>
</tr>
<tr>
<td>GW Mono-Hy C1</td>
<td>123.4</td>
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<td>115.0</td>
</tr>
<tr>
<td>GW Hybrid Blend</td>
<td>99.6</td>
</tr>
</tbody>
</table>

**mono-hy satisfaction guarantee**

During the 1971 crop year, if you are not entirely satisfied with MONO-HY brand monogerm hybrid sugarbeet seed, The Great Western Sugar Company will refund to you the difference in price between the MONO-HY brand and its regular GW brand of monogerm hybrid sugarbeet seed.

**NOTICE:** This guarantee is made available only to growers who have sugarbeet contracts with the Great Western Sugar Company.

The Great Western Sugar Company
P.O. Box 5308 T.A./Denver, Colorado 80217/(303) 893-4600

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What's Different In These New Ones?

By R. R. Wood
General Manager
Beet Seed Operations

● With the discovery and development of cytoplasmic male sterility in sugar beets by F. V. Owen, it became possible to produce hybrid sugar beets on a commercial scale.

Trials the past several years give a clear indication that beet growers can be assured of greater productivity by the use of new hybrid varieties being prepared for introduction after many years of intensive inbreeding and testing of large numbers of possible combinations.

A grower may well inquire "what is different in these new ones—I have been using seed labeled "hybrid" for several years and it has given good production—now you are talking of even better production. Just what is the story?"

A bit of history at this point may serve to answer this very pertinent question. At the outset of the breeder's capability of producing hybrids, certain decisions must be made as to the avenues to be followed:

1. Should the breeding be done at the normal chromosome (diploid) level or at the increased chromosome (polyploid) level?

2. Should mixed sterile populations be used or closely bred populations resulting from a tedious inbreeding process be the objective?

Since the inbreeding program offered, ultimately, a more satisfactory end product, it was adopted as a basic method. However, certain quick improvements seemed possible by use of mixed sterile populations, hence this method was used to take quick advancement of a 5 to 10% increase. Certainly a good stop-gap while the many years necessary for production and testing of hundreds of thousands of inbreds and hybrid combinations were being endured.

There is no intent here to indulge in genetic details and principles, except to say that the methods used to bring about the developments described here very closely parallel the classical and well proven methods associated with the development of hybrid corn (called maize in most areas outside North America.)

The advantage of cytoplasmic male sterility in producing sugar beet hybrids is that it constitutes a positive control of pollination. The initial productions of hybrid corn required a hand operation to de-tassel; a costly item in production. Now a similar sterility factor is used in corn hybrid production and in many other crops. The genetic sterility factor for pollination control can be a mixed blessing—witness the tremendous corn crop losses in 1970 from a fungus attack called "Southern blight". In this case, susceptibility to the disease is carried along with the sterility factor in the female parent.

It may be of interest to the beet grower to follow the course of production of a variety of sugar beet from breeder's seed to the commercial seed processing facility. The practices used in processing and preparation of beet seed to be issued to the grower will not be considered here. The responsibility of the plant breeders in the seed development program usually extends into the area of advice and counsel in commercial seed production. The point of his departure in actual handling of material is when he hands what is usually called "stock", "foundation" or "breeders" seed to the commercial seed production firm. As a general rule, this quantity is so small that an increase must first be accomplished.

In our operations this may be accomplished in three geographical locations, by over-winter planting in the Willamette Valley in Oregon, by transplanting of stored roots in the area adjacent to our Longmont, Colorado, research headquarters, or, by transplanting roots in a number of mountain valleys in the vicinity of Glenwood Springs, Colo. The latter location allows a maximum of isolation for production of some of our inbred lines that are highly self-sterile and hence are highly susceptible to contamination by any stray pollen.

Usually the first crosses of inbreds, where multi-parent hybrids are the objective, is conducted in Oregon where a highly favorable climate for the purpose is to be found. Commercial size increases from the above crosses are then made in Oregon and Arizona areas. It is at this point that we have two methods available to us for production of the final hybrid monogerm product:

1. Multi-germ pollinators may be mixed in proper proportion with the sterile type monogerm and planted by usual patterns. 2. Monogerm pollina-

R. R. Wood
tors are planted in alternate strips with the sterile Monogerm typed and destroyed after pollination has been accomplished.

Sugarbeet seed is produced under contract between the grower and the seed processor in the same concept as a beet grower produces beets for a sugar processor. It is an attractive crop for growers, from a returns viewpoint, but requires special equipment and know-how for certain phases of the operation. Proper cultural practices, weed and insect control, are very essential to succeed in beet seed growing.

The two production areas—Arizona and Oregon—differ markedly in climate and require careful consideration of commercial varieties to be produced at either place. Lower temperatures in Oregon, for example. This means that varieties requiring more dormancy for vernalization (initiation of seed stalk production) can be grown there but would fail in Arizona.

One other side of the problem, however, is that the wet and cool Oregon climate tends to foster certain fungus diseases on susceptible strains, and may limit the growing of certain parental types in that area. Fortunately, up to the present time only a few of the long-term inbred lines have shown such susceptibility and it is a diminishing problem in first cross and subsequent generations.

The foregoing rather limited discussion of beet seed production problems in general leads to the crux of this article—the production and distribution of our new Monogerm hybrids being introduced for the first time in 1971 under our new "Mono-Hy" label. These represent the answer to "what is different in these hybrids". Essentially, these new varieties represent combinations of inbred lines, closely bred over many years for certain desirable characters and put into proper combination after many years of testing.

These are now "coming to the surface" and exhibiting remarkable production capabilities—both in replicated variety trials and in "strip" trials on grower fields. This latter phase of testing will be considered separately.

Our distribution of "Mono-Hy" varieties will be changed from the traditional practices followed in introducing new varieties. With good reason, in the past new variety numbers have been blended with current inventory; so, the step-up in productivity was gradual over a period of years.

Now, the new "Mono-Hy" varieties will be distributed under variety designation. This allows growers the opportunity to become familiar with varietal characteristics, and at a future time—when a choice of acceptable varieties is available to him—he should be able to know the one or ones which best suit his farm and kind of farming.

It also allows both grower and processor the opportunity of taking immediate advantage of increased productivity by variety, to the limit of available seed supplies. It should be obvious from the discussion of seed production methods at the first of this article, that a 100% supply for all growers the first or even the second year is an impossible task. For 1971, at least, supplies will be rationed and all growers given the opportunity to share.

For 1971, only three Mono-Hy types will be available. These are Type A for leafspot areas, Type C for curly top areas, and Type D for Northern areas of Montana and Wyoming not susceptible to any particular disease problems. Numbers to fit the other areas of our company's operation will be available as soon as proper hybrid combinations can be worked out and tested. Indications are that both B & E types will be available soon.

Since we cannot, at the outset, supply an entire crop of Mono-Hy varieties, the standard hybrid blend, including the yearly improvement, will be available and make up the predominant quantities available for distribution. This pattern of introduction of a new variety is very similar to that used for introduction of Monogerm seed—the last major break-through in sugar beet breeding in several decades.

Processing and sizing will be as in the past, eliminating any necessity of plate changes in present seeding equipment. Everything possible is being done to assure the highest possible germination in each lot processed. In the processing scheme, if an odd lot falls below standard it is withheld and re-run to bring it up to an acceptable level.

**Grower Trials—Final Step**

- The final step in our beet seed breeding and evaluation is grower strip trials. This has been alluded to in other articles of this issue. Some of the objectives and procedures need to be clarified for our readers.

  First, it is one thing to conduct well-controlled, replicated variety trials. These provide the reliable statistical handle for the plant breeder and others concerned with variety development. But what is the result when these are placed in growers' hands and a crop produced under actual farm conditions? This is where the strip trial enters the picture.

  Small commercial productions of the hybrids are produced for testing. These usually are one to two thousand pounds in size. The candidate varieties are processed and sized to fit standard size drill plates. Ten-pound lots of as many as a half-dozen varieties are sent to each factory district. Upon occasion more than one set may be supplied. Factory agriculturists select a cooperating grower who agrees to plant each variety in a strip through his field in such a way that it can be harvested for yield and sucrose content.

  Usually this is in 6-row strips of multiples of that width. The strips are planted in succession and grown with the growers normal cultural practices.

  At harvest time beets from either full strips or a measured footage are specially identified and delivered to the receiving station in the normal way. Additional sugar samples are taken and thus yield and sugar performance of each variety can be calculated.

  The list of grower-cooperators in the entire GW area for 1971 is some what lengthy and cannot be given entirely here. Certainly all contribute significantly to the progress in sugar beet breeding. All growers involved in this effort in 1970 have previously had our appreciation expressed to them for their interest and efforts, and want to repeat here this writer's thanks for their participation.
Eaton
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: H. H. Pappenheim, 8,147; Victor Leffler, 7,819; Wilbur Miller, 7,513; Robert Schnell, 7,442; Larry Conger, 7,948; Leonard Michal, 7,540. Back row: Charles Leffler, 7,819; Vernon Conger, 7,948; John Leffler, 7,819; Ronald Pappenheim, 8,147; Richard Wilhelm, 7,479; Marvin Brinkman, 7,631; Richard Cantrell, 7,715; Charles Winter, 7,461.

Greeley
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: John Alles, 7,686; Fred Winters, 7,669; Don Ulrich, 8,267; Pete Croissant, 7,364. Back row: Harold Swanson, 7,358; Richard Tribelhorn, 7,353; Robert Cowherd, 7,593; Lynn Ottoson, 7,186; Ray Lesbuck, 7,358; Robert Lind, 7,236.

Loveland
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: H. W. Kurtz, 7,072; Albert Harding, 7,142; Martin Hamilton, 7,085; Paul Waag, 7,353; Harold Morgan, 7,172. Back row: Clarence Weichel, 7,731; LeRoy Waag, 7,229; Thomas Pitcher, 7,649; Fred, Harold and John Schroellin, 7,404; Frank and Donald Nygren, 7,111.
Longmont
HI-TEN
Front row, from left, with figure for pounds of sugar per acre: Arthur Adler, 7,874; Wallace Lebsack, 7,268; William Freaufl, 7,279; Roland Wiest, 7,357; Arthur Garcia, 8,245. Back row: Walr Nygren, 7,649; John Shultz, 7,476; Waldemar Frederiksen, 7,144; Walter Mayer, 7,435; W. D. Bell, 7,239.

Brighton
HI-TEN
Front row, from left, with figure for pounds of sugar per acre: Harold Han 7,791; Ted Zimbelman, 7,600; Edward Dill, 7,514; Herman Huwa, 7,516. Back row: Roy Hori, 7,437; Adolph Lebsa 7,954; Dave Weimer, 8,328; John Ghumm, 7,750; Dale Hepner, 7,455; F. L. Boulter, 8,531.

Fort Morgan
HI-TEN
Front row, from left, with the figure for pounds of sugar per acre: Melvin Schauermann, 7,853; Harry Shoemback, 7,618; John Holbeck, 7,755; T. E. Luft, 7,527; Fred Wahlert, 7,526. Back row: William Pofitz, 7,551; Richard Lippe!, Russell Gahagen, 7,896; Edward Stack, 7,667; Fred Weller, 7,492; Jack Shoemaker, 7,618.
Sterling
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: John Gareis, 7,030; Sam Karg, Jr., 6,879; Albert Albrandt, 7,216; Jack McLavey, 7,460. Back row: Edward Raffaeli, 8,280; Earl South, 7,842; Victor Hessler, 7,157; Clifford Bennett, 6,984; Russell Krueger, 6,955; Ted Ruf, 6,936.

Ovid
HI-TEN

Front row, from left, with the figure for pounds of sugar per acre: Mike Alvarado, 7,126; Don Haldeen, 7,067; Harold Bieber, 7,022; Harold Haldeen, 7,067. Middle row: Norman Frates, 7,824; Ronald Schiel, 7,474; Albert Neubauer, 7,807; Willard Rhoades, 7,033. Back row: Mike Kimberly, 7,255; Charles Steward, 7,025; Max Soper, 7,747.

Kemp
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: Edwin Deeds, 6,487; Carl Dvorak, 6,308; Dale Stevens, 6,490; Leon Silkman, 6,955; Melvin Sall, 6,763. Back row: Robert Irvin, 6,798; Dannie Weaver, 6,453; E. E. Morrell, 6,933; Edward Meissinger, 7,626; Arthur Johnson, 6,308; D. M. Daily, 6,572.
Scottsbluff
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: Russell Dougherty, 7,167; D. R. Reichert, 7,526; Dave Stricker, 7,814; Edward Vogel, 8,126; Stanley Reisig, 7,788. Back row: Harry Schmidt, 7,236; John Bauer, Jr., 7,652; Loyd Reisig, 8,003; W. O. Barbour, 7,734; Theodore Hara, 7,167.

Gering
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: Conrad Hoff, Jr., 7,798; Wilford Kaufman, 7,833; Carl Schmidt, 7,925; Howard Allison, 8,021; Donald Colson, 8,495. Back row: Wilbert Ruppel, 8,635; John Abel, Jr., 7,786; George Bott, Jr., 8,064; Kenneth Schleicher, 7,706; Harold Ruppel, 8,24.

Bayard
HI-TEN

Front row, from left, with figure for pounds of sugar per acre: Herman Andreas, 7,647; Harvey Eirich, 7,762; George Michal, 7,420; Dale Eirich, 7,5; Myron Bauer, 7,582. Back row: Marv Ramig, 7,700; George Green, 7,672; George Karubus, 8,047; Henry Jerger, 7,737; Robert Krantz, 7,429.
Mitchell HI-TEN

Front row, from left, with figure for pounds of sugar per acre: Ray Bolzer, 7,765; Marion Hessler, 7,621; Levern Libsack, 7,717; inset, Richard Butcher, 7,452; Robert Busch, 8,000; Reuben Strauch, 7,438. Second row: Harold Kaufman, 7,765; Robert and Morris Hessler, 7,621; Alex Strauch, 7,438; James Riley, Jr., 7,925. Back row: Roland Schmidt, 8,229; Dan Hara, 7,650; Albert Strauch, 7,438; Tucker Kanno, also representing William, Harry and George Kanno, not pictured, 8,245.

Billings HI-TEN

Front row, from left, with figure for pounds of sugar per acre: E. V. and Alvin Cole, 8,099; Harold and John Lambrecht, 8,110; Raymond and Leslie Kolb, 8,349. Back row: Lawrence Steinmetz, 8,005; Donald Mouat, 7,301; Ernie Icopini, 7,514; Clarence Kolb, 8,349; Donald Gibson, 8,086; not pictured, Lawrence Bangert, 8,176.

Lovell HI-TEN

Front row, from left, with figure for pounds of sugar per acre: J. L. North, 7,004; Claude Craft, 6,598; Gary Orr, 6,286; Jerry Lewis, 6,642; Sam Hartman, 6,555; Melvin Green, 6,642. Back row: Douglas Miller, 7,004; David and George Nelson, 6,952; Winston Miller, 7,004; Riki Shimogaki, 7,129; Benjamin Hauf, 6,926; Charles Ando, 7,326; William Arnold, 6,706.
1. The Hinkhouse brothers—Bill and Rex, who produced 7,051,865 pounds of sugar in the Kemp district to rank first among the High Sugar Producers for the second straight year.

2. Robert Poitz, who produced 4,729,367 pounds of sugar in the Fort Morgan district.

3. L. E. Smith of Sterling and his sons—Stan, Les and Gene, who produced 4,480,888 pounds.


7. The Smiths in the Lovell district—Dennis, Harold and James, who produced 2,490,661 pounds.


10. Sam Kraus, who produced 1,954,120 pounds of sugar in the Mitchell district.

11. The Matsudas—Dick, Sam and Tosh, who produced 1,293,426 pounds in the Loveland district.

12. James Sitzman, who produced 1,200,961 pounds in the Greeley district.

13. The Kehns—Jake, John, and Henry, front, with Conrad at rear, who produced 1,166,408 pounds of sugar in the Gering district.

14. Alex Reifschneider, who produced 1,101,360 in the Scottsbluff district.

15. The Tanaka brothers—Rocky, Bob and Dick, along with Sam, not pictured, who produced, 1,024,535 pounds of sugar in the Longmont district.
An inventor as well as a grower, Frank Barnes of Longmont displays his own herbicide incorporator he built several years ago.

Beets and beef are the key to the successful farming-cattle feeding operation run by Frank Barnes, east of Longmont, Colo.

Frank has learned a lot since the days when he delivered his first 20-acre sugarbeet crop to Eaton factories in 1934. He had just started farming 100 acres on his own that year and in his own words, "My air castles were bust when that first beet crop brought 4½ tons to the acre."

That was a very dry year, but even with water the Coloradon was unable to do much better than 13 to 13½ tons over the next five years.

Then in 1939 he moved to Longmont and better soil. Since that time his beets have averaged from 18 to 20 tons per acre. As a matter of fact, his 1970 crop was better than 20 tons with 17.3% sugar.

Frank farms 440 acres, about 180 acres of which are beets. He raises corn, alfalfa and small grain for cattle.
Beet growers can have a high return on their beet tops by recognizing their value as a feed for ewes. Norval Evert of Goodland, Kans., has no question concerning his tops. He has 300 acres under irrigation including 150 acres of sugarbeets and 100 acres of corn.

Norval purchased 1,100 unbred Texas ewes on Sept. 1, 1970. They are four to six-year-old sound-mouthed ewes costing $17.50 delivered from San Angelo, Texas.

When the ewes arrived he fed them green chop corn to prepare them for breeding. After two weeks on this feed, the bucks were put with the ewes and placed on beet tops the last week in September. Later they were fed on a ration of beet tops and corn stalks until Jan. 15. He likes to fence 40 acres of beet tops and 40 acres of corn stalks in a unit.

On Jan. 15, the flock was taken to the lambing sheds and corrals. The ewes were fed one pound alfalfa hay per day plus all the chopped beet tops they can eat.

The lambs began arriving early in February. This ration is fed until the ewe-lamb pairs are sold. Norval plans to sell them about April 1 and will receive $32 to $35 per ewe-lamb pair.

Labor requirements are few during the fall and early winter, with temporary fencing the only necessity until lambing in February.

After marketing an 800 head ewe-lamb flock in 1969, Norval recognized the valuable market he had for beet tops and increased his flock for 1970.

In summary, 150 acres beet tops, 100 acres corn stalks, and 40-ton alfalfa hay will maintain a 1,100 head ewe flock for seven months. Anyone with a pencil can easily calculate a return from feed and labor in excess of $16,000.

—Don Lindshield, Agriculturist
Kemp Factory District

Evert and his Ewes

feed. His cattle operation began in 1946, with about 150 heifer calves fattened. Today he feeds more than 900 head.

These include about 225 each of yearling heifers, heifer calves, steer calves and steers. The object is to hit the market at different times of year, to average out the best possible profit.

Frank usually silos his beet tops. This practice helps regulate his feed with a minimum of waste and cleaner fields after harvest. The cattle are fed beet pulp pellets.

"I consider tops equal to corn silage when fed in limited amounts," Frank explains. "I feed about eight pounds of siloed tops per head per day."

Chemicals and crop rotation are two practices Frank uses for control of weeds, disease and bugs. His rotation includes one year of barley, one of alfalfa, two of corn and one of beans. He uses Ro-Neet and Di-Syston on his beets and Thimet on the corn.

Weed control has the added benefit of making work easier for his field labor and thus less costly.

"The Longmont grower is a handy man with tools. Several years ago he built his own incorporator for application of insecticides and herbicides."

He incorporates dry Ro-Neet about one inch deep and reports favorable results under his particular circumstances. This chemical is put in pre-plant and then it's a matter of waiting for rain.

Frank is on the Highland Ditch Board and is working to see if water can be turned on earlier to activate the chemicals. He says ordinarily there is water in the ditches May 10 to 15, "We are trying to have enough water put in about April 15 to do the job, then it can be shut off until the regular opening."

Use of a spring-time harrow before and after thinning is part of Frank's operation. "If I get a shower and see weeds, I use the harrow as soon as the beets and moisture conditions permit." He cultivates about four times each year with the last cultivation a ditching.

Frank may be best known in beet-growing areas for the Barnes beet topper he built in 1961. He wasn't satisfied with the way tops were being saved, so he invented his own.

Lockwood is now building a lifter-loader Frank invented. This machine will have approximately a 3,000-lb. loading tank with three- and four-row units. The Coloradoan built his lifter-loader and used it for the first time in 1969. He says Lockwood also will be building the Barnes beet topper for him.

When he isn't farming, feeding cattle, working on machinery or handling Highland Ditch matters, the Longmont farmer keeps busy as a director of the Mountain States Beet Grower Association of Colorado and Kansas.
America Lorenzini, seated in front, with some of the members of his family, who all together represent four generations in sugar beets in the Weldon Valley near Fort Morgan. America is flanked by his two sons, Donald at left with his wife Judy, and Louis at right with his wife Maxine, who continue the family tradition. In the center stands America's granddaughter, Miss Gail Gardetto, a music teacher in Denver public schools. They got together at the Denver meeting last winter of the Mountain States Beet Growers Marketing Association of Colorado and Kansas.

The Lorenzini Legacy

America S. Lorenzini has been growing sugar beets for more than 60 years—ever since his father signed his first contract with Great Western Sugar in 1909.

Today America's sons and grandsons carry on the tradition, making the Lorenzinis a four-generation family of beet growers in the Weldon Valley northwest of Fort Morgan, Colo.

America also holds the distinction of being a native Coloradan who was born in Silver Plume in 1897. The Lorenzini family moved in 1909 to the Weldon Valley, where America and his brother, Joe, helped their father grow beets until his death in 1911.

That year America and Joe signed their first GW beet contract on their own. They farmed together until 1918, when Joe succumbed to the great flu epidemic. The next year America and his mother moved to the "home place" in the valley, where he still lives.

America was married in 1922 to Katie Chiara. Over the years they became the parents of five children—Donald and Louis, beet growers; Jack, superintendent of Woodland schools in Washington County; and Mrs. Charles Gardetto and Mrs. Edward Arndt.

In following their father's footsteps in sugar beets, Don farms 160 acres and Louis farms 200 acres in the Weldon Valley. They were joined just last year by three of America's grandsons—David Arndt, Louis Lee Lorenzini and Larry Americo Lorenzini, who contracted to raise beets for GW Sugar under the 4-H and FFA programs.

Meantime, America kept his seasoned hand in the beet business by contracting for 30 acres last year.
Retirement from a career of more than 40 years with Great Western Sugar came on March 31 for John D. Edmiston, senior agricultural executive of the company.

Edmiston, director of agricultural development at the Denver office, was granted early retirement at his own request. His departure was announced by President Robert R. Owen, who added:

"John was a popular emissary and persuasive advocate of the benefits of the sugarbeet crop for family farms and farm communities. Over the years, with his friendly way of work, he won the lasting affection and admiration of literally thousands inside and outside of the company. It almost goes without saying that John’s unique personal touch in our agricultural affairs will be sorely missed."

Edmiston’s career, beginning with the transition from horse to tractor, spanned the inventive era of the sugar-beet crop. His work included important roles in perfecting and promoting new machines and new methods to improve the productivity of beet farms.

Before he moved to his staff position a year ago, Edmiston was district agricultural manager for 13 years in Western Nebraska and in the areas near Billings, Mont., and Lovell, Wyo. Before that, he was agricultural manager from 1948 to 1957 at Greeley and Eaton, Colo., and from 1944 to 1948 at Windsor, Colo. In 1943, he was assistant agricultural manager at Brush, Colo. In earlier field assignments as an agriculturist, he worked at Fort Morgan and Longmont, Colo., and at all Great Western locations in Western Nebraska.

Edmiston began his year-around service in 1933 at Gering, Neb., but worked earlier during the sugar-making "campaigns" at the Fort Collins factory while attending Colorado A & M College, now Colorado State University. He earned his degree in botany there in 1933. A native of Pennsylvania, he was raised and schooled in Pueblo, Colo.

Edmiston and his wife, Phyllis, plan to continue living in Denver.

Fond Farewells to John and Bob

Retirement came in February for Robert G. Barton, who became a fixture of the field staff in the Gering district during his Great Western career of 34 years.

Bob was an agriculturist at Gering for the past 20 years. Earlier, he served for seven years with the field staff in the Scottsbluff district. He began his sugar career in 1934 in the sugar factory at Gering, working as superintendent’s clerk for six years.

For many years the Gering agricultural force consisted of Bob and his brother, Sam Barton, Jr., who retired in 1969 from a Great Western career of 35 years. The Barton boys were known over the years for their captivating smiles and cheerful humor, along with their close knowledge and long experience with the sugarbeet crop. Their father was one of the pioneer homesteaders in the Valley and one of the first beet growers in the Nebraska district.

At the time of his retirement, Bob was the subject of a feature article in the Scottsbluff Star-Herald. It noted that in his 28 years in the field Bob took part in several major improvements in beet productivity in the Valley and saw yields climb from 15 tons per acre to 20 tons or more.

Bob and his wife, Marjorie, will continue to make their home in Scottsbluff.
Your target: $342 an acre—
a reachable goal for sugarbeet growers in 1971

Where do we get that cash crop figure—$342?
From the 18.5 tons to the acre most growers can produce with today’s better seed and better techniques. And—from an $18.50 per ton price projected by two knowledgeable experts, Richard W. Blake, Executive Vice President of the National Sugarbeet Growers Federation and Robert R. Owen, President of The Great Western Sugar Company. Their joint statement quoted in the January 19 Denver POST says:

“We see a real possibility that total cash returns to growers for the 1971 crop could exceed $18.50 per ton of beets of long-term average sugar content, based on current sugar prices and recent market trends.”

That brings us to the magic formula:

18.5 tons x $18.50 = $342.25

Ask your GW Agriculturist about the new MONO-HY monogerm hybrid sugarbeet seed variety, approved for your use by the Grower-GW Joint Research Committee. Check the results of field tests that enable GW to offer it with a guarantee of satisfaction. Use as much MONO-HY as you’re allotted in this, the first year of its availability. Then work toward a yield of $342 per acre—or more.

THE REACHABLE GOAL.

Great Western Sugar Company
P.O. Box 5308
Denver, Colorado 80217

mono-hy
monogerm hybrid
SUGARBEET SEED

ADDRESS CORRECTION REQUESTED
The Great Western Sugar Co.
P.O. Box 5308 T.A.
Denver, Colorado 80217
Since the last issue of this publication, a number of organizational and personnel changes have been made in The Great Western Sugar Company. All were made in an effort to streamline and modernize the operation of the Company. The organization of the general office at Denver now consists of five major functional groups, each of which is headed by a senior vice president who reports to President George Wilber, Jr. Mr. Wilber’s stated purpose in combining each functional group under a senior executive was the delegation of responsibility and authority to the executive for more effective operation of his group.

The primary objective of the Company will be that of helping improve the profitability of the beet sugar industry. This relates to the grower through the improvement of his financial position by increasing his sugarbeet acreage, yield, juice purity and sucrose content. Sugar companies will benefit as a natural result of the improved position of their growers. A second objective is to generate, among growers, increased interest and commitment in the production of sugarbeets on a continuing, long-term basis.

Both of these objectives can be attained through opening up and maintaining effective channels of communication between Company and growers. Only in this manner can growers be made fully aware of the excellent resources available to them to aid in their operations. And only in this manner can the Company remain fully aware of the needs and desires of the growers.

Communications can also work in other ways. Day-to-day contact with growers is the special responsibility of our Agriculturists. Through effective communications we can supply these men with the information and technical expertise they need to assist growers in practical beet production. This can be done through: 1) Written information; 2) personal presentation to BOTH growers and agriculturists; and 3) specific training seminars for Agriculturists.

To open an important avenue of communication from growers to the Company, we are planning frequent visits to the field by members of the Denver general office staff for the purpose of visiting personally with growers. In addition, we will ask our men in the field to report regularly on comments and ideas expressed by growers, especially on those aspects of beet production or beet receiving where improvement is needed. In this way, we hope to obtain and disseminate information that will benefit other growers and Company operations.

By meeting these objectives through these specific programs, we hope it will become evident to growers what we firmly believe: That with close cooperation and harmony between growers and The Great Western Sugar Company, the production of beet sugar can be increasingly profitable for everyone.
The Essence of Change

GEORGE E. WILBER, JR., President
The Great Western Sugar Company

Change is an exciting word. It represents new ideas, new things, new techniques, new methods, new names, new faces; and it stands for the American way of life. Without change, our amazing country would not be a world leader today; Henry Ford and his competitors wouldn’t have been able to begin a revolution in transportation; our astronauts wouldn’t be the first human beings to tread the rocky face of the moon; and man wouldn’t be traveling through the air at nearly 600 miles per hour in the comfortable seat of a luxury airliner.

In the business world, change often causes consternation. Those locked in their tight grooves of “doing things this way just because we’ve always done them this way” are shocked at change. Theirs is the easy way, the comfortable way. They are secure in the knowledge that they know their business forward and backward, from stem to stern. What they don’t realize, or won’t accept, is the fact that the world is changing around them, and change with it they must—or fall behind and be trampled in the rush of modern times.

At The Great Western Sugar Company, the need for change is recognized. Systematic changes, improvements, have been called for and are being made. New agricultural methods to enable growers to produce more efficiently and profitably are a must: These include improved seed, new herbicides and insecticides, new irrigation methods, and improved machinery. New processing methods for beets must be found. New uses for sugar must be discovered, and new markets for new and old products must be searched out and exploited. There is a crying need to do more, grow more, sell more, and MAKE more. If we don’t there is no doubt that others will.

Beginning with this issue, the official name of the external house organ published by The Great Western Sugar Company has been changed to “UPBEET”. The new name combines a modern, contemporary ring with identification of the subject to which it is solely devoted. Its purpose is described in the subtitle, “A magazine for progressive sugarbeet growers”. Every effort has been made in this issue, and will be made in those of the future, to provide information which will be of use to growers in producing greater tonnage, more sugar per acre and higher juice purity.

To “change for the sake of change” is worthless, but change for improvement is vital. To improve, we must accept the fact that exchanging out-dated customs and methods for newer, more efficient ways is in order. We urge you to change with us, and grow with us.
Proper Harvesting Means Greater Returns From Your Beets

With the technical advances in harvester design made in the last few years, there isn’t much question as to whether most of the crop can be gotten out quickly and in good shape. But squeezing every dollar of profit out of sugarbeets depends upon proper maintenance and operation of harvesting equipment.

If you haven’t already checked your equipment to determine what parts will be required to allow operation through another season without breakdown, now is the time! When harvest time rolls around, anxiety to get the crop to the receiving station as early as possible often causes needed repairs and adjustments to go begging. As a result, growers sometimes settle for less than all of the crop, leaving part of it in the field. Improper maintenance of the harvester is certainly one of the items that can cause loss of a portion of the crop. Unfortunately, the part that is lost is the portion that would have cost the least to harvest.

FACT: You know you are going to have to operate the harvester over every row in the field — so your operating time is already set. If the machinery is poorly adjusted or maintained so that beets or parts of beets are left in the field, cost remains the same, but marketable product — what you get paid for — is reduced.

Harvester Operator Important

Another very important key to harvesting the whole crop is the harvester operator. He is responsible for staying on the row and making sure that the machine is properly adjusted. He must maintain the proper operating speed, proper depth, and proper adjustment of the lifter wheels or puller points and elevator chains, taking soil type and condition into consideration. He can increase or reduce tare by his ability to control the harvester. The degree of his attention to these details means the difference between harvesting all the beets or losing tonnage ... and profits.

Awareness Half The Battle

If the grower is aware of problems that may occur, half the battle is won. Following, in capsule form, are the eight biggest and most common causes of harvest losses:

1. Harvester off row.
2. Operating harvester too fast.
   A. Finder will knock beets over.
   B. Finder cannot react quickly enough for high and low-crowned beets, resulting in poor topping.

3. Finder itself not properly adjusted.
4. Finder not operating freely. Linkage between finder and topping knife may be binding.
5. Cutting edge of topper knives or discs dull or improperly sharpened.
6. Beet lifter, shovel-type or wheel-type, improperly adjusted. Marketable beets will be left in the field.
7. Harvester not maintained and greased for operation. Many times something as simple as a loose nut can cause the harvester to top or lose beets improperly.
8. End rows in field not harvested.

As a final tip toward better harvesting, growers who have installed cleaners on their harvesters, either commercial or homemade, report they have materially reduced the amount of dirt they haul to the receiving station and they are enjoying lower tares.

The chart printed below showing losses in tons per acre has been published before, but Great Western feels it bears repeating as an excellent reminder of how much can actually be lost overall from seemingly small losses per beet.

<table>
<thead>
<tr>
<th>Total Beets Per Acre</th>
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<tbody>
<tr>
<td>Losses Per Beet</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Per 100 Ft.</td>
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<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>1 oz.</td>
</tr>
<tr>
<td>2 oz.</td>
</tr>
<tr>
<td>3 oz.</td>
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<tr>
<td>4 oz.</td>
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</table>
Most businesses involve a certain amount of gamble. But you won’t find successful businessmen stacking the cards against themselves if they can help it. Yet, that’s what a sugarbeet grower is doing when he “guessimates” the amount of nitrogen his crop will need—he is betting against some pretty long odds.

If he guessess wrong and puts on less than he needs, he won’t get optimum yield. If he puts on more than he needs, he loses money in two ways: First, by the cost of the extra nitrogen that he applied but didn’t need; and second, by the lower payment he gets for his beets as a result of reduced sugar content. At today’s prices, an increase of just one percentage point in sugar content (one degree of polarization) grosses the grower approximately $1.45 more per ton of beets.

Physiologically, sugarbeets will always take up nitrogen when it is available in the root zone. When nitrogen is available, the roots grow and new leaves develop. The sugar which is produced by photosynthesis in the leaves is used with the nitrogen for plant growth. Only when nitrogen becomes deficient in the plant late in the growing season will any appreciable amount of sugar be stored. The most satisfactory conditions for sugar accumulation exist when there is little or no nitrogen available to the crop during the last four to six weeks before harvest. The sugarbeet plant then slows its rate of growth, yet continues to synthesize and store sugar.

Research from every sugarbeet producing area in the United States supports the above statements.

A University of Nebraska report, for example, indicated that in one case where soil was deficient in nitrogen, sugarbeets yielded 13.9 tons of roots with 16.1 percent sugar. Total sucrose production was 4,000 pounds per acre. Where an adequate amount of nitrogen was in the soil, yield was 28.8 tons of roots, 15.3 percent sucrose and a production of 8,800 pounds sucrose per acre—more than double that from the deficient field. When an excess of nitrogen was applied, the root yield was 33.8 tons but with only 11.8 percent sucrose and a total sucrose yield of 8,000 pounds per acre. This was 800 pounds less than where an adequate amount of nitrogen was supplied in the soil. The grower had to dig and haul five tons more roots to the dump, his payment for the crop was lower, and the sugar company had to process more than five additional tons of beets to get the same amount of sugar.

Fortunately, it is no longer necessary for the grower to guess at the proper rate of nitrogen fertilizer to apply. A low cost soil test and the small amount of time needed to gather the soil for the test are all it takes to eliminate almost all of the guesswork. When the soil analysis has been completed, figuring the amount of nitrogen needed is a simple chore. If the grower needs help, any Great Western Agriculturist can help him arrive at the proper figures.

### Nitrogen Sources

To understand the reasons for soil testing and proper nitrogen application, it is helpful to know where sugarbeets get their nitrogen.

**Soil Organic Matter.** A major supply of soil nitrogen is tied up in the organic portion of the soil. The bulk of this N is in a relatively stable form, which is slowly converted to available forms by soil microbes. An old rule of thumb says, for each percent of organic matter present, 30 to 40 pounds of N become available for crop use annually. In general, though, a release of 30 pounds N per each percent organic matter is a satisfactory estimate.

**Residual Mineral Nitrogen.** This is the ammonium and nitrate nitrogen present in the soil. Ammonium is converted to nitrate by microbial action. This nitrate is mobile and is subject to loss by leaching during periods of heavy rains or irrigation. In the past few years, research has shown that high concentrations of nitrate may build up in many western soils. It is not unusual to find 150 pounds of nitrate N per acre present in the top foot of an irrigated field; nor is 400 to 500 pounds per acre in the top five feet uncommon. Other fields may have virtually none. These differences must be taken into account when planning a fertilizer program.

**Barnyard Manures.** There are many reasons why barnyard manures are desirable in a fertility program, but they complicate the prediction of needed additional fertilizer nitrogen. Barnyard manures are highly variable in their nitrogen content. The classical figure given is 10 pounds of N per ton of manure, but not all of this will be available the first year. It is generally recommended that manure not be applied to the soil going into beets. The decay of organic matter early in the season ties up the nitrogen, resulting in a deficiency of N to the crop. Later in the season, when decay stops, available nitrogen is released and provides an excess toward the end of the growing season. This is just the reverse of what is desired in good nitrogen management.

**Previous Legume Crops or Plant Residues.** If the previous crop was a legume, or if beet tops were
plowed under, some additional N will be available for
the crop. This N becomes available much more rap­
idl y than that released from the relatively stable
organic matter. There is no way to predict precisely
such releases, but as a general rule, we suggest de­
creasing N fertilizers by the following amounts in
these situations:

Following alfalfa ..........Decrease by 80 lbs.
Following clover ..........Decrease by 30 lbs.
Following beans ...............Decrease by 30 lbs.
Beet tops plowed under ..........Decrease by 30 lbs.

Using Soil Test Figures

After the grower has received the results of his soil
test, he can use the following table to figure the
amount of nitrogen he will need for proper yield and
sugar production.

The recommendations in the table below are for
sufficient nitrogen to produce a 20-ton crop of beets
under normal conditions. If a farmer sets some other
yield goal, he should add or subtract 10 pounds N per
acre for each ton per acre difference in yield goal.
Thus, for a 25-ton per acre yield goal, he should add
50 pounds N per acre to the value in the table.

EXTREME CAUTION SHOULD BE USED IN
FIGURING REQUIREMENTS FOR YIELDS
ABOVE 21 or 22 TONS PER ACRE. IF SUCH A
GOAL IS BEING CONSIDERED, PROCEDURES
RECOMMENDED IN THE NEXT SECTION
SHOULD BE FOLLOWED.

### Basic Nitrogen Recommendations for Sugarbeets Based on Soil Nitrate and Organic Matter Levels

<table>
<thead>
<tr>
<th>N03-N Soil Test Value PPM</th>
<th>0-0.5</th>
<th>0.6-1.0</th>
<th>1.1-1.5</th>
<th>1.6-2.0</th>
<th>2.1-2.5</th>
<th>+2.5</th>
</tr>
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<tbody>
<tr>
<td>0.0-6.0</td>
<td>180</td>
<td>165</td>
<td>150</td>
<td>135</td>
<td>120</td>
<td>105</td>
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<tr>
<td>6.1-12.0</td>
<td>160</td>
<td>145</td>
<td>130</td>
<td>115</td>
<td>100</td>
<td>85</td>
</tr>
<tr>
<td>12.1-18.0</td>
<td>140</td>
<td>125</td>
<td>110</td>
<td>95</td>
<td>80</td>
<td>65</td>
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<td>18.1-24.0</td>
<td>120</td>
<td>105</td>
<td>90</td>
<td>75</td>
<td>60</td>
<td>45</td>
</tr>
<tr>
<td>24.1-30.0</td>
<td>100</td>
<td>85</td>
<td>70</td>
<td>55</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>30.1-36.0</td>
<td>80</td>
<td>65</td>
<td>50</td>
<td>35</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>36.1-42.0</td>
<td>60</td>
<td>45</td>
<td>30</td>
<td>15</td>
<td>0</td>
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<tr>
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### Split Applications

High yields require more nitrogen than low yields.
Unfortunately, if sufficient nitrogen is applied for a
high yield, which for some reason is not attained, the
crop quality will suffer from the extra nitrogen. Suc­
rose percentage will decline and the operator will
likely produce less total sugar than if he had applied
nitrogen at a lower rate. The best way to avoid this
situation is to split the nitrogen into two applications.

It is suggested that the early application be suf­
cient to grow an 18 or 19 ton-per-acre crop. If the
crop gets off to an early start with a good stand, an
additional N required to grow a 24 or 25 ton crop can
be applied by sidedressing. However, care must be
taken that the sidedress application is not applied to­
late. Unless the crop is early enough for early side­
dressing, the high yield will probably not be attained
and the sidedress application will not be needed.

### Deep Testing May Be Useful

Deep soil testing is not currently a widely ac­
thorit y practice, although it may become common in fu­
ter years if current studies show deep tests to be neces­
sary for accurate recommendations. There is no ques­
tion that many soils have available nitrogen down as
far as five feet. Research is being conducted to see if
the nitrogen content of the top foot of soil is suffi­
ciently correlated with the total soil so that accurate
recommendations can be made from the usual 12-inch
test. If it is proved that there is not a dependable cor­
relation, deeper tests will be called for.

One reason cited by proponents of deep testing is
that sugarbeet roots grow several feet deep, giving the
plant access to nitrogen which does not show up in
the 12-inch soil test. In cases where leaching has cau­
sed layers of nitrogen at lower levels, fertilizer recom­
mendations from shallow soil tests may be inaccurate.

Analyses from deep tests undoubtedly give a over­
all picture, and there is nothing to stop the grower from
making deep tests, if he wants to be sure he is not wasting money through excessive nitrogen
applications.

Routine analyses made at a soil testing labora­
tory will provide determinations of pH, soluble salts, liq­
uid content, organic matter, nitrate-nitrogen, texture,
available phosphorus, potassium, zinc and iron.

What actually happens to the soil sent in for test­
ing? The following pictures, taken at the Colorado
State University Soil Testing Laboratory, tell the story.
Reception room at the CSU Soil Testing Laboratory. Holding the telephone is Barbara Riker, Receptionist-Secretary. In the background are two of the ladies who make the actual analyses—they are identified in later photos. G. W. Hergert, in charge of the laboratory, was unavailable for a photo.

Arriving soil samples are placed in paper bags, assigned a number and tested as quickly as possible—usually within a week. About 50,000 determinations are made annually, which include soil tests, plant analyses and irrigation water analyses.

After the samples are thoroughly air-dried, they are put through this mechanical grinder which reduces them to a degree of fineness that will pass through a 2mm mesh screen. Shown operating the grinder is Mrs. Phyllis Geary, Junior Research Technician.
Small samples of the soil are carefully weighed out and put through various tests.

Exact amounts of extracting solution are measured into 12 glass containers at one time by this piece of equipment.

Mrs. Vi Crockett, Junior Research Technician, tests for available zinc and iron using the Atomic Adsorption Spectrophotometer, which sprays small amounts of the test solution into a flame. Meters then provide a reading of the amount of zinc or iron present.

To check the pH of the soil, a saturated paste is made of the soil and distilled water. A reading of the pH of the paste is then taken by this machine.

The glass containers are then put into a mechanical shaker, which shakes them for up to two hours, depending upon the test they are to undergo, and then the solution is poured through strainers into other containers.

Then the water (extract) is drawn from the paste by applying vacuum, and placed in an electrical conductivity cell in this machine. An electric current is passed through the extract, and the amount of salts present are read as a measure of its conductivity.
Marcia Clayton, Laboratory Assistant II, adds distilled water and ammonium hydroxide to a soil sample in preparation for the nitrate determination.

As she begins a test for organic matter, Mrs. Geary adds potassium dichromate and concentrated sulphuric acid to a soil sample. It is allowed to stand for 10 minutes, then distilled water is added.

Then the mixture is placed in a centrifuge for five minutes. It is then transferred to colorimeter tubes and the amount of organic matter present is read on the Spectronic 20.

To test for available potassium, an extracting solution is made of distilled water, ammonium acetate, acetic acid and ammonium hydroxide. This is added to the soil sample, shaken for five minutes and filtered. The extract is then placed in this machine, called a Flame Photometer, and the amount of available potassium present is shown.

Editor's Note: The description of the steps in the various tests have been oversimplified in the interest of brevity. Also, two of the tests usually run on all soil samples—lime and phosphorus—are not shown because they involve simply the addition of certain chemicals to the sample. Readings are taken without use of special instruments.
Receiving Equipment Readied for '71 Harvest

In early summer, the ring of hammers and the sputter and crackle of welders and cutting torches signalled the annual start of get-ready work at beet receiving stations throughout the Great Western area. In October, when beets begin rolling in, new, improved and relocated equipment will be ready to accept the 1971 crop more quickly and efficiently than ever before.

Two new Silver Beet Pilers, purchased from CF&I Engineers, will go into service this year — one at the Scottsbluff Factory receiving station, and the other at the Peconic station in the Kemp factory district. Four additional used pilers have been purchased to improve receiving facilities in the Nebraska and Wyoming areas.

Improvements are also being made on pilers already in service. For instance, a number of the 15-foot hoppers on older pilers are being extended to 25 feet in order to accommodate the increasing numbers of longer-bedded trucks. Grab-roll screens have been added in some instances, hydraulic truck hoists in others, and drive improvements have been added where pilers were previously underpowered.

Several pilers have been modified this year by the insertion of a ten-inch I-beam under the frame at the base of the machines. In effect, this serves to add ten inches to the height of the dirt belt so that trucks with higher-than-usual sideboards will clear. Not all pilers have undergone this modification, so drivers should check carefully before pulling under the dirt belt to see that there is adequate clearance.

In addition to piler renovation, changes in local conditions have made ten station changes necessary. This involves the relocation of several existing stations to new sites, and the establishment of new stations where none had existed before.

High Capacity Scales Added

Fifteen Great Western receiving stations that must frequently weigh tandem axle or twin-screw trucks with large loads are being equipped with new, 100,000-pound capacity Fairbanks scales and new scale houses. The 10-foot by 60-foot decks of the new scales will even accommodate a truck and trailer combination. Exact weight is automatically punched on a card at the touch of a button, and weighing time will be speeded up considerably.

Waiting Time Can Be Cut

Although everything possible is being done, with budget limitations, to keep receiving equipment in top operating shape, it is still a safe bet that truck drivers will be spending time in line at receiving stations occasionally. This is partially due to the nature of the sugarbeet harvest itself, but here are some tips for growers and truck drivers from Great Western Agricultural Managers that can help keep waiting time to a minimum.

1. Install spring-loaded sideboard lifters. Although the company makes every effort to station men at the front and rear of the truck to perform this chore, sometimes labor is not readily available. The spring-loaded lifters are especially helpful to feminine drivers.

2. Before harvest begins, inspect all truck boxes to see that the boxes are in good condition; that the hooks and hangers on which the box tips are in proper working order.

3. If the box is to be dumped both directions, be sure that both sides are unbolted and free so that it will lift properly.

4. Drivers should be careful to see that pitchfork scoop shovels and other items commonly used in the field are not left in the truck bed to be covered with beets and eventually dumped into the receiving hopper. These items can cause lengthy shutdowns by tearing belts and jamming receiving equipment.

5. Drivers should be ready, when their turn comes to drive their trucks onto the dumping platform, receive their dirt, and move on out to the scale as quickly as possible.

6. Clean, properly topped beets carrying a minimum amount of dirt and trash will unload the truck box more quickly and reduce tare.

7. If your harvest plans indicate you will cause a sudden overload of trucks arriving at a single receiving station, the Agriculturist should be notified in advance so that the receiving station crew can be "beefed-up" to handle the overload.

Although it is important that dumping progress be rapid and as smoothly as possible, speed is much less important than the safety of all concerned at Great Western receiving stations. When working around heavy equipment, the possibility of serious or even fatal injury is always present. Seconds count — but lives count more!
Modifications on this pile, located at the Stegall Station in Nebraska, include lengthening the hopper, installation of a hydraulic truck lift, and the addition of an electric boom drive.

In order to accommodate the new longer-bedded trucks, many piles are having their hoppers lengthened to 25'. The mechanic in this photo is David McGuffey, son of W. C. McGuffey, General Manager of the Nebraska District. During the winter months, David is a student at Montana State University, Bozeman.

The pile on the left has been modified by the insertion of a form-inch 1-beam under its frame, which adds ten inches to the height of the dirt belt and allows trucks with high sideboards to clear. Machine at right has not been modified.
Are Nematodes Costing You $87 Per Acre?

The difference was so obvious it looked like two different fields, yet the 14 rows of stunted sugarbeets in Dwayne Weiss' otherwise good-looking field had been planted at the same time as the rest of the crop. They had received the same fertilizer, same irrigation, the same overall treatment as the rest of the field, except for one thing—they weren’t fumigated last fall.

“This wasn’t an intentional check strip,” commented Dwayne, “I’ve been convinced for a long time of the value of fumigating for nematodes and I don’t bother with check strips anymore. But when we planted this field last spring, we unintentionally went past the edge of the fumigated area with those 14 rows and the nematodes sure took advantage of the opportunity!”

Dwayne farms just east of Scottsbluff, Nebraska, and he contracted with the GW Grower Service Center there to apply 18 gallons of Telone per acre to his field last fall. It was put in with chisels spaced 18” apart and apparently provided very effective control. The land on which the 14 stunted rows were planted had been fumigated for two years.

Because of the experience of Dwayne Weiss, and similar experiences by dozens of other sugarbeet growers, it isn’t difficult to understand why fumigation is recommended as a standard practice by Great Western. This is especially true of fields with a history of nematode problems and where beets follow beets in the crop rotation.
$87 Net Increase

If Dwayne's yield is about average for the area, he'll realize approximately $87 per acre more from his fumigated beets. Here are the economics:

Beet yield with fumigation (19 tons @ $18.50) ........................................ $351

**Best yield without fumigation (12 tons @ $18.50) ................................ . 222

Average per acre cost of fumigant applied (Telone) ...................................... $42

Net increase on fumigated acre .................................................. $ 87

*Price based on minimum return, including Sugar Act payments, forecast jointly on January 14, 1971, by the executive vice president of the National Sugarbeet Growers Federation and the president of The Great Western Sugar Company. Such prediction was made for "beets of long-time average sugar content, based on current sugar prices and recent market trends." Actual returns per ton of 1971-crop beets, which can be higher or lower than $18.50, will depend on actual sugar content and on actual sugar prices in the marketing year to end September 30, 1972.

Average yield gain on fumigated sugarbeets is seven to nine tons per acre.

Shell D-D and Dow Vidden-D fumigants will also provide effective nematode control. Whatever fumigant is used should be put down approximately 12 inches deep with chisels, or in the bottom of the furrow when using plow down methods. The soil should be sealed during the application process, or immediately after.

If one of the fumigants is to be applied, any one of five methods may be used: 1) Fall plow down; 2) Fall application with chisels; 3) Spring plow down; 4) Spring application with chisels; or 5) Fall or spring bedded and applied with chisels.

Fall Application Best for Fumigants

Great Western scientists recommend that fall application of fumigants be practiced whenever possible, primarily because soil moisture conditions at this time are usually better than in the spring and better control results. Fall application has other advantages—the grower usually has more time for such jobs in the fall, and fields can be planted in the spring as soon as weather conditions permit with fumigation already out of the way.

If fall fumigation is out of the question for some reason, however, it can be done in summer, winter or spring as long as the soil moisture is fifty percent or less of field capacity. It is imperative that the ground be sealed immediately after fumigation to prevent loss of the material through the surface.

Temik Registered

A new contact nematicide, Temik, was recently granted approval for use on sugarbeets by the Environmental Protection Agency and will be available for use next spring. Recommended dosage rate is two to four pounds active ingredient per acre, applied in a seven-inch band at planting and incorporated in the soil as thoroughly as possible. Temik kills nematodes by contact only, and has no fumigating action. It therefore must be in place at the time eggs hatch and before the nematode penetrates the sugarbeet plant.
Life Cycles Explained

Two types of nematodes affect sugar beets, the False Root-knot Nematode and the Sugarbeet Cyst Nematode. Both can have serious yield-reducing effects on beet crops when sufficient populations are present, especially when combined with other stresses such as hail and disease. The following diagrams are presented to illustrate the life cycles and feeding habits of the tiny round worms.

Life cycle of the false root-knot nematode

A. Eggs in the soil contain larvae which pass through one moult within the egg and hatch as second stage larvae when temperature and moisture conditions become favorable.
B. Second stage larvae enter roots of sugarbeet plant where they feed and begin to mature.
C. The feeding process of the larvae produces galls inside of which are the developing females.
D. Females reach maturity and begin depositing eggs outside the plant roots.
E. Males, upon reaching maturity, migrate from the root tissue into the soil.

Life cycle of the sugarbeet cyst nematode

A. Cyst in soil is the body of a female filled with eggs.
B. C. Some of the eggs in the cyst hatch when in the presence of root exudates of susceptible host (sugarbeet) and second stage larvae emerge, migrate to roots of host plant and enter through the cuticle—usually somewhere near the active growing point of the root.
D. E. Larvae feed and grow, passing from second to third stage larvae. Sexual differentiation begins.
F. G. Larvae pass from third stage to fourth stage at this time, females begin to burst through the cuticle (f) while the males, which are now vermiform (resembling a worm in shape), are still encased in the fourth larval cuticle.
H. The adult female remains attached to the root and continues to feed. Eggs are deposited outside the female at first, but later the eggs will remain within her body and soon completely fill it. At the end of the life cycle, the female body, filled with eggs, becomes a cyst.
I. Upon maturation, the male escapes from the plant and enters the soil. The male remains in the soil for periods ranging from a few days to several months. During this time, fertilization of the female takes place.
Harvest is only a short time away, and a lot of buying decisions will be made within the next few days. Many tired, used-up harvesters, toppers and defoliators will be replaced with shiny new equipment ready to head for the field. As a service to growers who are still planning purchases, we asked the equipment manufacturers to provide photographs and information on their latest models.

Their response was more generous than anticipated, but to the extent that our space will allow, here is our 1971 harvest equipment review. The order in which they are listed is in no way meant to indicate preference.

**Farmhand builds two defoliation models**, which they claim are the sturdiest and heaviest in the industry. Both are available with either double or triple rotors, and with or without scalping knives. The Model 811 is 90" wide, and the Model 810 is 128". Scupper lift makes it easy to turn while defoliating, and hydraulic shock absorbers keep scalping knives steady. A special "finder shoe" guides the hardened knives to cut just the crown of the beet, whether high or low.

**Farmhand's 812 Harvester models** will lift three 28" to 30" rows, four 22" to 24" rows or two 42" beds. A wrap-around bed chain prevents mud build-up in the machine and helps clean beets. The manufacturer claims the Model 812 will move through 20-plus tons per acre at six mph, and its 2,000 lb. capacity tank makes it handy for opening fields or changing trucks on the move. Standard features include heavy-duty lifter struts, elevator hood, four cleaning rolls, and three heavy-duty safety clutches.

**The John Deere 231 Beet Harvester** is adjustable, will harvest two 22" to 40" rows or three 22" to 24" rows at operating speeds between three and seven mph, claims the manufacturer. The tank holds 7,500 lbs. of beets. High flotation tires help in muddy fields. Optional and extra equipment includes grab roll attachment, depth frame topper, row-finder, rock springs for lifter wheels and bed-row posts for harvesting two rows per bed if the rows are at least 14" apart.

**The John Deere 432 Lifter-Loader** is said to harvest three rows of 22" through 32" beets or four 20" to 24" rows at three to seven mph. Wheel tread width is adjustable to match various row spacings. A row-finder and grab roll cleaning attachment kit are among the items of optional or extra equipment.
John Deere's 461 Topper-Windrower will handle four or six rows. It is available as a knife-topper (pictured) or a disc-type topper. Hinged conveyor extension permits laying the tops from 8 or 12 rows in one windrow. Rear beaters remove streamers from the crowns for a thorough topping job. Finder shoes contact beets and adjust the knives or discs to take big bites out of big beets, smaller bites off smaller beets.

New Heath Defoliators are designed with a unique number one rotor housing so that foliage is sucked into the knives for better, cleaner cutting, says the company. They are equipped with 1 3/8" primary drive shafts, 110 hp gearbox, and 2" shafting on the number one rotor. They feature enclosed drives for a clean design, which permits short drives, greater belt life and easy adjustment. Available in four and six row models, with or without third drum attachments and with or without scalpers.

Heath's new 660 Beet Harvester will harvest up to six 22" rows. It is designed to utilize as few moving parts as possible so maintenance, weight, and power requirements are kept to a minimum. Cleaning is accomplished by rubber flails which eject beets from the lifter wheels and also by the high capacity, 80" wide scrub chain elevator which rolls beets as they are emptied. 1,000 RPM PTO is standard; options include elevator extension, electric clutch for main elevator, steel kicker paddles in lieu of flails and self-contained hydraulic rowfinder.

The new Heath 340 Beet Harvester is claimed to be the first tank harvester with the capability for harvesting up to four 24" rows. It is equipped with an extra-large, 8,500 lb. capacity carrying tank and features a large Rienes screen area which empties onto a 48" wide flighted rear elevator chain. Rubber flails and 1,000 RPM PTO are standard. Options include cleaning roll attachment, steel paddles in lieu of rubber flails and self-contained hydraulic rowfinder.

Hesston's new Model 35 Beet Top Defoliator will handle up to four 30" rows. Primary drum has a 1 3/4" shaft and 48 flails which cut a 23" diameter. Secondary drum has a 1 1/8" shaft and 20 rubber flails to clean off any remaining green. Third drum and scalpers are optional. Other features include all drives on one side for easy servicing, a narrow width of 114", large doors for easy access to the primary drum, and a heavy-duty 88 hp gear box.

The Hesston Model 40 Beet Top Saver is engineered to remove just the right amount of crown, regardless of beet size. Comes with either knives or discs. The Model 40 cleans beet tops in a three-stage process and will deposit up to 12 rows of tops in a single windrow.
Hesston's Model 560 Tank Harvester and the Model 495-A Direct Harvester (pictured) are claimed to be heavyweight performers. PTO, drives, shafts, bearings and belts are larger to minimize maintenance and take the strain from the new, high horsepower tractors. Structural members are of heavy gauge steel. Spiral grab rolls may be replaced with flighted grab rolls for better scrubbing action in muddy conditions. Lifter wheels are hard-faced, may be re-ribbed.

The Lockwood 1971 model 12" Defoliator features unitized construction for increased strength without excess weight and hinged access doors over the rotors. Hinged shields over drive belts exclude dirt, are easy to open for maintenance. Extra large 6½" diameter flail shafts are mounted on 2" sealed bearings and are driven with power band belts. Choice of flail shafts and direction of rotation of all rotors. Third drum and scalpers are optional, as is the choice of 540 or 1,000 RPM PTO.

Lockwood's 1971 Six-row Beet Harvester features simplified, rugged drives with no U-joints (except PTO), and chain oilers to all main drives. The beater spool has 12 flails and a rubber back-up paddle. New model has combination chain and Rienks bed, and scrapers on side Rienks stars and discs. Hugger chain elevator has been redesigned, and the cleaning rolls have been redesigned to provide three pairs of rolls. A mud conveyor under the upper cleaning bed is now available, and a larger storage hopper has been installed.

The Lockwood Lifter-Loader comes in three or four row models, which are available with grab rolls or chain conveyors. They feature simple roller chain drives throughout, and an electric clutch control on the elevator. Split steel ejection paddles are adjustable for different spacings and serve as a rim scraper. Four rows of Rienks fracture clinging dirt from beets. Rear cross chain conveyor is available for sandy soil conditions, and two styles of row finders are available to keep harvester on the row automatically.
Each year at budget time, when operating funds are being allocated at The Great Western Sugar Company, over a million dollars of those funds are set aside to finance research programs. That research is a necessary expense can hardly be questioned, because no business can expect to survive long by “riding its reputation” in today’s strongly competitive markets. New methods, new products and new markets are the basis for modern business.

Great Western research takes several directions. One is the objective of helping its growers produce more sugar per acre at lower cost. To do this, GW’s Agricultural and Technical Services Department has a number of research projects underway:

1. A combination of chemical and cultural weed control methods is being sought which is suited to the grower’s entire rotation of crops. Improved weed control will enable better use of electronic and mechanical thinners, bringing more growers a step nearer the goal of total mechanization and the elimination of the hand labor problem.

2. Insect control research is three-pronged:
   A. An extensive program is being developed which emphasizes sugarbeet root maggot and nematode control. This involves the screening of an entire series of new chemical materials.
   B. New ways are being sought to utilize the control chemicals already on the market and approved by state and federal government agencies.
   C. New ways to reduce the cost and improve the effectiveness of nematode control are being studied.

3. The development of new, improved hybrid sugar beets is of vital importance to the industry. So important that Great Western is devoting the full-time of four men with doctor’s degrees, plus a supporting staff, to this project alone. These were the men who developed high-yielding Mono-H Monogerm sugarbeet seed which was first planted on a large scale this year. A continuous plant breeding program continues the search for beets with greater yield capacity, higher sugar content, higher juice purity and improved disease resistance.

4. Research is being conducted in the area of sugarbeet nutrition—how and when sugarbeets can be fertilized to enable them to produce to their full capacity.

5. Field and greenhouse tests are being conducted with new growth regulating chemicals which change the physiological characteristics and metabolism of the beet plants and help them to store more sugar.

If these programs are successful, it could lead to the production of continuous beets, which is not now feasible in most areas due to the building of nematodes, disease and other beet parasites. One of the biggest advantages to be gained from the planting of continuous beets is the elimination from the crop rotation of less profitable crops. In other words, growers would be able to get maximum returns from their land every year.
Storage and Processing Methods Studied

GW research also takes other directions. For instance, our scientists are looking for techniques to reduce sugar loss during the time when beets are stored in piles between harvest and processing. Experiments with straw and woven plastic coverings for the beet piles are being conducted, and the use of ventilated trench silos is being checked out.

Improvement of processing procedures cannot be overlooked as a means of increasing efficiency and profitability. For instance, the quality control analytical station at the GW factory in Loveland, Colorado, will be automated for the 1971 campaign with a purity analyzer, polarimeter, refractometer, pH meter and colorimeter; all connected "in line" with the sugar manufacturing process. These instruments will monitor the quality of a) thick juice, b) standard liquor, c) high green, d) machine syrup and e) molasses. Loveland will serve as a model factory to establish the feasibility of automating quality control at all GW beet processing factories for future campaigns.

As the meat packers now utilize everything but the "squeal" of the pig, GW expects to make more complete use of beet by-products. A procedure for refining and converting either Steffen house molasses or Johnstown molasses (Borden juice) to liquid sugar through an ion exchange method is being designed.

Steffen house molasses and Borden juice contain a material called raffinose, which can be treated with enzymes to produce more sugar (sucrose) or it can be converted into three simple sugars called glucose, fructose and galactose. Currently, the GW technical staff is exploring several means by which to economically convert raffinose into saleable sugar.

In the 1971 campaign, a modern technique will be employed to more accurately determine sugar inventory. The feasibility of correlating bulk density of sugar in silo storage to the actual amount of sugar in storage by means of a "gamma probe" has been demonstrated. This method will be implemented in one of the GW silos in Windsor, Colorado, to determine bulk sugar inventory.

Great Western will also be ready, this year, to implement the necessary analytical methods for monitoring the content of factory waste streams—in the interest of controlling pollution. The purpose of this project is to assure that GW is in compliance with regulations currently being set up by the Environmental Protection Agency.

Commencing with this campaign, GW will initiate a quality control program which will aid in producing a more consistent beet pulp pellet.

Responsibility for researching new ways to improve processing procedures (like those described above) lies with the Technical Development and Service Department, whose primary duty is to provide all GW operating departments with technical support aimed at maintaining product quality and factory process control. This, in turn, assures that GW products will unfailingly meet consumer standards.

Great Western enjoys its reputation for being "Research-Minded", and fully expects to continue its leadership in the quest for greater efficiency in the sugar industry.
Chest deep in beets, young John Russell Harsh looks on proudly as his dad, L. L. "Lanny" Harsh accepts a "LABOR FREE BEETS" banner from GWS Senior Vice President, Harry Roadman (left). The banner was one of seven presented to progressive growers who used chemical weed control and mechanical thinning to minimize the use of hand labor in producing their beet crops. The Harshes farm in the Galeton, Colorado area, near Greeley. (Photo by Greeley Tribune.)
table of contents

a billion dollar enterprise ........................................... 3
better nitrogen management .......................................... 4
great westerners invade privacy of pest .......................... 7
goal of grower-gw research committee ............................... 10
gws water pollution control program ............................... 12
postplant herbicides ................................................... 14
a letter to our growers .................................................. 17
it's our environment too .............................................. 18
grower's report card .................................................... 19
planting sugarbeets to final stand .................................. 20
a new campaign .......................................................... 22
production guide distributed .......................................... 23
russian newspaper report ............................................. 24

about the cover

Production of GWS' new mono•hy sugarbeet seed requires over 1,000 acres of flowering beet plants. The cover photo shows typical male and female sugarbeet plants during "the mating season." On the left is the male-sterile female and on the right is the male pollinator. GWS produces its beet seed in the states of Oregon and Arizona.

upbeet
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UPBEET is solely devoted to the promotion of the most efficient, practical methods of sugarbeet production available to today's growers. Every effort has been made to provide information which will be of use to growers in producing greater tonnage, more sugar per acre and higher juice purity.

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It may surprise you to learn that growers for The Great Western Sugar Company and its subsidiary, the Northern Ohio Sugar Company, are a part of an enterprise that nears a billion dollars in effect on the communities in our area!

Most economists agree that money generates about seven times its original amount in total effect when introduced into a community. Therefore, the $124 million injected by our Company, multiplied by the seven factor, becomes $868 million—nearly a billion dollars. That’s about $173,600 for each of our 5,000 growers.

Of the $124 million, cash paid to growers so far for the 1971 beet crop totals $96 million; 1971 property taxes paid by the Company amounted to $3 million; and the Company payroll pumped another $25 million into Colorado, Montana, Wyoming, Nebraska, Kansas, Ohio and Michigan. All of this money eventually moves into the economy, changing from hand to hand, its effect multiplying as it is used by more and more people.

These numbers are particularly staggering considering that today fewer than 5% of America’s population are farmers, and a very small percentage of these farmers are sugarbeet growers. People in your own communities should be aware of the importance of sugarbeets to their well-being. We think it is time they were told, and are initiating our own campaign to let them know. We ask your help in relating the facts to them.

We should point out that the above figures are conservative, at best. The Sugar Act and Great Western Sugar beet payments through April 14, property taxes and payroll are by no means all of the story. To these must be added other contributions which are substantial, but difficult to calculate; such as: Freight, goods and services, and the balance of payments for the 1971 crop.

During the last campaign, Great Western Sugar employed 5,440 people, of which 2,076 were year around employees. Sales were in excess of $175 million, ranking us in the state of Colorado with such firms as Coors Brewery, Gates Rubber Company, Mountain Bell and Public Service Company of Colorado.

The future of the sugar industry, as a whole, is bright. But capitalizing on the opportunity will require a great deal from us all. For instance, we know there is a shortage in the inventory of world sugar at present, indicating that demand is outstripping supply. This shortage, in all probability, will provide higher sugar prices, which in turn should make sugarbeets an even higher-return crop. Therefore, with your help, combined with on-going research, development of new sugarbeet varieties, improved machinery and cultural methods, we believe the next decade can be one of even greater prosperity for all of us.
better nitrogen management is the golden key to higher quality sugarbeets

some revealing answers from deep soil tests

Gone is the era characterized by the late 40's and early 50's when sugarbeet yields averaged 13-15 tons per acre. With today's improved varieties, inexpensive balanced fertilizers, increased use of herbicides and other pesticides, and better cultural methods, the average sugarbeet grower in the United States can expect yields in excess of 18 tons per acre.

As sugarbeet yields have increased in the past 20 years, quality (amount and extractability of sucrose) has steadily decreased. So much so that in some instances, total pounds of sugar produced from a 20-ton crop of sugarbeets in 1971 amounted to no more than that produced from a 17-ton crop in 1951. That's an odd sort of progress!

What is responsible for this steady decline in sugarbeet quality, and how can the trend be reversed? From an examination of the records of the past 20 years, one finds two outstanding differences between sugarbeet culture today and that of 20 years ago. Could one or both of these two differences (increased use of pesticides and increased use of nitrogen fertilizers) be responsible for the observed decrease in sugarbeet quality?

nitrogen the culprit

A thorough review of the results of many experiments with insecticides and herbicides, the two most widely used pesticides for sugarbeet production, revealed that no significant detrimental differences in quality resulted from their use.

However, an investigation of the effect of nitrogen on sugarbeet quality reveals that excess nitrogen causes a decrease in percent sucrose and an increase in the amount of impurities in the sugarbeet root.

After identifying nitrogen and more specifically the nitrate-nitrogen problem, sugarbeet researchers at the GWS Agricultural Research Center and various state universities in the West developed a program to determine the effect of high and low nitrogen on sugarbeet quality.

The objectives of the program are to inventory the amount of available nitrogen in the soil profile, correlate this inventory with sugarbeet quality and finally recommend the proper amount of nitrogen fertilization to give maximum production of sugar per acre.

Fortunately, there are certain very important aspects of the effect of nitrogen fertilization on sugarbeets that are known. For instance, the graph shows the relationship between available nitrogen, yield, and percent sucrose.

As the amount of available nitrogen increases, the yield increases but the extractable sucrose decreases. It is also known that the amount of nitrogen available to the plant is maintained at a level in excess of what is needed for normal growth and development, the beet roots will fail to "ripen" or "sugar up" in the fall. As long as nitrogen is available, the sugarbeet plant will utilize it to produce new leaves and

Total available nitrogen vs. sucrose content and tons per acre.

*Some of the information for this graph was provided by Dr. John O. Reuss, Associate Professor of Agronomy, Colorado State University, Ft. Collins.
larger root. Only when nitrogen becomes deficient will the plant slow its growth and begin to store sugar. The highest degree of sugar storage is attained when the plants are deficient in nitrogen 4-6 weeks prior to harvest. During this period, if night temperatures are low (50°F) and the days warm and sunny, sugar content in the beet roots may rise as high as 20 percent. Therefore, it should be the ultimate goal of every sugarbeet grower to point his fertilizer applications at attaining a nitrogen deficient condition sometime during the middle of August.

In theory, this should be quite simple; however, in practice, it is more often than not a difficult task if the common practice of over fertilization of corn is continued and the old practice of soil sampling to the one foot depth to determine fertility levels is used.

Recent studies conducted at Colorado State University, the University of Nebraska and the GWS Agricultural Research Center show that soil sampling to one foot to determine nitrogen fertility levels is highly inaccurate. These studies showed that in many instances, prospective sugarbeet fields contained as much as 600 pounds of available nitrogen in the form of nitrate in the top six feet of soil. In most samplings, the bulk of the nitrate-nitrogen was deeper than the one foot level.

Studies at the University of Nebraska have shown that sugarbeets will utilize nitrogen from at least six feet deep in the soil profile and possibly deeper. The studies further indicate that sugarbeets are "lazy" nitrogen users — they extract nitrogen from that level in the soil where the nitrogen content is the highest or most easily obtainable. Therefore, under favorable growing conditions, the sugarbeet plant will continue to extract nitrogen from deeper and deeper in the soil if it is available.

These facts led researchers to reason that chronic low sugar producing fields must have a high nitrogen content somewhere in the deep soil profile. Data collected from soil samples taken to the five foot depth on fields planted to beets in 1971 indicated that their reasoning was correct. Those fields that produced sugarbeets with low sugar content still had abnormally high nitrate-nitrogen content after harvest. Those
Giddings' probe showing the operator lowering the bit into the soil.

fields which produced beets with normal or high sugar content had low nitrate-nitrogen content after harvest.

When sugarbeet fields contain sufficient nitrate-nitrogen in the top five feet of soil to produce the desired tonnage, no additional fertilizer is required or desirable. This fact has been demonstrated with consistent results, so much so that present recommendations are to take a deep soil sample (3-6 feet) and base sugarbeet fertilization schedules on the results from this total profile, not just the top 12 inches.

Figures 2-6 demonstrate pictorially the use of Giddings' hydraulic deep soil probe. This machine is excellent for taking deep soil samples because it is simple to use and easily moved from one site to another. Deep soil profiles were obtained from approximately 600 fields throughout Great Western Sugar territory this past fall and spring.

Better fertilizer management will result in larger returns per acre. Available data indicates that the best returns are obtained when approximately 150 pounds of available nitrogen per acre are applied for sugarbeet production.

more answers sought

At the GWS Agricultural Research Center, research is in progress to determine the interactions between varieties, plant spacing and various fertilizer regimes. More experiments are also being conducted on the reliability of deep soil tests and the relationship between high residual nitrate-nitrogen and sucrose content of sugarbeets. Methods for monitoring the amount of nitrate-nitrogen in the soil throughout growing season are being considered.

In the near future such questions as, "what effect do various irrigation practices have on nitrate availability?"; "how much additional nitrate is added with irrigation water from various sources?"; "can a correlation between the amount of nitrate in top 12 inches and the total profile be described and used to recommend nitrogen fertilization?" will be investigated. The answers and many more questions need to be answered, but in the interim high tonnage and high sugar content beets can be produced if nitrogen fertilization is managed correctly.
great westerners invade privacy of pest!

Last fall, the agricultural field staff of The Great Western Sugar Company's North Central Colorado district was equipped with special gear to enable them to invade the privacy of a well-known sugarbeet pest. Armed with a newly developed kit, GWS agriculturists have been peering through magnifying lenses in search of nematode cysts in the fields of sugarbeet growers throughout north central Colorado.

The nematode is a microscopic roundworm that inflicts damage to sugarbeet plants to the tune of millions of dollars each year by feeding on the roots of the plant. There is no damage to the sugar itself, but yields are drastically reduced. Although the tiny worms are much too small themselves to be seen even through a magnifying glass, their eggs are deposited in small, round sacs called “cysts” which are large enough to be seen with the help of a hand lens. The number of cysts present in a weighed sample of soil will provide a reasonably accurate estimate of the number of nematodes present in the entire field.

For example, some 40 million nematodes can be expected to be present in the top six inches of soil in one acre when four to five cysts are found in 1/4 pound of soil. That is enough nematodes to reduce the yield of that acre by seven or more tons of sugar beets, which means a substantial loss to the grower.

Fortunately, it is not necessary for sugarbeet growers to endure the heavy losses which may be caused by the tiny worms. Nematodes can be controlled very effectively through a standard soil treatment process known as fumigation. But fumigation costs the grower approximately $40 per acre and most growers are not anxious to spend that amount of money unless they have been assured that there is a sufficient population of nematodes present in their fields to warrant this expense.

Previously, the only sure method of obtaining that information was to collect samples of soil from the field and pay to have a laboratory analysis made. This was time consuming and expensive, and besides, it was difficult for some growers to believe that something they couldn’t see was damaging their crop.
The GWS nematode test kit was designed to solve those problems. In practical use, the agriculturist takes a measured sample of soil from a field, mixes it with water, pours it through a strainer and then through filter paper. He and the grower examine the filter paper with a hand lens, and count the number of cysts present. One cyst in the sample indicates the presence of about eight million nematodes per acre, two indicates 16 million, etc. From this simple, quick and inexpensive test they can determine whether fumigation would be a practical investment for the grower.

The kit was developed and approved through the combined efforts of the Research & Development Department of Great Western Sugar, the GW Grower Service Center at Platteville, Colorado, the Joint GW-Grower Research Committee, Dow Chemical Company and Colorado State University.

It consists of an attache case used to hold the following items: Two hand lenses (one of which is lighted); standard kitchen strainers, scoop and spatula; small scales; funnel; plastic saucer; filter paper; instruction booklet and other items. Everything necessary to make the nematode determination is included in a compact, easy to use and carry format.

Officials of Great Western Sugar believe the kit will be a very important factor in increasing the sugar production per acre in north central Colorado. Their surveys show that of the 55,000 acres of sugarbeets harvested in the North Central Colorado district in 1971, 30,000 acres would have benefited materially from fumigation. Only 4,500 acres were fumigated, leaving 25,500 that should have been, but weren’t.

It has been established that a grower will break even on the cost of fumigation if he obtains a yield increase of 2.4 tons per acre. In fields where heavy populations of nematodes are present, yield increases of up to nine tons have been experienced. If an intermediate figure of six tons used for illustration purposes, it would indicate that an additional 144,000 tons of beets could have been raised on the 24,000 acres that weren’t fumigated in north central Colorado.
The soil and water mixture is allowed to set for 3 to 5 minutes, and is then poured through a sieve to remove large particles of debris. The nematode cysts fall through the sieve.

dollars, this means an additional $2,500,000 gross income would have been earned by growers in the district.

Since the kits were distributed to GWS agriculturists last fall, a total of 733 nematode determinations have been made, representing some 600 fields in north central Colorado. As a result of the new awareness by growers of the nematode problem in their fields, treated acreage has jumped to 7,500 acres for the 1972 season. An improvement, but still less than one-third of the estimated 30,000 acres that should receive treatment.

For growers who would like to see “proof of the pudding” before going into more extensive control programs, GWS has initiated a “10-10-10” offer whereby the grower agrees to fumigate a half-acre strip of sugarbeet land. It costs him $10, Dow Chemical Company provides the fumigant (about $10), and the chemical is expertly applied by the GW Grower Service Center (the final $10). Fifty-seven growers have taken advantage of the offer.

As another incentive, district growers have been offered a free plow sole application kit with each 1,000 gallons of Telone fumigant they purchase. This is an excellent method of application in most north central Colorado soil types, and saves the grower an extra trip over his field.

It was previously believed that effective fumigation could only be accomplished in the spring, immediately before the crop was planted. But research now indicates that it is equally, if not more effective, if done in the fall because moisture and soil conditions are more likely to be right for fumigation at that time.

Great Western Sugar is spreading the story of nematode control among its growers, and, suiting action to words, GWS agriculturists are doing their best to invade the privacy of one of the biggest little sugarbeet pests in Colorado—the nematode.
goal of grower-gw research committee – most recoverable sugar possible per acre

Members of the Grower-GW Joint Research Committee have a common goal—to seek to obtain the greatest amount of recoverable sugar possible for maximum economic benefit of grower and Company, from an acre of sugarbeets. Committee-supported research is in addition to present independent research conducted by GWS and others.

Since the committee was organized several years ago, members have had many meetings, attended technical sessions, and traveled to other beet growing areas to observe firsthand what growers there are doing to improve the production and quality of sugarbeets.

The committee, whose membership is made up of beet growers and GWS personnel, recognizes that several factors have major effects on quality and production. Among these are stands, variety, soil fertility (primarily nitrogen), and moisture.

The committee initiates seed variety testing in an effort to assure GWS growers in Colorado, Kansas, Montana, Nebraska, and Wyoming that they have access to the best varieties available. Again this year, the committee has contracted with five state agricultural colleges to test and evaluate beet varieties—not only those that are presently being planted commercially in the five states, but also varieties from another U.S. sugar company and from foreign producers of seed.

A company wishing to enter a variety in the independent variety trials must submit performance data to the Research Committee which indicates the variety is adapted to the area where the company wishes to market the variety; it is then entered in trials upon approval of the Research Committee.

Variety tests for 1972 are being conducted in the Yellowstone Valley of Montana by Montana State University’s Huntley Station under the direction of Agronomist Don Baldridge. The trials are located on the Kolb brothers’ farm at Hysham, and Jack Benner’s farm at Park City. The University of Wyoming is conducting tests in the Heart Mountain area on the John Williams farm and Marvin Stricker is the grower-cooperator in the Manderson area; Professor Don Force is in charge. Nebraska trials are under the direction of Agronomists Frank Anderson and Paul Nordquist of the University of Nebraska’s Scottsbluff and North Platte Stations. Professor Bill Schmehl is conducting trials for Colorado State University; one is at the Ft. Collins Station, the second on Politz Farms Inc. at Yuma, and the third on the Pete Kaiser farm at Holyoke, Colorado. Agronomist John Lawler at Kansas State University’s Colby Station, is directing the tests being conducted in Kansas this year.

Trials carried out by the colleges are generally productivity type tests comparing tons per acre, percent sugar content and juice purity.

Because sugar beet varieties resistant to certain diseases have been in general use for many years, there has been little loss in GWS areas caused by Cercospora (leafspot) and curly top. The
committee believes it imperative that resistant varieties continue to be used. All varieties being tested for use in an area where disease conditions exist, or where such conditions may be expected to exist in some years, are evaluated by the USDA Plant Science Research Division at Logan, Utah, for leafspot resistance. The USDA Plant Science Research Division at Logan, Utah tests for resistance to curly top.

Total cost of the variety performance trials conducted by state universities is borne by companies whose varieties are being tested.

Another vital factor affecting quality is nitrogen fertilizer. Every grower's goal is to increase sugar content of his beets since an increase of one percentage point of sugar (one degree of polarization) will increase his return considerably. The committee feels that expanded research, and in some cases, actually funding research projects on nitrogen usage, would be most beneficial to growers and GWS. As a result of research, answers are now being found to questions posed by growers on how much nitrogen to use for optimum crop production. Continuing research is necessary to obtain maximum benefit.

The committee continues to back a project at the Northern Colorado Research Demonstration Center at Greeley in which a study is being conducted on cash crop rotations. They also hope to resolve the question of which crop in the rotation is best suited for application of manure.

The committee, in cooperation with Kansas State University and the Bureau of Reclamation, supports the demonstration work on the Leroy Evert farm at Goodland, Kansas. These demonstrations, developed by Kansas State University, are concerned mostly with water usage. They will cover water measurements—both on and off the field, furrow intake rates, soil moisture measurements, and sprinkler irrigated sugarbeets. The demonstrations are intended to answer the often-asked question, "are we making the best use of the water that is available for irrigation, and, if not, what can be done to improve water usage?"

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Money for the support of research concerning the culture of sugarbeets has also been budgeted for Montana State University, Kansas State University, University of Nebraska and Colorado State University. The projects will involve establishment of stands, nematode control, and spring mechanization studies.

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Since World War II, The Great Western Sugar Company has worked toward the reduction of pollution of all types, but water pollution has had the greatest attention. Our efforts really began with the impounding of waste lime from the process and the installation of settling ponds to remove the dirt, weeds, and beet fragments from the flume water.

Along with these efforts, we made installations of continuous diffusers, pulp dryers, and Steffens Filtrate concentrating systems to further reduce water pollution effluents. These not only reduced water pollution, but provided more efficient operations from the standpoint of cost, manpower, and extraction.

In recent years, we have been busily engaged in the further reduction of water pollution by the installation of totally closed flume water systems, eliminating the discharge of this water to the river. This program will be completed by campaign 1973.

And, finally, in the years immediately ahead of us we must look toward the total closing of our condenser water systems to approach the idealistic "zero discharge" goal which is now being considered in federal legislation.

Some numbers will help us place these achievements and goals in perspective, but first, let us define some terms.

For instance, the words "biochemical oxygen demand" (B.O.D., for short) are not apt to mean much to the average reader. Fundamentally, B.O.D. is the measure of how much oxygen a bacterial colony would need while digesting the organic material in the polluted water.

Flume water clarifier installed at Loveland in 1971.
B.O.D. is usually measured in parts per million (p.p.m.), or in milligrams per liter (mg./l.). These units are interchangeable in normal usage. It is interesting to note that the higher the B.O.D. number, the more polluted a substance is.

For further background in understanding this, sugar is the major substance that causes our wastes to be polluting. Sugar is made up of three basic elements: carbon, hydrogen, and oxygen in the proper proportions. In digesting the sugar in our waste waters the bacteria break the sugar molecule down into simpler parts, converting sugar into carbon dioxide and water which are non-polluting substances.

Now, with that behind us, let’s look at our accomplishments, using the numbers. When a sugar factory was built prior to World War II no consideration was given to water pollution. These factories poured the wastes shown in the left hand column (below) into the nearby streams:

<table>
<thead>
<tr>
<th>Pounds B.O.D. per ton beets sliced</th>
<th>Pre-W.W. II</th>
<th>By 1973 Campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flume Water</td>
<td>4.5</td>
<td>0</td>
</tr>
<tr>
<td>Pulp Screen Water</td>
<td>2.0</td>
<td>0</td>
</tr>
<tr>
<td>Pulp Silo Drainage</td>
<td>12.3</td>
<td>0</td>
</tr>
<tr>
<td>Lime Cake</td>
<td>5.5</td>
<td>0</td>
</tr>
<tr>
<td>Slurry</td>
<td>0.7</td>
<td>0</td>
</tr>
<tr>
<td>Condenser Water</td>
<td>0.7</td>
<td>0</td>
</tr>
<tr>
<td>Steffens Waste Water</td>
<td>13.3</td>
<td>0</td>
</tr>
</tbody>
</table>

These wastes have been eliminated over the years by the various improvements made to the plants. The installation of a continuous diffuser eliminated the pulp screen water. Pulp dryers eliminated the pulp silo drainage. Lime cake lagoons eliminated the lime cake slurry. Facilities to concentrate Steffens filtrate eliminated that waste. And finally, the closing of our flume water system eliminated the flume water discharge. Totaling up what we have done so far, refer to the right hand column of numbers, which totals 0.7 pounds B.O.D. per ton of beets sliced. That amounts to a 98.3% removal of water polluting effluents, a performance of which all of us can be proud.
postplant herbicides can keep that weedy hand out of your pocketbook!

Weedy sugarbeet fields reduce average root weight by at least six percent, which would amount to about 1.25 tons per acre in a 20-ton field. That’s removing dollars from the pocket of the grower just as surely as the hand of a pickpocket!

Early weed competition after crop emergence, especially under conditions of limited soil moisture, retards crop growth and root size throughout the growing season. But this problem can be solved by use of preplant herbicides and timely irrigation. This combination of practices has shown that it will almost eliminate yield loss from early weeds.

So, the task at hand now is to control late weeds, thus further reducing labor cost and increasing cash returns to the grower — which is, after all, the name of the game.

WEED COMPETITION

The natural pressure exerted on weeds by the crop, plus cultivation after thinning, are insufficient to provide clean fields at harvest. This is particularly true if irregular stands exist. Crop growth alone lacks the competitive intensity necessary to inhibit late weed germination, and the grower will begin to see pigweed, nightshade, lamb’s-quarters, watergrass and other strong weed competitors poking through the canopy of sugarbeet leaves in his fields.

Again, chemical pressure added to the combination of crop competition and mechanical cultivation will eliminate late weeds and assure season-long weed control at a reasonable cost. Timely cultivation, used with either early or late chemical weeding, supplements the program by knocking out the weeds that have managed to escape the other control methods. And there always seems to be a few of those hardy individuals.

RESIDUAL WEEDING

Today, chemical weeding is essential to the proper use of machine thinning, and excellent programs have been developed and used with very satisfactory results. However, season-long weed control with minimal hand labor and planting to stand will remain impossible goals unless growers place greater emphasis on postplant chemical weeding. Unfortunately, statistics indicate that only ten percent of the acreage in GWS territory receives a postplant chemical application.

POSTPLANT CHEMICALS

Postplant (layby and post-emergence) herbicides are soil-acting (those that are absorbed from the soil by the roots of the plant, such as Eptam and Treflan) and foliar-acting (those that are applied to the foliage of the plant, such as Pyramin, Dowpon, Betanal, Herbicide 273 and Carbyne). Postplant herbicides are more effective when used in sequence with preplant herbicides and the use of chemicals is combined with timely cultivating, thinning, and irrigation. Soil-acting layby herbicides will not control established weeds, so application must be made after early weed removal by cultivation or by a postemergence application or both.

EARLY APPLICATION

Postplant herbicides require early application to be effective.

Apply layby herbicides just as early as incorporation machines can be safely run in the field with the small beet seedlings. For continuous weed protection, Eptam should be applied before Ro-Ne breaks down and loses its effectiveness — and while beet seedlings are in the two to four leaf stage, or even earlier. Application can be made before, after thinning, whichever weed conditions and the grower’s machinery. Eptam or Treflan may be applied in a wide band between or over-the-row, or over.

Field cultivated and post-sprayed with Betanal. Note dying weeds in the beet row.
A sequence of preplant and postemergence herbicides was successfully used to control weeds through thinning time in this field. Ro-Neet was used as the preplant herbicide, followed in four weeks by an application of Betanil as a postemergence herbicide.

Sectioned rolling cultivators and power tillers do a good job of incorporating layby herbicides. Spring tine weeder and flex harrors can also be used to incorporate layby chemicals. Cultivators should be adjusted to throw some of the treated soil into the crop row to make sure chemical weed control remains effective near beet plants. Growers should be careful to avoid ditching below the depth of chemical incorporation, because overall application also prevents weed growth between the rows.

It may be necessary to repeat or split the chemical application, with a five to six week time lapse between applications, to maintain weed control when Eptam is soil-applied and applied in water runs. Thorough wetting and uniform water distribution across the row or bed are essential for effective weed control.

It is best to avoid dual soil application of Treflan and doses exceeding 0.5 lb/A active ingredient, because chemical carry-over may occur on some soil types and conditions.

Layby doses for various chemicals and soil types are given in Table 1.

![Table 1. Layby Doses for Various Chemicals Soil Types](image)

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Light soils</th>
<th>Med. Light soils</th>
<th>Med. soils</th>
<th>Med. Heavy soils</th>
<th>Heavy soils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eptam</td>
<td>2</td>
<td>2</td>
<td>2.5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Treflan</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>Eptam + Treflan (trial basis only)</td>
<td>1.5 + 0.5</td>
<td>1.5 + 0.5</td>
<td>2 + 0.5</td>
<td>2 + 0.5</td>
<td>2.5 + 0.5</td>
</tr>
</tbody>
</table>

Maturity stage at application

<table>
<thead>
<tr>
<th>Beets</th>
<th>Weeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-emergence to weeds and soil incorporated.</td>
<td>Pre-emergence to weeds and soil incorporated. Keep Treflan off beet crown.</td>
</tr>
<tr>
<td>2-4 true leaf onward before or after thinning.</td>
<td>4-6 true leaf onward before or after thinning.</td>
</tr>
<tr>
<td>Same as above.</td>
<td></td>
</tr>
</tbody>
</table>

Apply postemergence herbicides early, but not before seeding beets have their true leaves exposed ¼ to ½ inch or more. True leaf tissue is required to prevent damaging amounts of herbicide accumulating in the beet plant. Weeds must be small at application — from the cotyledonary (seed leaf) to the two to four true leaf stage — to obtain effective control. Postemergence herbicides are used primarily following a preplant herbicide to eradicate susceptible weed escapes before selective electronic thinning and to save very weedy fields from plowdown. In most cases where postemergence chemicals do not do their
intended job, it is because the application was too late or soil conditions were too dry after application. It is better to apply post-emergence herbicides too early rather than too late.

Postemergence doses for various chemicals and infestations are given in Table 2.

SEQUENCE APPLICATIONS

The application of herbicides in sequence is reliable enough for full scale field use in 1972. This practice is designed particularly for the grower who is committed to farming for the machine. Sometimes a preplant application will produce a relatively weed-free field, but this is the exception rather than the rule.

Growers who use chemical weeding, particularly sequence weeding, should expect to see some temporary crop injury, depending on conditions. But they should remember that yield and crop quality will not be affected by early crop retardation caused by chemicals. Furthermore, it has been proven time and time again that chemical weeding systems are more effective and less costly in time and money than production without chemicals.

The challenge in 1972 is to replace clean-up labor after thinning with the use of an effective postplant chemical. Soil-acting layby chemicals properly positioned after a preplant and/or postemergence application will do the job and set the stage for real progress with the residual soil-acting herbicides of the future.

Table 2. Postemergence Doses for Various Chemicals and Infestations

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Dosage Range</th>
<th>Maturity Stage at Application</th>
<th>Weeds Affected</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botanil</td>
<td>0.75-1 Lb/Ac</td>
<td>First true leaf stage (1/8&quot; and longer)</td>
<td>Crotalaria to 2-1; true leaf Kochia rosette 1&quot; in dia. or less</td>
<td>Foxtail Pigeon</td>
</tr>
<tr>
<td>Carbaryl</td>
<td>0.75-1 Lb/Ac</td>
<td>Seedlings</td>
<td>Wild Oat</td>
<td>No control</td>
</tr>
<tr>
<td>Dowpon or Basalan</td>
<td>2.25-3 and 3-4.1 Lb/Ac</td>
<td>Up to 4-leaf stage, and directed layby after 7-leaf stage</td>
<td>Seedlings only</td>
<td>No control, except when used with Pyramin</td>
</tr>
<tr>
<td>Pyramin + Basalan</td>
<td>6.12 Lb/Ac (after planting) 12 Lb/Ac (post-emerge only)</td>
<td>Same as for Pyramin + Dowpon</td>
<td>No control</td>
<td>Wild Buckwheat Smilax weed</td>
</tr>
<tr>
<td>Pyramin + Betanal (trial basis only)</td>
<td>2 to 1 Lb/Ac</td>
<td>First true leaf stage (1/8&quot; and longer)</td>
<td>Crotalaria to 2-1 true leaf Kochia rosette 1&quot; in dia. or less</td>
<td>Foxtali Pigeon</td>
</tr>
<tr>
<td>Pyramin + Dowpon + Surfactant (trial basis only)</td>
<td>3 to 2 Lb/Ac</td>
<td>First true leaf stage (1/8&quot; and longer)</td>
<td>Crotalaria to 2-1 true leaf Kochia rosette 1&quot; in dia. or less</td>
<td>Foxtali Pigeon Barnyard</td>
</tr>
<tr>
<td>Pyramin + Dowpon + Surfactant (trial basis only)</td>
<td>2 to 1 Lb/Ac</td>
<td>Same as for Pyramin + Pan</td>
<td>Foxtali Pigeon Barnyard</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Some Herbicide Sequences for 1972

<table>
<thead>
<tr>
<th>Herbicide and Sequence</th>
<th>Dosage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ro-Neet—Eptam</td>
<td>2.5 to 6 to 12 Lb/Ac</td>
</tr>
<tr>
<td>Ro-Neet—Betalys</td>
<td>2.5 to 6 to 12 Lb/Ac</td>
</tr>
<tr>
<td>Ro-Neet—Pyramin + Dowpon</td>
<td>2.5 to 6 to 12 Lb/Ac</td>
</tr>
<tr>
<td>Pre-Beta + Treffal</td>
<td>2.5 to 6 to 12 Lb/Ac</td>
</tr>
<tr>
<td>Ro-Neet—Eptam</td>
<td>2.5 to 4 to 1 Lb/Ac</td>
</tr>
<tr>
<td>Ro-Neet—Treffal—Eptam</td>
<td>2.5 to 4 to 1 Lb/Ac</td>
</tr>
<tr>
<td>Ro-Neet—Treffal—Eptam</td>
<td>2.5 to 1 Lb/Ac</td>
</tr>
</tbody>
</table>

Some herbicide sequences are employing postplant chemicals given in Table 3. Growers should consult their agriculturist and refer to the 1972 GROWERS GUIDE for detailed instructions on herbicide usage and rate of chemical application.
Dear Growers:

It has not been my pleasure as yet to meet all of you. However, having attended the annual meetings of your associations and several directors' meetings, I have, over the past nine months, come to know many of you. This has been a rewarding experience for me, and I sincerely hope that I will be able to visit many more of the fine beet growing farms in this area over the summer months.

During my first nine months in northern Ohio, we have seen several major events. In late August of last year we experienced a four-week strike which caused all growers concern since a record beet crop was due to be harvested. The crop did indeed turn out to be a record, which, coupled with a very late harvesting season, led to a hectic two week period of receiving beets. The cooperation and patience received from growers during this period was very much appreciated. The ability of the Company's agricultural department to cope with this unique situation of a record crop and warm weather greatly impressed this newcomer to the area.

Once the campaign started, it was quickly evident that processing modifications made to the Fremont facilities during the summer of 1971 had enabled us substantially to achieve the plant's rated slicing capacity. However, despite this improved slice level, our campaign still ran considerably longer than normal. The plant at Findlay experienced a series of minor operational difficulties and over the long campaign operated slightly below expected levels. We are currently focusing our inter-campaign maintenance program on these problems to ensure a return to a normal level for the 1972-73 campaign. In total, however, the campaign was satisfying considering the impact of the strike and the well-above-average tonnage.

Very recently we were given the green light to build a second thick juice tank at the Fremont plant. This will allow us to process more beets in a given campaign period and has enabled us to increase our acreage for 1972. We are very pleased with this development and appreciate the grower's support and interest in this project. (See article following.)

Now that a new growing season is upon us, we are attempting to work closely with each and every grower in order to achieve a widespread knowledge of the latest techniques and equipment. We urge you to call or visit if you feel we can be of any additional help during this crucial time in the crop year.

For our part, we will spend the summer months researching better methods of traffic control, implementing our safety, sanitation, and pollution control programs, and completing our maintenance and capital projects.

The spirit of cooperation between the growers and the Northern Ohio Sugar Company that I have seen is a great credit to both parties. However, we cannot relax, since the need for cooperation will be greater in the future due to increased pressures on all of us. I am referring to the pressures of competition, public interest, and governmental regulations.

In closing, we would like to wish you good weather, healthy crops, and a pleasant summer for you and your families.

F. Taylor Carlin, District General Manager
it's our environment too!

The Northern Ohio Sugar Company is proud of the fact that it has faced up to its moral and legal responsibilities as a good citizen and is dedicated to eliminating the pollution potential of its factories. In doing so, we recently committed an additional $1.4 million and countless man hours to our on-going program—which has already cost many times that amount.

We will describe a little later what our overall program entails but first let's take a closer look at pollution itself. Most industries and institutions cannot avoid producing one or more of the four distinct types of pollution; namely, air, water, solid waste and noise pollution.

Air pollution is defined as contamination of the atmosphere by particulate matter; such as, dust, fumes, gas, mist, smoke, vapor, odor or any combination of these. A few of the more common terms you might now hear are: Ambient fumes, gas, mist, smoke, vapor, aerosol,stack, and standard conditions.

Water pollution may be defined as the return to a natural water supply of waste waters containing ingredients that significantly degrade the quality of the water supply to subsequent users. In referring to water quality standards published by the State Department of Health, we find additional technical terms appearing: B.O.D. (biochemical oxygen demand), temperature, pH, effluent, suspended solids and so forth.

Solid waste disposal introduces more new terms: Sanitary land fills, open burning and approved incinerators. Permits for sanitary land fills are controlled by the Ohio State Department of Health, County Commissioners, and County Health Departments. Industry can no longer dig holes and bury its waste without extensive engineering studies to determine the environmental effect of the buried waste.

Noise pollution is a relatively new field of study requiring special instruments to measure the degree of pollution. The intensity of the sound source, measured in decibels, determines the period of exposure allowable under the Federal Occupational Safety and Health Act of 1970. Control of noise begins at its source. Reduction of the noise level in factories can be accomplished by isolating the noise source, requiring all new equipment to meet federal noise standards, and installing noise control devices under maintenance programs.

As you can see, the field is very broad, there are many regulatory bodies involved, many laws to interpret and comply with, and much new technology to develop.

As individuals, we tend to point the finger of criticism at various institutions and industries and call them "polluters", but pollution control is a terribly complex subject both technologically and sociologically. It must be understood that the installation of pollution control devices, though critical, reduces the capital available for plant expansions, may affect plant efficiency, quite often lowers production and increases operating costs. In some cases the required installation of pollution control equipment leaves management no alternative but to close the doors on marginal operations creating loss of jobs and community hardships.

Therefore, we must be careful not to solve one problem at the cost of creating several more. A balance must be reached and this takes time.

Northern Ohio Sugar Company is a subsidiary of The Great Western Sugar Company. Our parent corporation has a five-year capital budget of several million dollars for environmental control beginning in 1972 and running through 1976. GWS has 17 factories committed for their fair share. We have budgeted over one million dollars for environmental control in our seven Ohio facilities alone. Future plans for Findlay include the modernization of the boilerhouse, revision of the water system to reduce son waste materials, and reduced B.O.D. of the flume water by increased aeration. We are presently experimenting with new control agents but as yet have not determined their effects. We have taken noise surveys in our factories, pinpointing the source of potential problems.

Continued on page 23
You, our growers in southeastern Michigan and northwestern Ohio, have led the domestic industry in many aspects of modern sugarbeet culture. For example, we were the first to have "all" of our acreage treated with a pre-emerge herbicide.

"Many" of you have found that you can grow high yielding sugarbeets without hand thinning. "Some" of you have found that you can produce far above the factory average yields with the use of no hand labor whatsoever.

Since these techniques of growing sugarbeets are a matter of record, it is essential that the words "many" and "some" in the two preceding paragraphs be changed to "all", as referred to in the first paragraph.

Following are two reasons we believe the above statement is important:

1. Good hand labor is difficult to obtain.
2. The county, state and federal rules and regulations regarding the housing and usage of such labor continuously increases costs. Either of the above reasons is enough for each grower to make sure his operation is included in the "all" class.

We sincerely feel that every beet grower can, and must, be able to grow a profitable crop of sugarbeets with little, or no, hand labor within the next five years or forget about growing the crop.

How? The answer is in just two words — "eliminate weeds". You see, we know that by proper planting of our greatly improved beet seed it isn't necessary to hand thin our beets. The only problem, therefore, is weeds.

We are fortunate in this area since we normally get good pre-emerge weed control. Unfortunately there is an abundance of late weeds and, of course, some escape from our pre-emerge. However, in 1972, we now have post-emerge herbicides such as Pyramin, Betanal, Herbicide #273, etc., that will control a large percentage of late and escape weeds if used correctly.

If you wish to succeed in growing more profitable sugarbeets in the future, follow this recipe.

1. Careful planting to stand to fit your soil type and conditions.
2. Intelligent use of pre-emerge herbicides.
3. Early, careful and thorough cultivations.
4. TIMELY use of the proper post-emerge and layby chemicals.
5. Mechanical weed and stand reduction programs, if necessary.

We are sure that if every Northern Ohio sugarbeet grower would put into practice the above five points we would quickly reach our goal of more profitable sugarbeets with little, or no, hand labor.

Grade yourself on the above five points. How did you come out?

If we were to grade the district as a whole the following would be our conclusions.

<table>
<thead>
<tr>
<th>District Report Card</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Space Planting</td>
<td>A-</td>
</tr>
<tr>
<td>2 Pre-emerge herbicides</td>
<td>A</td>
</tr>
<tr>
<td>3 Cultivations</td>
<td>C+</td>
</tr>
<tr>
<td>4 Post-emerge and layby herbicides</td>
<td>B</td>
</tr>
<tr>
<td>5 Mechanical weed and stand reduction</td>
<td></td>
</tr>
</tbody>
</table>

1. Space planting — Coming along very well. We are being cautious and learning as we go, but definitely making progress.

2. Pre-emerge herbicides — Must give us an A or A+. In some cases a little more care should be taken in regard to the amount of material per inch of band width, but otherwise extremely good.

3. Cultivations — The Lilliston Cultivator has lifted us from a mediocre grade to at least a C+. In many instances we still don't cultivate soon enough. We should, and can, cultivate with a Lilliston when the beets are too small to see from the tractor seat.

4. Post-emerge and layby herbicides — This is the glaring weakness in our present beet growing program. We have the materials and the experience to use these herbicides. All we have to do is use them in a timely fashion. YOU MUST MAKE UP YOUR MIND AT PLANTING TIME TO HAVE THE PROPER EQUIPMENT READY TO APPLY THE PRESCRIPTION HERBICIDES TO YOUR FIELDS.

5. Mechanical weed and stand reduction — Grade B — Many growers have shown great ingenuity in this respect. Just keep using the equipment you have that works well for you under your conditions.

Not a bad report card, but it wouldn't win any scholarships. Our goal is a straight "A" average for every Northern Ohio grower. Let's get going!
The following article is written specifically about research performed in the Northern Ohio area. However, GWS research scientists agree that the general concept of planting sugar beets to final stand could well be applicable to many of our western growing areas.

Planting sugar beets to final stand is gaining acceptance rapidly by growers in Ohio and Michigan. For two years, numerous growers have been properly spacing beet seed at planting time and have eliminated hand or mechanical blocking. This saved not only the cost of blocking but also the additional seed that would have been used if the beets were blocked.

In three years of testing in Ohio, beets were spaced at planting at 3.3 to 4.1 inches and not blocked. If 100% emergence occurred there would be 360 and 290 beets respectively per 100 feet of row. However, because of 95% germination of the seed, possible problems with too much or too little soil moisture, crust of the soil, planting too shallow or too deep, herbicide or insect damage, or wind, the final stand is not equal to the number of seeds planted. A 60% emergence of the seed planted is about average for the Northern Ohio Sugar Company area.

A summary of 12 tests conducted from 1969 to 1971 is shown in the following table.

The yield was significantly higher on the hand blocked beets which had a 120% stand (100% stand = 100 plants per 100 ft. of row) while the unblocked beets had a 192% stand. But the sugar content averaged .4% higher on the non-blocked beets and this was statistically significant. Although gross sugar was 290 pounds per acre higher for the hand blocked beets, the difference was not statistically significant. Thin juice apparent purity was .5% higher for the non-blocked beets and the difference was significant. The net result was no significant difference between blocked and un-blocked beets.

In two tests in 1969 and two tests in 1971 in Ohio non-blocked beets were compared with normally blocked beets and beets that were approximately double blocked, or a spacing of about 6 inches apart. In these tests special effort was made to determine the effect of an extreme poor stand of beets on yield and quality.

A yield reduction did tend to occur when the stand of beets approached 200%, or when dropped down in the 60% stand range, but the differences were not statistically significant. Sugar content and thin juice apparent purity tended to increase as the stand decreased although only the differences in purity were significant.

**BLOCKED vs. NON-BLOCKED BEETS — SUMMARY 1969-1971**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield Tons/A</th>
<th>Sugar Content %</th>
<th>Gross Sugar</th>
<th>Thin Juice App. Purity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocked (120% Stand)</td>
<td>29.1</td>
<td>14.5</td>
<td>8454</td>
<td>92.5</td>
</tr>
<tr>
<td>Non-Blocked (192% Stand)</td>
<td>27.5</td>
<td>14.9</td>
<td>8166</td>
<td>93.0</td>
</tr>
</tbody>
</table>

**EFFECT OF BEET SPACING ON YIELD AND QUALITY**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Stand Percent</th>
<th>Yield Tons/A</th>
<th>Sugar Content %</th>
<th>Gross Sugar lbs/A</th>
<th>Thin Juice App. Purity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Blocked</td>
<td>181</td>
<td>26.3</td>
<td>15.6</td>
<td>8154</td>
<td>93.5</td>
</tr>
<tr>
<td>Normal Blocked</td>
<td>108</td>
<td>28.3</td>
<td>15.2</td>
<td>8575</td>
<td>92.9</td>
</tr>
<tr>
<td>Double Blocked</td>
<td>63</td>
<td>26.4</td>
<td>14.9</td>
<td>7889</td>
<td>92.3</td>
</tr>
</tbody>
</table>
Gross sugar was not affected by beet stand to a statistically significant degree although as the extremes of either high or low stands were approached, a reduction occurred.

It is to the best interests of growers that methods be developed for raising beets with a minimum of hand labor. Blocking beets in Ohio costs approximately $17.00 per acre and when beets are blocked by hand or mechanical means, more seed per acre is planted. By planting to stand, many growers could save the $17.00 blocking cost plus the cost of additional seed if they were to be blocked.

Planting beets to final stand in the Ohio area is feasible and can be done without too great a risk to the grower. Each grower will need to assess his beet farming operation with regard to soil type, type of tillage, machinery available for planting and soil conditions at planting time to determine the amount of seed he should plant.

As these tests indicate, there is a wide range in beet stands that will provide acceptable and economical yields. The grower needs to decide what percent beet emergence he expects to be maximum for a particular field and then plant the amount of seed that will be needed to provide a beet stand of approximately 200%. Let's assume that from past experiences and field conditions at planting time that the grower decides that the maximum emergence will be 70%. To get 200 beets per 100 feet of row, the grower needs to plant approximately 286 seeds per 100 feet, or a spacing of about 4.2 inches. A 50% emergence would provide a stand of about 143 plants per 100 feet. If adverse conditions occurred and only a 30% emergence were attained, he would still have a stand of about 86%.

Although planting beets to final stand is not as simple as it may sound, many growers have done it successfully. Last year in the Findlay factory area, for example, 40% of the total harvested acreage (approximately 4,300 acres) received no hand thinning. As more improvements are made in seed quality and seed bed preparation, we will see more and more beets planted to final stand.
a new campaign

Historically, when the words "A New Campaign" began to echo in the offices and factories of the Northern Ohio Sugar Company, a look at the calendar indicated the time of year when leaves were turning and the wind-up of another harvest season was near.

But in Fremont this year, trees were just beginning to bud, and harvest was still half a year away when the first campaign for '72 began. The change was the result of a new concept in sugar storage, initiated at the Fremont factory in the fall of 1971—thick juice storage.

All this came about because of a need to increase the capacity of the Fremont factory. But why go to thick juice storage rather than adopt the more conventional method of expanding all the processing equipment to increase capacity. There are several reasons.

First, let's look at the primary reason for increasing the slicing capacity of a factory. It is simply for the purpose of recovering the sugar from the stored beets before huge losses occur from the deterioration that inevitably results from prolonged storage.

However, if just the slicing capacity is expanded, this gives rise to another problem—what to do with the increased volume of thick juice that results from a greater slicing capacity.

Large capital expenditures would be needed to expand the equipment all the way through the factory processing steps from thick juice to white, marketable sugar.

This was avoided by continuing to process thick juice at the normal rate, while the excess is diverted to a large storage tank. By storing the sugar in thick juice form, which can be put through the final processing steps at a later date, large expenditures are not needed to increase the factory's sugar-end capacity.

There is a further advantage in that there is no need for additional concrete silos to store the granulated sugar. By the time the juice processing campaign begins, sales have reduced the volume of sugar stored in the existing silos, making room for the newer sugar.

This method of storage and operation also enables the factory to run its equipment and utilize plant facilities for many more days of the year.

The advent of two campaigns per year has not been without problems. At the beginning some minor delays were encountered. These were corrected as they appeared, but maximum flows were not attained until April 20th.

Being the first to initiate processes and innovations in the industry carries with it a large amount of pride. But unfortunately, unforeseen problems are a part of innovation. Due to the dedication and determination of the personnel at the Fremont factory, however, these problems have been overcome. A few changes remain to be made, but the "New Campaign" is progressing very well.

The newest innovation, thick juice storage, for Northern Ohio Sugar Company is another indication of favorable results which can be obtained by the Company and growers working together toward one result—more sugar per bag at the most economical cost available.

Aerial view of the thick juice storage tank at Fremont, Ohio.

During the slicing campaign of 1971-72, the factory sliced a total of 475,551 tons of beets in 10 days. Of that slice, the equivalent of 121,222 tons of beets—4,635,066 gallons of thick juice went to the juice storage tanks. At the completion of the slicing campaign, the factory had stored the silos or marketed 685,030 bags of sugar, 100 lb. equivalent. Of the juice in storage we can expect to extract about 235,000 bags of sugar for a total of 940,696 bags for this crop year.

The foregoing explanation brings us to the date of April 3, 1972, the date of "A New Campaign". The first "Juice campaign" in the history of Northern Ohio Sugar was started on this date.
Our past record is also interesting. We installed a completely closed water system in Findlay in 1956. We have installed fly-ash collectors and additional boiler capacity to reduce air pollution in this area. We have installed a closed water system in Fremont with all the tailings screened from the flume water then shredded and dried in our modern gas-fired pulp dryer to reduce solid waste disposal. We no longer discharge water from either our Findlay or Fremont systems to any stream or river in Ohio. All our industrial waste water is discharged through the Findlay and Fremont sanitary sewers.

As individuals, each one of us can also be guilty of pollution. Dropping litter in the street is a form of pollution. Burning of leaves and trash in our back yards is not only contributing to air pollution but also is in violation of the open-burning law.

Although the total cleanup of pollution may not be progressing as rapidly as we would like, we must all be patient as the development of pollution control equipment is three to five years behind the legislative standards imposed on us today.

Remember that industry is also a citizen of our community, and the Northern Ohio Sugar Company has had pollution control at the top of its priority list for several years. Perhaps our motive is a little bit selfish—because it’s our environment too!

Distribution of The Great Western Sugar Company’s “1972 GUIDE TO MORE PROFITABLE SUGARBEET PRODUCTION” has now been completed. The new booklet contains 34 pages of useful information concerning all phases of sugarbeet culture in the Rocky Mountain region, the plains of western Kansas, eastern Colorado and western Nebraska.

General categories covered by the booklet include:

- Facts about the use of herbicides, insecticides, soil fumigants and planting equipment.
- Importance of nitrogen fertilizer in relation to sugar content.
- Soil management techniques for use on soils susceptible to blowing.
- The importance of timely irrigation for maximum sugar production is emphasized, with a suggestion to use irrigation scheduling services where available.

The purpose of the booklet is to assist growers in producing sugar beets as efficiently as possible, using the latest developments and technology available. A copy of the GUIDE can be obtained by contacting your local agriculturist.
russian newspaper report indicates sugarbeet technology in ussr is bogging down

Russia is the largest producer of beet sugar in the world. Quite often there are reports on its high levels of production and modern farming techniques—not only with sugarbeets but with all other crops. A translation of the following article was brought to our attention and we thought it would be of interest.

According to a recent report in "Izvestia", a well-known Russian newspaper, there is a delay in the implementation of progressive techniques in sugarbeet production in the Soviet Union. This, the report said, is especially true of the use of pelleted monogerm seed.

"Izvestia" sent two journalists to the agricultural districts of Russia and the Ukraine to determine the reason for the delay. They talked with growers, collective farm leaders, leaders of agricultural districts and seed factory officials, as well as government officials. Those interviewed agreed that pelleted seed reduces labor requirements by 50 percent and increases yield. However, in spite of this unanimous acceptance, of the approximate 5,000,000 acres planted to sugarbeets in the Ukraine, only 37,000 are planted with pelleted seed. They hope to plant 98,800 acres next year, but the report carried an attitude of pessimism and indicated pelleted seed would remain in short supply.

Pelleted seed is produced in three factories, two in the Ukraine and one in Russia. Total production of these factories can supply only 1/100 of the seed needed.

Seed germination is low, production techniques in the factories are primitive and involve extensive hand work. Other countries have increased their seed germination more than 90 percent by the use of simple techniques like vibrating tables and airflow separators. "Our seed factories still do not have such machines," stated the assistant to the director of the All-Union Research Sugarbeet Institute in Kiev. One factory requested funds to speed production but was met with opposition from the leader of the All-Union Sugarbeet Corporation. The funds were refused. Another company has been working on the construction of a machine for pelleting seed for the past three years. To date it has not been put into production.

Production of planters is also dragging. A factory in Kirovograd has been able to deliver a planter which has an adaptor for planting pelleted seed, but specialists say it is not sufficient to do the job properly. Even this less-than-adequate planter is in limited supply and only 1,000 are available for the whole country. The factory produced one planter for real precision planting, and by planting season they hope to have eight available for use. Precision planters, the journalists determined, are not being built any faster because the Department of Agriculture is not ordering them.

A Department of Agriculture spokesman agreed that his agency could order more seeds and planters, but this effort would be ineffective in view of the weak problem. Planting pelleted monogerm seed is effective, he stated, only if fields are free of weeds—fields which have been prepared by using herbicides. Ordinarily weeding is done by hand and it is in their opinion it would be useless to plant pelleted seed under these conditions. That problem exists, he stated, because the chemical industry has not produced the necessary herbicides.

The journalists then met with the assistant to the secretary of the Chemical Industry. He told them that every time production plans are fixed on herbicides, the Government Plan removes the funds necessary for their development. Herbicides, the government says, can wait; the USSR needs more fertilizers, polymers, and organic synthesis products. So there is no date set for herbicide production. In the midst of these delays chemists have been working for eight years to produce Phenac, they hope to have it out by 1972.

The journalists concluded the report by saying the solution of bringing progress and technology in the sugarbeet industry to the USSR is complex, and will be possible only when representatives from the Department of Agriculture, the food and chemical industries, and machinery builders get together with the Government Plan of the USSR to come up with a solution through joint effort.

For the present time, however, the situation is as the title of the "Izvestia" article indicates—"but the work is not done."
THIS VOLUME IS BOUND INCOMPLETE AND LACKS:

v.60, no.2, 1972
table of contents

editorial: action oriented research ........................................... 3
the 'big four' in fumigation .................................................. 4
nebraskans look deep for nitrogen .......................................... 7
research featured in n.e.c./k. tours ........................................ 10
gws team attacks extraction problem ...................................... 12
growers comment on minimum tillage ...................................... 14
a letter to our growers ...................................................... 17
mono-hy looks good for nosco area ......................................... 18
'the only good weed is...' .................................................. 20
modern sugarbeet processing in iran ......................................... 23

about the cover

GWS has added a new symbol. Nothing can be more appropriate than to feature the sugar-beet which represents the basis for the existence of this Company and the industry — of which we are all a part. The green leaves of the beet represent research, growth and progress by GWS and its growers; and the blue circle symbolizes the unending spirit of cooperation between growers and Company. The step-by-step building of the symbol on the cover reflects the change and growth that has occurred in the 67-year history of The Great Western Sugar Company.

UPBEET

A MAGAZINE FOR PROGRESSIVE SUGARBEET GROWERS

Winter 1973

Volume 61, Number 1

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Denver, Colorado 80217

UPBEET is solely devoted to the promotion of the most efficient, practical methods of sugar-beet production available to today's growers. Every effort has been made to provide information which will be of use to growers in producing greater tonnage, more sugar per acre and higher juice purity.

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action oriented research

Research on pile storage has just started to bear fruit. Sugar losses were reduced about 20% in 29 commercial test piles during the last campaign through the use of straw and plastic pile coverings. This program is being expanded to include new experiments involving trench storage and the use of modified topping techniques to reduce rotting.

During the last two years, our seed operation was materially restructured. Latest improvements in genetic and operational seed technology can now be commercialized in a minimum amount of time. Minimum standards for germination have been increased to 90%, and the single standard increased to 95%. We are now working on even better ways to color and pelletize the seed to improve plantability and assure stands.

Discovery of genetic resistance to nematodes by USDA scientists, with GWS support, is one of the most exciting finds since monogerm seed was developed. GWS scientists are now attempting to "breed" this resistance into high sugar monohybrid hybrids. It is too early to predict the outcome, but nematode resistance is an example of the excitement that research can generate in a progressive, forward-looking company with optimistic growers.

Better herbicides are the object of a greatly intensified search. A joint field testing program with a British company for development of a new chemical that controls kochia has been underway for over two years. The new program to control nitrogen and bring about higher sugar content and purity has been well received in all growing areas. Proper management of plant nutrition and irrigation will mean more sugar in the bag and greater profits for the grower.

On the factory side, "extraction" is in the center spotlight. Throughout the sugarbeet industry, extraction has been decreasing for many years. This means increased costs and less profit for all concerned. A massive assault on extraction involving both Research & Development and Operations is underway at GWS. No stone has been left unturned by a team of experts now studying the problem. Recommendations and plans for improvement have been made for this campaign. Long range (3 to 5 years) plans are being put together now to further improve the process of sugar making and increase operating efficiency.

GWS recently entered into an agreement with the Japanese Government and The Hokkaido Sugar Company of Tokyo to test the feasibility of a new enzyme process which will — if successful — have a significant impact on future extraction rates. Sugar that now stays in molasses will go into the bag. Other opportunities and licensing agreements are being explored that may eventually increase the operating efficiency of our factories. Thick juice storage, ion exchange, time kiln modification and fuel use economics are examples of programs underway.

The future of the sugar industry is bright. But capitalizing on the opportunity will require even greater emphasis on research, development and adaptation of new technology by the grower and by the Company. The Grower-GW Joint Research Committee can be the nucleus and foundation of the new, technologically oriented Great Western Sugar Company.

by Dr. T. J. Army, Vice President Agriculture and Technical Services

Discovery and adaptation... are the by-words of Great Western Sugar's research team, headquartered at Longmont and Loveland, Colorado.

Our research staff is the largest and most experienced of any in the United States sugarbeet industry. To assure expertise in all vital areas, top specialists in several disciplines, ranging from irrigation to sugar processing, have been added to our staff of experts. Our people are action orientated! They are involved in problem solving for today and for the future. They are a proud, productive group with a lot of stamina to back up their know-how. Our research on chemical weed control and plant breeding has received international recognition.

At Great Western Sugar, research has always been directed toward practical benefits for growers, Company and customers. But during the last two years a concerted effort has been underway to make GWS research efforts even more responsive to the needs of growers and the processing department. Programs are underway to solve immediate problems such as those related to air and water pollution, and to define opportunities which will enable us to improve sugar production in the next five to ten years.

During the past year GWS scientists and agricultural field staff members have greatly expanded cooperative field testing programs with growers. Efforts to find techniques and procedures to increase extraction in our factories are receiving increased emphasis.

Through the Grower-GW Joint Research Committee, crop production problems are identified and methods are defined and initiated to find solutions. Under the program in which one cent per ton is contributed by the growers and matched by the Company, expanded research and field testing programs are underway for better weed control, fumigation for nematode control, root maggot control and soil management for wind erosion control.

Through participation in the Beet Sugar Development Foundation, the Great Western Sugar research staff is able to keep abreast of all significant technological developments in other domestic sugar companies. Our active participation in the International Sugar Research Foundation keeps us informed of developments in the sugar industry throughout the world. These comprehensive surveillance programs, encompassing all aspects of sugarbeet production, help assure the future advancement of producer and processor alike.
here's the "big four" in soil fumigation
which one is best for your own operation?

In past UPBEET articles on nematode control, emphasis has been directed toward identifying nematode infestations, the benefits gained through the use of nematicides and economics. In this article, we will point out the options available in regard to machinery and techniques for applying nematicides.

There are probably as many methods of applying nematicides as there are people who use them. Each grower modifies a basic technique to fit his own particular situation.

But four basic methods of applying soil fumigants are commonly recommended today. These are the plow sole applicator, shank applicator, bedder-fumigator and the deep placement shank applicator. There is a fifth type of applicator, called a fumigun, but this hefty applicator is most often used by strong-backed researchers at state, federal, and private research institutions. However, it is an excellent tool for fumigating greenhouses and garden spots.

PLOW SOLE METHOD EASIEST

The plow sole applicator pictured in Figure 1 is probably the easiest to use of all fumigation equipment. In practice, a container for the fumigant is attached to the front of the tractor. Tubes transport fumigant from the container to outlets attached to each plow sole. Each outlet is fitted with an orifice which applies a measured quantity of fumigant when the tractor is driven at a predetermined, constant speed.

The most commonly used containers for fumigant with the plow sole applicator are side-mounted 55-gallon drums made of steel or fiber glass (Figure 2). However, for better weight distribution and better visibility many growers are going to a larger front-mounted tank.

An important advantage of plow sole applicators is the fact that they are grower owned. A grower who owns his own plow sole applicator is not dependent on custom applicators who, in many cases, cannot be on the job when he is ready to fumigate. Another important advantage is that when fumigants are applied with a plow, the jobs are being accomplished one time—plowing and fumigating. Fewer trips over the field save time and money and leave the soil in better tilth.

Let's assume that you own your own plow sole applicator and it is mounted and ready to go. However, where do you get the fumigant to treat your soil? You can call the G.W. Grower Service Center and tell them you need fumigant. If you have a truck available, they will tell you to come in and pick up a 5-gallon nurse tank. If you do not have a truck available, they will service you with a similar nurse tank mounted on a trailer. When you get the nurse tank to your field, it is a simple matter to connect the hose to the filling spigot on your plow sole kit, turn on the nitrogen bottle and fill your tanks. (Figure 3) During the fumigation operation, goggles should be worn to protect your eyes against fumigant that gets on your skin.
Fall fumigation with the plow sole applicator has given consistently good results over the past few years and is recommended over any other method. However, this method of applying soil fumigants works well in the spring, also, and should be considered whenever both plowing and fumigating must be done.

SHANK APPLICATOR POPULAR
The most commonly used method of application, used by nearly all commercial applicators, is to shank the fumigant into the soil with a machine similar to that shown in Figure 4. The shanks on machines of this type can be adjusted to accommodate either broadcast (9-11 inches between shanks) or “in the row” application of fumigants (22 inches between shanks). In practice the fumigating equipment can be run perpendicular to, diagonal to or parallel to the direction the rows will run. These machines should be adjusted so the fumigant is placed 12-13 inches deep.

After any fumigation application, it is very important that the surface of the soil be sealed to prevent the fumigant from escaping. This is especially true of fields treated with shank type applicators since the movement of the shank through the soil leaves a channel through which the fumigant can escape.

In contrast with plow sole applicators, most shank applicators utilize a pump to transport the fumigant from the storage tank on the tractor or fumigating rig to the outlets in the shanks. Commonly, these pumps are driven by a ground wheel which allows the tractor operator to vary his speed to suit the soil conditions of the field and still apply a constant rate of fumigant.

One disadvantage of shank applicators is that they are such specialized pieces of equipment that most growers cannot or do not personally own them. Many times in the spring, demand for their use is greater than most commercial applicators are equipped to handle. Even though these difficulties exist, a very large percentage of the 16,000 sugarbeet acres fumigated last year were fumigated with this type of equipment.

The logistics of handling the fumigant to service these rigs is similar to that previously discussed for the plow sole applicators.

TWO JOBS AT ONCE
A relatively new piece of equipment in the GWS area is pictured in Figure 5. This tool, known as a bedder-fumigator, completes two
operations at once. As the name implies, this equipment consists of an “in the row” shank fumigator and a bed shaper. When used in the fall, this machine affords the grower excellent nematode control and the deep furrows catch and conserve snow and rain. This gives the users of this method of nematode control the added advantage of being able to get their crop in and up at the earliest possible date in the spring.

When used in the spring this technique provides excellent ditches which facilitate irrigating for emergence.

The bedder-fumigator works well with any row width (22, 24, 30, etc.) and it has been reported that excellent nematode control can be obtained using reduced rates of fumigant (12 gpa).

This method of fumigation should not be overlooked by many growers who could use it to their great advantage.

As with the shank applicator, the bedder-fumigator has a ground wheel-driven pump and places the fumigant 12-16 inches below the seed.

BREAKS UP HARD PAN

There are occasions when growers would like to break up a hard pan in some of their fields to increase water and root penetration. Many times, fields needing this type of treatment also need to be fumigated for nematode control. To accomplish both jobs, the piece of equipment shown in Figure 6 was built at the GW Grower Service Center in Platteville, Colorado. This machine consists of large ripping shanks fitted with outlets for applying soil fumigants. The fumigant can be metered through a gravity flow or pump driven system. It can place the fumigant at a depth of about 33 inches while breaking up any hard pan which might exist at that depth.

The biggest disadvantage of this type of fumigant applicator is its heavy power requirement. Less power is required if the ripping shanks are placed on a “V”-shaped tool bar.

Its advantages are increased profit through nematode control and the performance of two jobs at once.

We have just described very practical methods of applying soil fumigants. However, there are certain basic do’s and don’ts that must be followed if maximum nematode control is to be gained with a minimum of problems. These are:

1. DO make sure your equipment is calibrated properly and deliver the correct amount of fumigant (15-20 gpa).
2. DO place the fumigant 12-16 inches deep or as deeply as possible.
3. DO seal the surface of the soil adequately to insure against unnecessary loss of fumigant.
4. DO use caution when handling soil fumigants—avoid getting it in your eyes or on your clothing.
5. DO wait at least 5 days before planting.
6. DON’T fumigate wet soils.

The agricultural field staff in your area will answer any questions you have about methods and materials for soil fumigation.
deep-testing program expected
to help check sugar content decline

The sugarbeet plant is a deep feeder, sending its tap root down many feet into the soil in search of water and nutrients. Therefore, the practice of sampling the top foot of soil to establish nitrogen needs for sugarbeets is like judging a book by its cover—you can easily miss a very important part of the story!

For example, fifty Nebraska fields were sampled down to the six foot level recently as a part of a new deep soil testing program initiated by The Great Western Sugar Company. These fields averaged over 197 pounds of residual nitrogen per acre already available to a sugarbeet crop. Much of this nitrogen reserve would have been missed by the old shallow testing method.

Armed with this new information, Nebraska District Agricuturists adjusted many nitrogen recommendations, and sugar content and purity analyses on 1972 crop beets are expected to provide confirmation of the worth of the new deep testing method.

How did the program get underway? Let's start at the beginning.

SUPPLY SHOULD BE CONTROLLED

Nitrogen control means providing the growing sugarbeet with the amount of nitrogen it needs to produce maximum tonnage while at the same time limiting the nitrogen so that the beet will be as high in sugar as possible at harvest. If the supply is too small, the crop starves and quits growing before the season ends. The result is that tonnage is cut short and, although sugar percent will probably be high, yield will be low and grower and Company both suffer from insufficient production.

We know that excess nitrogen in the soil causes lower sugar content and lower purity and that we must control it. For many years nitrogen depletion was a limiting factor in production. Today, excess nitrogen is a problem on the farms of 50 percent of GWS' Nebraska sugarbeet growers. Prior to 1945, the feeding of livestock and a rotation of alfalfa or sweet clover produced a good beet crop. Twenty tons of beets per acre was the standard excellence and usually the man who reached that goal followed that program.

In the 1940's, commercial nitrogen fertilizers first made their appearance and in the 50's they really came into their own. Growers were urged to "maximize" their yields by using "all of the growing season". This was done by adding commercial nitrogen to assure continued plant growth throughout the season. Addition of phosphate already was a standard practice.

As the years passed and use of nitrogen increased, yields went up but sugar content declined. Twenty-five tons of beets per acre and 13 percent sugar were all too common.

Finally, soil researchers began measuring residual nitrate nitrogen and its effect on various crops in western soils. Dr. John O. Reuss of Colorado State University introduced this concept in the GWS area in 1971. Other soils men had been studying nitrogen build-up in soils but our first formal introduction to the idea was by Dr. Reuss.
SAMPLING PROGRAM INITIATED

Following Dr. Reuss' presentation at the GWS winter agricultural meetings, a deep soil sampling program was initiated with the help of the University of Nebraska soils department. The program was designed to ascertain within practical limits just how much nitrogen was available in a given field. It was hoped that this system of sampling and testing would indicate whether or not a field needed added nitrogen to produce a crop of beets and if so, how much.

The University of Nebraska advocated that soils be sampled to a depth of 36 inches. GWS Agriculturists began deep sampling with hand augers.

Seventy-seven fields were sampled, but it was not possible to take more samples in time for spring planting. Each 12-inch increment of soil was tested separately so the nitrate nitrogen content at that depth was known.

The University of Nebraska soils laboratory ran tests on all samples and forwarded the results to Louis Daigger, extension soils specialist at the University's Scottsbluff Station, who made fertilizer recommendations to growers based upon the tests. He worked closely with Company Agricultural Managers and Agriculturists.

Results obtained from the limited number of samples were significant: Large amounts of nitrogen were found in fields that were chronically low sugar producers. Nitrogen in those three foot profiles varied from 14 to 22 pounds per acre. A rule of thumb in figuring nitrogen requirements is ten pounds for each ton of beets desired. The field with 249 pounds per acre, therefore, already has plenty of nitrogen without additional fertilization. More information was needed to confirm those first findings, so an enlarged sampling program was slated for the fall of 1971.
REduced rates urged

All growers with chronically low sugar content beets were urged to reduce nitrogen rates for beet ground. This advice was based upon knowledge of the farm's history of producing low sugar beets and the grower's record of heavy fertilization. Further strength was added to the convictions of the Nebraska District agricultural staff by the data obtained from the sampling done that spring, and by preliminary results of deep nitrogen studies that had been carried out at the University of Nebraska's Scottsbluff station by agronomist Frank Anderson.

The sampling of fields for 1972 plantings commenced about two weeks before the 1971 beet harvest started. Two men were hired to sample fields. A hydraulic probe sampler was used and 253 fields were checked before sampling was completed about Thanksgiving.

Several experimental samplings were made on high and low sugar content beet fields just harvested to provide an inkling of how nitrogen and sugar percent were correlated. These were inconclusive and indicated that deeper samples were needed. A test was designed using fifty of the commercial fields that had been already sampled. They were selected by comparing nitrate nitrogen contents per foot in the one, two, and three foot depths. Fields were selected that were suspected of having additional amounts of nitrogen at the four, five, and six foot levels. These samples could not be taken until spring, but the results of the tests confirmed earlier suspicions.

Significant amounts of nitrogen were found at the lower levels.

The fifty fields averaged 145.42 pounds of nitrogen per acre in the top 36 inches and an additional 51.7 pounds per acre in the 36 to 72 inch profile, bringing total nitrogen per acre to 197.12 pounds—enough to produce a 20 ton per acre crop.

Because of the time lag between sampling the fields and obtaining the test results from the University lab, growers became anxious to fertilize before spring tests were available. A district policy of recommending reduced nitrogen applications even without test results was adopted.

The GWS Agricultural Research Center was asked to provide proof that residual nitrogen in soils in fact existed and that excessive amounts could be measured. They responded by setting up a study of selected high and low sugar content fields. Forty of the fields were sampled for residual nitrates in Nebraska last spring. This information and the results from the 50 special fields sampled to the six foot depth as well as three foot samples from over 250 commercial fields provided valuable additional data.

CONVINCING EVIDENCE

To complete the study, this year GWS Agriculturists have recorded the actual pounds of nitrogen applied to each of the sampled fields. The 50 special fields were sampled by petiole testing last summer. This information, plus the careful tabulation of sugar contents and yields from the sampled fields this fall, should provide final confirmation. But there is already much convincing evidence that the practical method to determine fertilizer needs is to sample each field to a depth of six feet or to the impervious layer if that is less.

Growers who continue to grow corn in the rotation with beets will likely continue to increase the rate of nitrogen applied to corn to assure maximum corn yields. These fields should be tested for residual nitrogen prior to planting beets.

An additional hydraulic sampler for the Nebraska District was purchased and sampling began as soon as soil temperatures were satisfactory and fields were ready this fall. The cost to growers of such sampling runs about $6 per field.

To round out the deep testing program, additional basic research is needed. Specifically, information regarding the proper handling of samples from field to laboratory needs augmenting. For instance, what are the effects of warm temperatures on a moist sample collected in the morning and carried around in the cab of a pickup until evening before it is spread out to air dry? What soil temperatures are satisfactory for sampling? How much variation in nitrogen content can be expected from the sampling procedure itself?

Frank Anderson is researching available reports on these programs and has planned a number of tests to augment previous work and provide the additional information needed.

Although this story refers primarily to work being conducted in Nebraska, it should be mentioned that deep soil testing studies are being carried out in other GWS growing areas. □
"BEET FARMING ON A BIG SCALE and HOW TO DO IT", might have been an appropriate title for two sugarbeet tours held last summer and fall. The route of the tours, which were ably arranged by the agricultural staff of the GWS Northeast Colorado/Kemp District, took observers through the vast fields of sugarbeets in the rolling hills and flatlands of eastern Colorado, western Kansas and southwestern Nebraska.

The first of the two tours, held July 25 through 27, was the more extensive. Its primary purpose was the observation by members of the Grower-GW Joint Research Committee of the progress of university research projects made possible by grants from the Committee.

Grant-supported projects inspected during the first tour included nitrogen soil test research and "independent" variety testing conducted by Colorado State University in the Holyoke area. In Kansas, the tour visited the Colby Experiment Station and observed irrigation, fertilizer and variety research being conducted by Kansas State University.

Shortly after the tour buses left Fort Morgan, they visited an excellent example of space planting nematode control plot in which Temik and Telone were compared, and observed a field planted to various varieties to determine Fusarium resistance. As they proceeded into the Sterling area, they were able to observe wide degrees of Fusarium resistance among inbred lines and lesser differences between varieties in a trial planted by the GW Agricultural Research Center on the George Kloberdanz farm. Next was a stop at the large nematode control test conducted by the Agricultural Research Center on a farm north of Sterling. In this test, all new chemical compounds exhibiting nematode control possibilities were being compared.

The second tour (held September 25 & 26), although not quite as extensive, was very similar to the first and was precipitated by favorable comments from members of the first outing. The second was sponsored by the Mountain States Beet Growers Marketing Assn., and attended by directors of several grower associations and GWS personnel.
Minimum tillage in the sandy soils of eastern Colorado was observed under a circle sprinkler operated by the Otsuka brothers at Sedgwick. Here the Committee saw an example of successfully preventing wind erosion on sandy soil and establishment of beet stand through minimum tillage.

In the Julesburg-Big Springs area of northeastern Colorado and the panhandle of southwestern Nebraska, the Committee observed some rather large beet plantings in which all modern techniques were used to grow the crop with a minimum of hand labor and to obtain maximum yield.

After an overnight stay at Ogallala, the group proceeded to Grant and Imperial, Nebraska, where they made a stop to observe in detail the research and development work being conducted by the Company. Here, it was explained that with various tillage implements, it was possible to keep sufficient old crop residue on the surface to prevent wind erosion and still get the beets planted, emerged and cultivated so that a crop could be produced. Also, beets stripped with corn for wind erosion control in the winter and spring were observed.

Minimum tillage farming was also observed in the Wray-Idalia, Colorado, area where the technique got its impetus for GWS growers and where it is commonly used for the growing of beets on light soil under circle sprinklers.

Sugarbeet farming in the Burlington-Goodland area was discussed by the tour guides. Irrigation there, it was mentioned, is all from pumps and is applied in furrows with tail water pits on most farms.

Sugarbeet equipment on display at the Hitchcock Implement Company at Burlington, Colorado, and at the headquarters of Gene Smith near Imperial, Nebraska, attracted a lot of attention from tour members. Large machinery is needed to farm the large acreages of sugarbeets commonly contracted in those areas. Mr. Hitchcock had 12-row equipment to handle bedding, planting, cultivating and thinning; a six-row top saver and three-row harvesters all of his own design or modified to suit his operation. Machines like these are used extensively in the eastern Colorado and western Kansas areas.

Committee members and other participants in the tours were able to get a first hand view of sugarbeet research, appreciation of the large fields and vast acreages of sugarbeets that are produced in that area, and an idea of the sugarbeet growing potential there.
Declining sugar extraction has been a puzzle and a source of deepening concern throughout the U.S. sugar industry for many years. "Sugar extraction" is a measure of how much of the total amount of sugar in sugarbeets can be economically removed by the standard factory refining process. In other words, it refers to the pounds of sugar obtained per ton of beets processed. That amount has been declining slowly but steadily for more than two decades.

Through the years, the extraction decline has amounted to only a few percentage points. However, when those few percentage points are multiplied by the millions of tons processed annually by Great Western Sugar, the loss shared by growers and Company has amounted to millions of dollars.

The problem was puzzling because it could not be attributed to any single cause. No individual change in the growing of beets or in the factory process could be cited as the reason for the decline. It was like the weather — "Everyone worried about it, but no one knew what to do about it." It was also similar to the weather in that it affected the entire beet sugar industry; it was not confined to a single company or area.

Determined to solve and eliminate the problem once and for all, Great Western Sugar launched an all-out assault late last spring. The assault team, designated the "GW Sugar Extraction Task Force" was formed and placed under the leadership of Dr. Robert Gramera, Director of Technical Services. Other team members included Walt Akeson — Plant Physiologist; Tom Clements — Quality Control Chemist; Jack Eastman — Area Manufacturing Manager; G. R. Enevoldsen — Factory Manager; Steve Force — Area Manufacturing Manager and Limestone Manager; John Hedde — Quality Control Chemist; Leonard Henderson — District Agricultural Manager; Laurens Kuijper — Senior Chemical Engineer; Jack Powell — District General Manager; Davis Sunderland — District Agricultural Manager; and Brooks Stein — Project Leader, Process Development.

Again, since there was no apparent single reason for the decline, the team was faced with examining every facet of sugar production, from planting of seed through growing, harvesting, transportation, processing... right down to the final product. Something, or some combination of things, or as it turned out, was at the root of the decline and had to be uncovered. It was a detective job that required weeks of study and research, followed by additional weeks of analysis.

The team began a methodical search governed by a set of preset objectives that were divided into two sections — first the causes of the problem had to be found, then a plan of corrective action had to be developed and put on a time schedule. A simplified version of the objectives looked like this:

SECTION I — PROBLEM ANALYSIS
1. Examine agricultural and factory process records going back to 1950 to check for variances from the normal pattern, then analyze the variances discovered. (A monumental research job!)
2. Investigate significant changes in agricultural and factory processing practices since 1950.
3. Analyze the information obtained through objectives one and two, then isolate the factors considered responsible for the decline in extraction.
4. Separate the responsible factors and place them in appropriate categories:
   (a) Those predominant in all districts.
   (b) Those affecting a single district or limited to a few districts.
   (c) Those specific to a single factory area.
5. Consider each factor carefully then place them in order according to which had the least and which had the most, affecting extraction.

SECTION II, DECISION ANALYSIS
6. Develop and recommend the necessary corrective action for each factor, including alternatives in agricultural and factory operations.
7. Prepare a priority list of corrective action steps that would enable GWS to put more sugar in the bag from the same volume of beets.

The Task Force rolled up their sleeves and went to work, accomplishing their assigned tasks in addition to carrying the normal work load required by their everyday jobs at GWS.

When the results began to come in, it became apparent that not one, but more than 45 separate factors were combining to cause the declining extraction rate. Ironically, but certainly not unexpectedly, many of the factors were undesirable side effects from practices that were adopted to improve agricultural or factory production.

Now, according to the list of objectives, the next step was...
weigh each factor and give it a priority rating so that corrective action could get underway. The list of 45 causes was reduced to 10 "major" causes that were considered to be the biggest contributors to the problem.

A three-pronged plan was set up dividing corrective action into three separate time schedules:

1. Immediate. Those things that could be done immediately and put into effect during the 1972-73 harvesting and processing campaign.
2. Short range. Those projects that could be accomplished within a span of two to three years.
3. Long range. Major projects which would require revamping of processing operations and agricultural practices. These would be aimed at obtaining the highest production of sugar at the lowest possible cost, in addition to and as a part of the elimination of the sugar extraction problem.

Step One of the corrective action program is now underway and Step Two is beginning. Key people throughout the GWS organization have been given a list of the ten major causes and asked for their recommendations regarding both short and long range solutions. These must be analyzed one by one and either adopted and put into practice or discarded, based on sound economics.

Although the Task Force is confident that they have discovered the major factors contributing to the declining extraction rate, finding workable solutions may be an even tougher job than defining the causes. For instance, some of the problems are of such a technical nature that 16 major research projects are being undertaken by the Agriculture and Technical Services Department in an attempt to find answers to them.

The project is huge but the stakes are high, and eventual reversal of the decline in sugar extraction will benefit everyone. It will mean more sugar to sell in the growing industrial and consumer markets, and more dollars in the pockets of GWS growers.

**WHY AN EXTRACTION ANALYSIS? COMPANY TRENDS**

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**RESULTS**

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When the turnabout has been effected, Company growth indicators should reflect the healthy pattern shown by this chart.
can low tillage sugarbeets control wind erosion?

Reprinted by permission from the July, 1972 issue of COLORADO RANCHER AND FARMER.

Loren Dickson (left), Vernon, Colorado, and Wendell Wagner, GWS Agriculturist at Wray, inspect a field of minimum tillage sugarbeets planted in wheat stubble. Dickson and his sons were among the first in Colorado to try the technique in beets.

When spring winds begin to blow, sugarbeet growers in the sandy regions of northeastern Colorado watch their fields with an apprehensive eye. They know from past experience that when the soil begins to move, they stand a chance of losing their entire crop.

In an effort to diminish sugarbeet losses in light soils agriculturists at the Great Western Sugar Company have recently encouraged a comparatively new system of sugarbeet growing in Colorado. With the idea in mind that soil movement must be prevented, they've adapted a technique used successfully in other crops—minimum tillage farming.

Sometimes called "trash farming," the minimum tillage concept is based on the practice of seeding a crop in the previous year's stubble. It eliminates the traditional sequences of disking, plowing, harrowing and floating the land prior to planting. Instead, an implement called a tilther is used to mulch the stubble, plant the seed and apply fertilizer and herbicide all in one operation.

Wendell Wagner, Great Western Agriculturist at Wray, says the machine can be adapted for any width row, using a sliding bar arrangement, and can be used in most varieties of stubble. Although most tilthers are designed for 6-row use, at least one 12-row prototype model is now in operation. Wagner notes that the implement has been used successfully in his area to plant beets, corn and dry beans.

In operation, the tilther utilizes a set of slicing blades which mulch existing stubble just ahead of the planting mechanism. The blades work well in corn, wheat or other grain stubble, removing roots and stalks but leaving behind a fairly coarse residue to help hold down light soils. Liquid applicator tanks can be mounted on the tilther to apply liquid fertilizer and herbicides during the mulching-planting operation.

Great Western spokesmen feel that good weed control in low tillage beets can generally be achieved by applying a herbicide during planting, supplemented with a lay-by herbicide at or after thinning. Although most of these beets have been hand thinned, growers using electronic thinners have reported minimal loss of effectiveness.

Likewise, no particular difficulties have arisen from harvesting minimum tillage beets. Great Western representatives say the residues in the fields have little or no effect on harvesting equipment. Corn stalks and roots, wheat stubble, etc., are generally deteriorated by the end of the growing season.

Norm Davis, Great Western agricultural manager at Fort Morgan, says the low tillage concept for sugarbeets seems best suited for center pivot irrigation systems. In the eight counties comprising northeastern Colorado, 240,000 acres are presently under sprinkler irrigation, with 5.6% of the acreage planted to sugarbeets.

"More and more sprinkler irrigation systems are going into the area," Davis explains. "And you get about the same results on sandy soil from sprinkler irrigation that you get from natural rainfall—the ground is set up to blow.

Good protection will be afforded these sugarbeet seedlings in this field, planted under minimum tillage conditions in wheat stubble and stubble. Sprouting seed can be seen at the tip of the knife blade.
leaving ground cover in the field, you cut down the chances for wind erosion."

"Minimum tillage farming also conserves moisture," Davis adds. "Since you don't work the ground as frequently with the tilther, you bring less soil to the surface where it will lose its moisture content."

According to Great Western spokesmen, the first known beet growers to use minimum tillage in northeastern Colorado were Loren Dickson and Sons, Inc., Vernon, who last year grew 111 acres of sugarbeets in corn stubble. By using the stalks as ground cover, they were able to minimize wind erosion. At the end of the season they harvested a respectable 20.6 tons of beets per acre.

Pleased with their results last year, this spring the Dicksons seeded 210 acres of beets in low tillage, using wheat stubble as a ground cover.

"We have a lot of wind in our area," Loren Dickson points out, "and much of our land is fairly sandy. We feel we'd have lost most of our beet crop this year if we hadn't had some kind of ground cover to hold the soil. I figure we'll stay with minimum tillage from now on."

The Vernon growers seeded their beets this year at a rate of six seeds per foot in 30-inch rows. They use a center pivot irrigation system and an electronic thinner.

STUBBLE IS USED

Corn stalks and wheat stubble have been the most widely adapted forms of ground cover used to date. Robert Poytz, who has a large farming operation near Yuma, planted 1,050 acres of sugar beets this year, with 260 acres of them in wheat stubble.

Poytz planted the crop under center pivot irrigation, using a 12-row prototype tilther to seed the beets. Herbicide and fertilizer were applied at planting time. He also used the tilther to seed his dry bean crop.

"This minimum tillage farming is an entirely new kind of agriculture for me," Poytz says. "A farmer has a lot of new techniques to learn. My ground isn't as sandy as much of that around here, so blowing isn't as big a problem. However, I like the idea of minimum tillage because it saves a lot of time and labor. It takes fewer steps to get the crop in."

Norm Davis suggests that several kinds of ground cover could be used on sandy ground. "Rye or oats planted in the fall, after harvest, could serve effectively to plant beets in the next spring," he says. "The oats, for example, would winter kill, and in the spring a grower would simply go through the field with the tilther."

Davis cautions that too heavy a cover crop can create problems too. "A fairly light ground cover works best with the tilther," he notes. "Some of the growers using minimum tillage in corn stalks this year had to go through the stubble with a chopper before they were able to use the tilther."

However, too light a ground cover can also create difficulties. William R. McCracken, who farms 440 acres near Fort Morgan, planted 130 acres of low tillage beets this year in corn stubble. The corn had been planted in 30-inch rows, and since McCracken's beet harvesting equipment operates on 22-inch rows, he went through the field with a disk to level the corn rows before planting.

As a result, the stalks were too fine to hold the ground well, and McCracken lost half his beet acreage to wind. But he still feels he profited from using the low tillage technique. "We've had quite a bit of trouble from wind erosion," he
George Dowell and Carroll Chabot worked with Robert Poytz, right, to plant 1,050 acres of beets this year, including 260 acres in minimum tillage. This 12-row Sidewinder was used to seed the crop.

says, "This spring we had a couple of windstorms that under most circumstances would have blown out the entire field. I figure that the 65 acres of beets I still have were saved because of the corn stalks."

McCracken's beets are under sprinkler irrigation, and he notes that "I started the sprinkler as soon as the beets were in the ground — the same day." He planted at a rate of six seeds per foot and applied fertilizer and herbicide at planting time. The beets were hand thinned.

Dean and Stuart Tyner, who farm near Joes, are also trying the minimum tillage idea for the first time. They seeded 130 acres of beets in a light milo stubble, using a planting rate of four seeds per foot. They applied fertilizer and herbicide at planting time. The field is sprinkler irrigated, and they pre-irrigated the ground twice prior to planting, with the sprinklers calibrated for an inch of water each set.

"I think minimum tillage is going to work well on sandy soils where we need to hold the ground down," Stuart says. "And I believe that in heavier soils this technique would help to reduce compaction. By using the tiller only once, you compact the soil far less than with a conventional tillage method."

The Tyners feel they could have used a heavier ground cover than the milo stubble provided. They say they would have preferred to plant in rye or oats stubble, or perhaps corn stalks.

"We're definitely going to plant our sugar beets in corn stalks next year, though," Stuart notes, "if for no other reason than so we can sleep at night when the wind blows."

WRAY RANCHER EXPERIMENTS
David D. Fix, Wray, has 180 acres of low tillage beets this year, planted under the direction of the McCook Ag Technology Company, a water and fertilizer management firm. The crop was planted in corn stubble, using a planting rate of four seeds per foot. Fertilizer and herbicide were applied during planting, and a supplemental herbicide was applied during cultivation. The crop was hand-thinned.

Since the stalks were too heavy for the tiller, Fix shredded them prior to planting. He pre-irrigated the ground twice before planting.

Fix also has a field of furrow-irrigated minimum tillage beets this year, planted in corn stubble. Just prior to cultivation, the crop looked as good as those planted under sprinkler irrigation.

Beet growers interested in the minimum tillage concept might profit from inspecting some of these fields this summer. Although the technique is far from an answer to all beet growing problems, it does supply some help with wind erosion, moisture conservation, time and labor expense and equipment investment.

Wendell Wagner says, "All this general area has a history of wind erosion. In recent years, the size of individual farms has increased, fewer farmers have cultivated more and more ground. When it rains and the wind blows, many of them simply have too much ground to get all stripped."

"Minimum tillage is going to provide at least one answer to the problem."
Dear Growers:

Mud, mud and more mud! What started out to be a good crop year turned into a very difficult one for agriculture in northwestern Ohio and southeastern Michigan. In fact, we were on the receiving end of more rain and less sunshine than any other single period in the history of the Northern Ohio Sugar Company. Even so, we would have recorded an above average crop in the area if we could have had normal weather during harvest. But, as you well know, we did not.

What saved the day was the determined efforts of growers to bring in a sugarbeet crop in spite of continued attempts by the weather to prevent it. You are to be commended for your determination and inventiveness in accomplishing an almost impossible task. Neighbors helped neighbors and some of the methods used for getting the beets out of the ground (mud) were ingenious. For instance, some modified harvesters by adding wheels, changing depths and making other changes, others were piling beets on the side of the road to prevent having to haul them out of the fields with trucks, and many of you were pushing and/or pulling trucks with tractors as they bogged down in the mud.

The beets received at the piling grounds were reasonably good considering the rain, then snow and freezing temperatures encountered at harvest time. Mud caused many processing problems in the factories, but equally determined efforts by our NOSCO employees kept the machinery operating at a slower, but satisfactory rate.

Through your diligent efforts we were able to overcome a difficult growing and harvesting season, and we extend our heartiest compliments for the cooperation and patience it took to get the job done.

With this season behind us, we are now looking forward to a better season and an excellent crop. But even with a better break in the weather, we are facing some significant challenges in 1973. Our efforts, which will require your co-operation and support, must be directed at higher sugar content and purities. Recently, the Company has done considerable research on methods for increasing cwt's of sugar in the bag per ton of beets sliced.

These studies have covered all aspects of the business with special attention on seed development and agricultural practices. As demands for our capital and profit dollars increase, it is imperative that the producer and processor alike concentrate on productivity.

Over the course of the next several months, we intend to apprise you individually and collectively of our 1973 plans and look forward to your continued interest and support in the future agricultural challenges we all face. Again, we at the Northern Ohio Sugar Company extend our thanks for your efforts related to the 1972 crop, and wish you the very best for the New Year.

F. Taylor Carlin, District General Manager
Trials over the past several years give a clear indication that Ohio and Michigan sugarbeet growers can be assured of greater productivity by the use of new Mono-hy\textsuperscript{a} monogerm hybrid sugarbeet seed for their 1973 crop. The new varieties are products of many years of intensive breeding and production testing of large numbers of sugarbeet hybrids.

Two Mono-hy varieties will be distributed for use by Ohio and Michigan growers, Mono-hy E2 and Mono-hy A1.

The E2 variety, which has been proven to the satisfaction of researchers in three years of Ohio and Michigan tests, produces a significantly higher sugar content, possesses a higher degree of leaf-spot resistance, and is equal to presently-used varieties in tons of beets produced per acre. A potential seven percent increase in sugar production is possible for these two states from this Mono-hy variety, as indicated by extensive replicated trials. Present indications are that seed supplies are adequate for 30\% of Northern Ohio Sugar Company acreage to be planted to Mono-hy E2 in 1973. The second new variety, Mono-hy A1, will be available in sufficient quantity to fill total seed requirements. Results from trials and commercial plantings indicate this is an excellent variety to use where leafspot incidence is not limiting or is controlled by fungicide treatment.

Supplies of standard Great Western hybrids will also be available as in the past.

The following test results are from trials conducted in the Northern Ohio District. The figures are easy to understand if the reader remembers that they are given as a percent of test average, with 100% equaling the test average. For example, Mono-hy E2 sugar yield (first column) was 4.2 percent above the average of all varieties, so it is listed as 104.1. In tons per acre, it was 1.1% above the average of all varieties, so it is listed as 100.1. Figures less than 100 indicate the results were below the test average for that particular item.

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>% SUGAR</th>
<th>% THIN JUICE PURITY</th>
<th>TONS PER ACRE</th>
<th>PROJECTED EXTRACTABLE SUGAR PER ACRE**</th>
<th>LEAFSPOT INDEX***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-hy E2</td>
<td>104.2</td>
<td>100.6</td>
<td>100.1</td>
<td>107.6</td>
<td>2.0 to 6.0</td>
</tr>
<tr>
<td>Mono-hy A1*</td>
<td>101.3</td>
<td>100.1</td>
<td>100.1</td>
<td>101.9</td>
<td>4.0 to 6.5</td>
</tr>
<tr>
<td>GWH 37</td>
<td>98.9</td>
<td>96.6</td>
<td>101.5</td>
<td>98.4</td>
<td>3.0 to 4.5</td>
</tr>
<tr>
<td>Test Average</td>
<td>14.2</td>
<td>93.0</td>
<td>23.7</td>
<td>5,225 lbs.</td>
<td></td>
</tr>
</tbody>
</table>

* Mono-hy A1 test results reflect only 1972 trials and a projection of the leafspot index based on test data.
** Projected extractable sugar per acre is based on laboratory test results conducted at harvest time.
*** Storage losses, etc., are not considered.

The Leafspot Index is reported from actual visual observations. The ratings are on a 0 - 10 scale, with 10 equating 100% damage.

Mono-hy seed is conveniently packaged in durable, easy-to-stack and store cardboard cartons. It is available in five and ten pound cartons.
Mono-hy E2 can put more sugar in the bag by an average of 7.6%, as indicated by the above test results. But there are other advantages as well. For instance, red coloring has been added to the seed to ease the job of spot-checking planter performance. The red seed is highly visible in almost all types of soil. Blotter test germination rates of 90% or better can be expected from all Mono-hy seed, plus a single plant rate of 92% to allow greater precision in planting to stand. Coated Mono-hy meeting the high quality standards set by the GWS seed house, is available to provide even greater uniformity of surface and size for planting accuracy.

The beginning of hybrids

The discovery by Dr. F. V. Owen, a U. S. Department of Agriculture scientist, of a character called cytoplasmic male-sterility, allowed the production of races of sugarbeets which were 100% male-sterile. This major breakthrough cleared the way for the production of hybrid sugarbeets.

Beginning in 1950, plant breeders at Great Western Sugar started producing inbred lines on an extensive scale. During one year in the late 1950's, GWS researchers had about 10,000 inbred lines under consideration in the program—one they had developed themselves. At no time during the 1950's and 1960's did the number of inbred lines with which they were working drop below 6,000.

Lines have been developed from widely varying sources because it is known that hybrid vigor is best expressed in hybrids developed from different sources. Great Western chose as its source material open-pollinated varieties which were adapted to the GWS areas plus recognized varieties from all over the world.

Essentially, the new varieties represent combinations of inbred lines, closely bred over many years for certain desirable characters and put into proper combination after years of testing. These are now "coming to the surface" and exhibiting remarkable production capabilities—both in replicated variety trials and in strip trials on grower fields.

Mono-hy sugarbeet seed is being tested around the world. Varieties were tested in 15 foreign countries in 1972, and more trials will be added in 1973.

Montana / Wyoming District

(Figures are shown in percent of average of 1971 and 1972 trials)

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>% SUGAR</th>
<th>% THIN JUICE PURITY</th>
<th>TONS PER ACRE</th>
<th>PROJECTED EXTRACTABLE SUGAR PER ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-hy D2</td>
<td>102.5</td>
<td>100.3</td>
<td>104.5</td>
<td>107.5</td>
</tr>
<tr>
<td>G.W.D. Blend</td>
<td>98.9</td>
<td>99.8</td>
<td>99.4</td>
<td>97.9</td>
</tr>
<tr>
<td>HH 19</td>
<td>96.5</td>
<td>99.2</td>
<td>108.6</td>
<td>104.1</td>
</tr>
<tr>
<td>Test Average</td>
<td>15.8</td>
<td>93.3</td>
<td>23.3</td>
<td>6,586 lbs.*</td>
</tr>
</tbody>
</table>

*Pounds projected extractable sugar based on 1972 laboratory test results conducted at harvest time compares favorably to the normal expected average for these varieties, however, storage losses, etc., are not considered.

Colorado, Kansas and Nebraska

(Figures are shown in percent of average of 1971 and 1972 trials)

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>% SUGAR</th>
<th>% THIN JUICE PURITY</th>
<th>TONS PER ACRE</th>
<th>PROJECTED EXTRACTABLE SUGAR PER ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-hy A1</td>
<td>101.2</td>
<td>99.8</td>
<td>101.8</td>
<td>102.8</td>
</tr>
<tr>
<td>Mono-hy A2</td>
<td>100.2</td>
<td>100.2</td>
<td>101.5</td>
<td>102.3</td>
</tr>
<tr>
<td>G.W.A. Blend</td>
<td>100.5</td>
<td>100.1</td>
<td>95.3</td>
<td>95.8</td>
</tr>
<tr>
<td>Test Average</td>
<td>16.2</td>
<td>94.3</td>
<td>22.2</td>
<td>6,295 lbs.*</td>
</tr>
</tbody>
</table>

*Pounds projected extractable sugar based on 1972 laboratory test results conducted at harvest time compares favorably to the normal expected average for these varieties, however, storage losses, etc., are not considered.
Among those of us who struggle with nature to raise farm crops for a living, it's hard to argue with the old saying that goes, "The only good weed is a dead weed," except that it doesn't go far enough. It should continue, "but the best weeds are the ones that never get started—especially in a sugarbeet field."

Another time-worn saying that we can "bend" to apply to weeds is, "The older they get, the harder it is to make them fall". Meaning, of course, that young, tender weeds are much easier and cheaper to control than older, well-established weeds. Once a weed gets up a full head of steam, we have to work harder and spend more money to knock it out.

So the obvious thing to do is whip weeds before they get started, right? Fine, you answer, but only if it doesn't cost me more than it's worth. That's fair enough, because this is something an efficient grower must consider before he adopts any practice in his farming operation.

First of all, let's discuss what weeds can do to the profitability of a sugarbeet crop. We all know that in many fields, there is enough weed seed present to take over the entire field if no controls at all are applied. And there's an additional supply handy in fence rows and adjacent fields that can get into beet fields as if by magic. So that's the starting point—total loss. That is allowed to happen in very few cases, so let's go on to more probable figures.
In most instances, it is a case of
reduced yields and reduced in-
come. For example, a loss of ten
percent of your tonnage to weeds
at today's sugar beet prices will
cost you about $30 per acre. If you
have 50 acres of sugarbeets, that's
$1,500 that didn't go into your
pocket. If your loss was 20%,
double all the above figures to see
how much your gross income
dropped.

When do weeds do the most
damage? Researchers at Great
Western Sugar's Agricultural Re-
search Center tell us that early
weeds are the biggest culprits be-
cause they reduce the vigor of the
seedling beets. (This statement is
agreed to by Ohio State and Mich-
igan State weed specialists.) There
is good evidence that certain
weeds even inhibit beet emer-
gence through a toxic root dis-
charge. So early weed control,
until beets are large enough to
help control weed growth by form-
ing a leaf canopy, is of vital im-
portance. Beets should be as free as
possible of weed competition up
to and beyond thinning time, and
this becomes even more important
if planting to stand is practiced.

Dr. Jim Widner, agricultural
research manager in Ohio, notes,
"Year in and year out, we can ex-
pect about 85% control of weeds
from use of a pre-emergence herb-
icide. Then we should come back
and clean up the escapes with a
post-emergence application. Ex-
perience indicates that a good
program of chemical weed control
will give an increase in yield of
about one and one-half tons per
acre over the old mechanical con-

The following table is reproduced from the Northern Ohio Sugar Company's "GUIDE TO MORE PROFITABLE SUGARBEET PRODUCTION."

### Pre-Emergence Chemical Rates for Sugarbeets

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATE PER ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>22&quot; ROWS</td>
</tr>
<tr>
<td><strong>LIGHT SOILS</strong></td>
<td></td>
</tr>
<tr>
<td>Pyramin</td>
<td>6 1-1 0-14 0-13</td>
</tr>
<tr>
<td>Pyramin</td>
<td>6 1-7 1-2 1-1</td>
</tr>
<tr>
<td><strong>MEDIUM AND HEAVY SOILS</strong></td>
<td></td>
</tr>
<tr>
<td>Pyramin</td>
<td>6 1-13 1-7 1-5</td>
</tr>
<tr>
<td>Dry TCA</td>
<td>6 1-13 1-7 1-5</td>
</tr>
<tr>
<td><strong>HEAVY SOILS</strong></td>
<td></td>
</tr>
<tr>
<td>Dry TCA</td>
<td>6 2-7 1-14 1-12</td>
</tr>
<tr>
<td>Liquid TCA</td>
<td>6 1.2 qts. 1.0 qts. 0.9 qts.</td>
</tr>
<tr>
<td><strong>LIGHT AND MEDIUM SOILS</strong></td>
<td></td>
</tr>
<tr>
<td>Liquid TCA</td>
<td>6 1.6 qts. 1.3 qts. 1.2 qts.</td>
</tr>
<tr>
<td><strong>HEAVY SOILS</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Pyramin rates applied pre-emergence can be increased up to 20% in medium and heavy soils in 1973.*
Pyramin plus TCA was applied to these beets at planting time in an eight-inch band sprayed over the row back of the press wheel. Both exhibit excellent weed control in the rows.

The following table is reproduced from the Northern Ohio Sugar Company's "GUIDE TO MORE PROFITABLE SUGARBEET PRODUCTION."

### Suggested Post-Emergence Treatments and Rates

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>RATE OF PRODUCT PER ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalapon-Dowpon—Basfapon</td>
<td></td>
</tr>
<tr>
<td>Dalapon</td>
<td>4.0 lbs.</td>
</tr>
<tr>
<td>Herbicide 273</td>
<td>2.7 pts.</td>
</tr>
<tr>
<td>Betanal</td>
<td>8.0 pts.</td>
</tr>
<tr>
<td>Pyramin Plus</td>
<td>12.0 lbs.</td>
</tr>
<tr>
<td>Pyramin + Dalapon</td>
<td>4.0 lbs. + 2.7 lbs.</td>
</tr>
<tr>
<td>Pyramin + Betanal</td>
<td>2.0 lbs. + 6.2 pts.</td>
</tr>
<tr>
<td>Betanal + Herbicide 273</td>
<td>6.2 pts. + 2.7 pts.</td>
</tr>
<tr>
<td>Betanal + Dalapon</td>
<td>6.2 pts. + 2.7 lbs.</td>
</tr>
</tbody>
</table>

1| Calculated on 28-30 inch rows.
2| Use a dormant spray oil at the rate of 5% of water volume with this combination.
3| Use 1 to 1½ gal. of water per inch of band per acre. NO MORE!

**CAUTION:** When day temperatures are above 80°F, it is recommended to spray in late afternoon or evening to prevent excessive leaf burning.

- **Dalapon** — Annual grass control, not effective on broadleaves.
- **Herbicide 273** — Smartweed and Wild Buckwheat control.
- **Betanal** — Lambsquarter, Ragweed, Wild Buckwheat, and Mustard control.
- **Pyramin Plus** — Contains Pyramin + Dalapon + a surfactant in one container. Effective control of most annual broadleaves and grasses.
- **Pyramin + Dalapon** — Add spray oil to this combination. Control will be similar to Pyramin Plus.
- **Pyramin + Betanal** — Excellent broadleaf control plus residual control.
- **Betanal + Herbicide 273** — Mixed broadleaf weed problem including Smartweed.
- **Betanal + Dalapon** — Mixed broadleaves and grasses.

**NOTE:** Full label rate for Pyramin in Ohio and Michigan in 1973 is 8 lbs. per acre active or 10 lbs. of material, when applied in split application, pre-emergence followed by post-emergence.问题，不同土壤类型，等等，所以每个都要求个人的关注和处方类型的 weed control recommendation. Northern Ohio agriculturists will be glad to help in putting together a weed control program tailored for each of your fields.”

Sugarbeet growers are fortunate in having two of the most effective pre-emergence weed control herbicides available for their use—Pyramin plus TCA. The combination, when properly applied at recommended rates, is almost fool-proof. Each grower has available the information needed to use Pyramin plus TCA to achieve maximum results.

Post emergence chemicals must be used in an effective labor-free sugarbeet production program. Several effective post-emergence herbicides are available, such as Herbicide 273, Betanal, Dowpon, and Pyramin. Proper timing of post spraying is of critical importance. Weeds must be sprayed when they are in the two to four leaf stage. Beets should be in the two to four leaf stage. }
Appreciation for the following article is extended to Lyman H. Andrews, 74. He retired in 1967 as southern agricultural manager of The Great Western Sugar Company, after a career of 48 years in U.S. sugarbeet agriculture. Since that time, he and Mrs. Andrews have made two trips to Iran for the International Executive Service Corps, where Mr. Andrews served as an advisor to the Ahvaz Sugar Refinery Company, Ltd., in Ahvaz, Khuzestan.

The construction of the most modern beet sugar factory in the Middle East, at Ahvaz, Iran, has many firsts to its credit. It is the first and only beet sugar factory in Iran to process beets from March to June from winter grown sugarbeets. Its first campaign began March 24, 1971, slicing the first sugar beet crop ever grown for processing in the semi-tropical province of Khuzestan in southwestern Iran, known 2,500 years ago as the "Persian Bread Basket", which supported the fabulous Persian empire of Cyrus and Darius.

The climate of this promising irrigated river plain compares with the sugarbeet producing areas around Phoenix, Arizona, and the Imperial Valley of California, where sugarbeets are grown during the fall and winter months and processed in the spring. The other 27 operating beet sugar factories in Iran process beets during the fall and first winter months as is done in most of the United States.

When His Imperial Majesty the Shah of Iran, accompanied by the Prime Minister and other state officials visited the Ahvaz factory late in 1971, he expressed his satisfaction with the Company’s achievements and said that it was encouraging to observe that experiments with the cultivation of winter sugar beets had been so successful.

This pilot project having been declared a success, large-scale farming operations in the production of winter sugar beets are expected to revolutionize agricultural and economic conditions in Khuzestan and make the province the center of Iran’s sugar industry. This is due to the far sightedness and determination of the Company’s founder and managing director, Prince Abounasr Azod.

During the Shah’s visit he emphasized to the Company’s directors and technicians the importance of keeping the sugar content of the beets high—at least 18%, and of raising 60 tons per hectare* (24 tons per acre). Before leaving Iran from his second assignment as a volunteer advisor, the Shah expressed his satisfaction with the Company’s achievements.

*The U.S. equivalent of a hectare is approximately 2.47 acres.

The first truckload of sugar beets to be delivered to the Ahvaz factory was brought in on March 15, 1971 by Mr. Dehdashghi. He harvested 65 acres of sugar beets, some yielding 30 tons per acre with an average sugar content of over 17%.
Mr. Andrews saw sugar beets that would surpass these figures for sugar production per acre. Yields such as these create new wealth for the community without depleting the natural resources as is done in the mining of minerals and in pumping of oil and gases which Iran has in such abundance.

The Ahvaz beet sugar factory has a daily slicing capacity of 2,500 tons of beets. Provision was made during its construction for a future slicing capacity of 4,000 tons per day. The total capital investment so far is $17.7 million. The new factory installations include the following major units:

1. A vertical diffuser.
2. A complete pulp dryer and pelleting mill with a pelleting and pulp storage warehouse.
3. A single upright circular sugar silo with storage capacity of 10,000 tons of white granulated sugar.
4. A Steffens Process (one of the three or four now in Iran).
5. A central tare house and beet laboratory for determining the individual sugar content of each beet grower's daily deliveries. This is also a first for Iran and will encourage production of high quality sugar beets.
6. The sugar end will produce granulated cube sugar packed for hotels, restaurants and private home use.

Iran's present beet sugar production from its 28 factories, plus the production from one sugar cane mill located in Khuzestan, does not furnish sufficient sugar to keep up with the increasing population and per capita sugar consumption. However, the prediction has been made that with the plentiful water supply stored behind the great Mohammad Reza Shah Pahlavi dam on the Karum river, there will be enough irrigated land to produce annually in Khuzestan two million tons of sugar beets. This will be enough to supply three or four additional beet sugar factories to be built in Khuzestan in the coming years and will assure an increasing source of income for farmers, technicians, implement companies, business and government revenues.
table of contents
editorial: you're a salesman, too! 3
research report to growers 4
petiole nitrate testing 9
latest in root maggot research 10
disease resistant varieties 12
foam spells doom 14
tailwater reuse stretches water supply 16
plants can kill themselves 18
new gws export subsidiary formed 19
a letter to NOSCO growers 20
erie flexes its muscles 21
controlling the last 15% 22
nebraska's new 10,000 lb. club 24

about the cover
The beautiful array of color on our cover is a sugar crystal. A polarized light was applied and the photography was accomplished with a micro lens. The crystal has been magnified 500 times.

UPBEET is solely devoted to the promotion of the most efficient, practical methods of sugarbeet production available to today's growers. Every effort has been made to provide information which will be of use to growers in producing greater tonnage, more sugar per acre and higher juice purity.

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UPBEET is a magazine for progressive sugarbeet growers.

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you're a salesman, too!

by C. W. Petitt
Senior Vice President — Sales

"YOU ARE PART OF THE GREAT WESTERN SUGAR COMPANY'S SALES TEAM". The grower, supplier, agricultural, research, factory and general office personnel, along with the broker, sales office personnel, etc., all make up that effective GW team which produces, sells and distributes approximately 1½ billion pounds of one of nature's purest high-energy foods.

On average, each man, woman and child in the U.S. consumes about a bit more than 100 pounds of sugar per year. Therefore, Great Western supplies the entire sugar needs of approximately 15 million people yearly in the Midwest. Being the largest beet sugar producer in the U.S. the company produces about 25% of our country's beet sugar supply. Domestically grown sugar, beet and cane, account for about 55% of the sugar consumed in the United States and the rest of our supply must be imported from many parts of the world, such as the Philippines, countries in Central and South America, the Caribbean, and the Far East.

During the past several years, the world has consumed more sugar than it has produced by using up the world inventory surplus. This demand is due partly to the emerging nations' increased standard of living and because these nations are attempting to provide their people with more balanced diets. Obviously, this is leading to far higher world prices as well as increasing U.S. prices, and this indicates the pressing need for greater sugar production worldwide.

Sugar is sometimes thought of as a luxury item because of the pleasant nature of the product. Far from being a luxury, sugar is an important item in our daily diet. Many will remember that sugar was one of the first items to be rationed during World War II, and one of the last to be removed from the rationing list.

At that time, a committee in Congress said, "For many years, it has been the policy of the United States government for defense and strategic reasons to preserve within the United States the ability to produce a portion of our sugar requirements. This has been done because sugar is an essential, vital product needed by American consumers."

Today, this statement is still true, and we must not overlook the importance of beet sugar and the industry that produces it.

Since World War II, there has been a tremendous change in the food buying habits of the American housewife. Convenience foods have become a way of life. For example, many of us can remember our mother baking a cake "from scratch". Buying the basic ingredients, flour, sugar, eggs, shortening, milk, etc., and mixing up her own. Today, most of us buy a box of cake mix from the grocery shelf containing all of those ingredients, including sugar. Keep in mind that since 1920, sugar consumption has not appreciably changed from about 100 pounds per person per year. However, today, less than 25% of the sugar consumed is purchased by the housewife in a five or ten pound package at the grocery store. Instead, she buys much of the sugar consumed by her family in the form of convenience foods; and therefore, we at Great Western find ourselves selling and distributing more of our sugar to food processors, such as canners, bakers, confectioners, and the soft drink industry. About 20% of our total production is packaged for the consumer at our Brighton, Fremont, Billings and Scottsbluff factories. The remainder is produced and sold in the form of 100 pound bags, in bulk, and in liquid form to the major food processors.

All Great Western sugar is marketed through food brokers. These brokers handle other food items which partially accounts for their efficiency in being able to handle our sales volume at a cost less than 1% of the selling price of the sugar. This efficiency and low cost is extremely important and few industries could point to such a low sales cost.

At Great Western, we produce high quality sugar; and we, of course, must deliver our product to our customers with that same high quality. But just as importantly, we must stress the service and reliability of our Company and its growers. We, of the Great Western sales team, have to keep in mind that to make the buyer want Great Western sugar rather than our competitor's product, WE MUST SELL GW QUALITY, UNSURPASSED RELIABILITY, AND SERVICE.

An important factor in GW's reliability is the continuous and adequate supply of sugarbeets which makes it possible for GW to be a dependable and regular supplier of sugar to all our customers.
from the grower-gw joint research committee

For some time, the members of the Grower-GW Joint Research Committee have felt that growers should have a comprehensive, written report on the results of the research their dollars are helping to fund. Here is the first such report, and we feel that UPBEET presents an appropriate vehicle to carry the details to you.

You will note that in addition to the standard seed evaluation tests sponsored by the Committee, research into some of the more pressing sugarbeet production problems is now being sponsored through grants-in-aid to state experiment stations throughout the GWS growing area. We sincerely believe this program will speed the eventual solution of many problems to the mutual benefit of all our growers.

As in the past, committee members invite your comments and suggestions, as only in this way can we be sure that the interests of all GWS growers are being served satisfactorily. Also, please remember that the universities and experiment stations encourage your interest in the research in progress.

Kish Otsuka, Co-Chairman
Waldo Peterson, Co-Chairman
Grower-GW Joint
Research Committee

colorado report

A study aimed at reducing wind erosion in sugarbeet fields got underway last fall under the supervision of Professor Alex Dotzenko of Colorado State University. He seeded three small grains (wheat, barley and rye) to find out how they survived the winter, and this spring he seeded sugarbeets in the same fields after using chemical and mechanical methods to kill the seeded grains. Professor Dotzenko is also evaluating different systems of seed bed preparation, sugarbeet seeding and irrigation practices at 12 sites in the Wray and Joes area of eastern Colorado. After harvesting the tests this fall, he will be able to begin making recommendations for better ways to grow sugarbeets in wind-swept areas.

Improving sugarbeet quality through nitrogen management was a research project undertaken by Dr. John Reuss of CSU. Last year, he, Joe Giles and Dr. Al Ludwick determined the difference in effect of four rates of nitrogen fertilizer on sugarbeet yield and quality in eighteen different tests throughout Colorado.

Results from one year's testing show interesting trends. Sugarbeet yields were increased in only three of the test fields by applying nitrogen fertilizer, and in all of those three fields the nitrate nitrogen in the soil was low. The researchers found that in considering soil nitrate nitrogen only, sugarbeet yields will continue to increase as the amount of nitrate increases to a limit of around 200 pounds per acre. However, Dr. Reuss concluded that chances of increasing beet yields by applying nitrogen fertilizer were good only if the soil nitrate level was below 100 pounds per acre. The chances are poor, he says. In other words, both soil nitrogen and fertilizer nitrogen are
Influence yields but soil nitrogen is more important.

As expected, sucrose percentages generally were lowered by applying nitrogen fertilizer—100 pounds of fertilizer nitrogen decreased sucrose by 45/100 of one percent. Other factors were also very important. Higher nitrate nitrogen in the profile decreased sucrose content—the studies showed that each 100 pounds reduced sucrose by 85/100 of one percent. Date of harvest also played an important part—sucrose increased almost 20/100 of one percent per day between September 25 and October 16. But stand was also important—for each additional ten beets per 100 feet of row, sucrose increased 14/100 of one percent.

The CSU researchers also investigated petiole (leaf rib) nitrogen and concluded that nitrate levels in petioles can be related to nitrate levels in the soil at planting, but predicting sucrose content at harvest from early season testing has not been satisfactory. Tests are being conducted again this year.

At the Northern Colorado Research-Demonstration Center, located northeast of Greeley, a study involving rotations with cash crops is underway, with particular emphasis on two objectives: (1) To evaluate four cash cropping systems using modern agricultural technology to maintain a high level of production over a period of years, and (2) to evaluate the use of manure within each cropping system. In that particular area, large quantities of manure are available from feed lots, and have been used abundantly on cash crops. How often manure should be applied and on which crops in the rotation will be one of the important questions researchers hope to answer in the study. The basic purpose of the study, however, will be an economic comparison of some of the more common cash cropping systems, because complete cash cropping systems have become more acceptable to farmers.

Kansas Report

At the Northwest Kansas Irrigation Demonstration Farm at Goodland, 90 acres of sugarbeets were grown on irrigated land under the direction of LeRoy Evert, farmer-owner, and DeLynn Hay, Kansas State University extension agricultural engineer.

Production data for the 90 acres showed 15.19% sucrose and yields of 16 tons per acre.

Results for the special demonstration in 1972 were somewhat inconclusive because of high residual nitrogen levels and hand planting of sugarbeets, which adversely affected fertility and plant population tests.

For 1973, a portable solid set sprinkler will be installed on the six acre beet field. Plans call for irrigations by the sprinkler to be scheduled according to soil moisture levels. A secondary use of the system will be that of crop cooling during the season. Furrow irrigation will be used to irrigate a 90 acre beet field.

Special demonstrations will be continued with the exception that sugarbeets will be planted by machine this year to reduce emergence and labor problems encountered with hand planting. Additional management data to be collected in 1973 will include the distribution of water by the sprinkler system; water intake rate variations during the season; and soil moisture values.

At the Colby, Kansas, experiment station, tests showed that sugarbeets yielded as much when they received one inch of irrigation per week as when they received two inches. More testing this year will show the influence of rainfall on the efficiency of use of irrigation water. Three year studies with nitrogen fertilizer applications show that best sugarbeet yields and sugar production are obtained with 100 to 150 pounds of nitrogen per acre.

Montana Report

With grants from the Grower-GW Joint Research Committee, new projects were initiated by Montana State University in 1972 to study the effects of soil fertility and irrigation management upon the production of sugarbeets.

In one experiment, directed by D. M. Erb, assistant soil scientist, plots were established to determine the influence of three irrigation practices and ten different fertilizer practices upon yield of roots, sugar content and juice purity of beets. The first year's results indicate that irrigation practices chosen for the experiment generally had little or no effect on sugar production; although the maximum watering practice apparently leached some of the nitrogen out of the root zone so sugar content and juice purity of those beets were higher. No fertilizer practice
influenced total gross sugar yield per acre, but application of 200 and 300 pounds of nitrogen per acre produced a significantly lower sugar content and juice purity than did zero and 100 pounds of nitrogen per acre. The application of phosphate and potassium fertilizers had no effect on any character, indicating the trial field was adequately supplied with these nutrients in 1972. This particular research is expected to be continued for three to five years.

Two nitrogen fertility experiments were conducted on sugar beets by Don Baldridge, agronomist at the Huntley Station, with the objective of getting data from which accurate nitrogen fertilizer recommendations can be made from testing soil for nitrate and organic matter content. At the two trial sites, which differed greatly in residual nitrogen, the fertilizer nitrogen requirements were accurately predicted. At the assumed optimum rate, maximum yield of roots was obtained without sugar content and juice purity decrease.

Baldridge assumed the nitrogen requirement for beets to be ten pounds per acre per ton of beets. In figuring the nitrogen requirement to be added then, the formula is: Tons expected X ten, reduced by the amount of nitrate nitrogen in the top four feet of soil and by 20 times the organic matter percent in the top foot of soil. This calculation of nitrogen application is very similar to that used by other states in the western beet growing areas.

Montana State University conducts other sugar beet research besides that which is funded by the Committee. Sugar beet herbicide experiments have been conducted for the last 20 years at Huntley, Sidney and in some years at Corvallis, and these results along with the results from GWS research have been used for formulating herbicide recommendations. The role of organic matter in growing sugar beets is being studied at the Sidney Station under the guidance of Glenn Hartman, associate soil scientist. 1972 results indicate light applications of manure (ten tons per acre), 50 and 100 pounds inorganic nitrogen and alfalfa plowed down were the most favorable treatments for sugar beets, considering yield of roots and sugar content.

nebraska report

At the University of Nebraska, Scottsbluff experiment station, studies covered seed, fumigation and sugar beets quality resulting from proper use of nitrogen. Major emphasis was placed on improving sugar content and purity by controlling nitrogen used for crop production. A fertilization recommendation study involving 390 cooperating growers was undertaken where fields were sampled to depths of three to six feet. Nitrate nitrogen measured in the soil profile was used as the base for predicting the requirement of additional nitrogen for maximum production. While results varied because of the wide range of management practices encountered, there is little question future programs will be based on information gained from this type of study. Table 1 clearly indicates the effect of nitrate nitrogen in a 6-foot profile on sugar content percentage.

Table 1. Nitrate nitrogen content in six-foot soil profile from 32 fields and the sugar content of sugar beets grown on these fields. The tests were conducted following harvest.

<table>
<thead>
<tr>
<th>Number of fields sampled</th>
<th>Nitrate nitrogen in 6-foot profile lbs./acre</th>
<th>Sugar content %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>9</td>
<td>18.42</td>
</tr>
<tr>
<td>6</td>
<td>21</td>
<td>17.47</td>
</tr>
<tr>
<td>5</td>
<td>41</td>
<td>16.68</td>
</tr>
<tr>
<td>10</td>
<td>66</td>
<td>14.74</td>
</tr>
<tr>
<td>5</td>
<td>129</td>
<td>14.01</td>
</tr>
</tbody>
</table>

Another approach to studying the problem was used in which 150 six-foot soil samples were taken in June, 1972, after the sugar beet stands were established. Results from this study clearly define the relationship between high nitrate levels and low sugar content. A study of the second year response of corn and field beans to soil fumigants was also conducted. The conclusion drawn from this study was an overall yield increase of 3.9 bushels per acre on Great Northern beans and a 7 bushel per acre overall yield increase on pinto beans. Corn yields were not consistently affected by previous soil fumigation. Indications are that the root maggot problem was slightly less in fumigated plots.

wyoming report

The root maggot continues to be the number one insect pest on sugar beets in Wyoming. An experiment was set up by the University of Wyoming to compare and evaluate different methods of placement, incorporation and timing of insecticides with respect to their effectiveness in controlling sugar beet root maggot. Dr. Chris Burkhardt, head of entomology
and Dr. Clarence F. Becker, head of agricultural engineering, at the University were leaders of the study. Experimental work was done on the Lloyd Snider farm in the Heart Mountain area, the Alvin Justus farm near Manderson and the Bruce Murray farm near Powell.

Two standard insecticides, Thimet 15G and Diazinon 14G, both with federally approved labels, were applied separately as a planting time treatment and a post-emergence treatment. The planting time treatment was metered on by means of two Gandy three-row granular applicator boxes and was applied immediately after planting using five different incorporation units. These units were drag chains, injector tubes, Sinner weeder, Lilliston wheels, and a finger weeder. One row was given no incorporation.

Post-emergence applications were applied about five weeks after planting when the beets were in the two to eight leaf stage and when adult flies were beginning to appear. The same method of incorporation was used with one exception—the Sinner weeder was replaced with four rotary hoe wheels spaced one and three-quarters inches apart. All plots were cultivated once before the post-emergence application.

Several criteria were used to evaluate the effects of the two insecticides used with the various methods of incorporation and pre-emergence vs. post-emergence time of application.

Thimet and Diazinon both performed satisfactorily in the experiment, but Thimet appeared somewhat more effective. Post-emergence treatments were somewhat better than planting time treatments. The best method of incorporation is still inconclusive. Further research is needed and will be conducted this year.

Dr. Burkhardt also did some research using both a planting time and a post-emergence application of insecticide on the same field. Preliminary results indicated that where both a pre and post application were used, the insecticide performed better than where only a single application was used.

Research studies using both a pre
and post application of an approved insecticide will be expanded this year.

committee-sponsored seed testing

This year, independent seed testing trials are being carried out in 12 locations in five sugarbeet-producing states. Fifteen varieties are being tested, of which five are new ones being tested for the first time. Not all varieties will be tested at all locations, but they will be tested in the areas in which they seem to be most adapted.

At each test location, each variety will be replicated six times. Those varieties which are being tested for later use in areas where disease could be a problem receive special treatment. They undergo testing for curly-top resistance at the USDA’s Agricultural Research Service station at Logan, Utah, and leaf spot resistance testing by the USDA at Ft. Collins, Colorado.

Project leaders for seed testing are:

Colorado—W. R. Schmehl, CSU Experiment Station
Kansas—J. R. Lawless, KSU Colby Branch Station
Montana—D. E. Baldridge, MSU Southern Agricultural Research Center
Nebraska—F. N. Anderson, University of Nebraska Scottsbluff Station
Nebraska—P. T. Nordquist, University of Nebraska North Platte Station
Wyoming—Ross Richardson, University of Wyoming Agricultural Experiment Station
G. A. Smith, USDA, ARS, Ft. Collins, Colorado
D. L. Mumford, USDA, ARS, Logan, Utah

Growers are welcome to observe the varieties under test. For further information about the varieties and test locations, interested growers are requested to contact their local research committee members, whose names appear in the following listing:

Colorado
Frank Barnes
Longmont, Colorado

Photos courtesy University of Wyoming

FINGER WEEDER

SINNER WEEDER

NO INCORPORATION

Walter Dittmer
Brighton, Colorado
William Dike
Goodland, Kansas
Robert Gerk
Holyoke, Colorado
Roy ‘Ole’ Johnson
Eaton, Colorado
Kish Otsuka
Sedgwick, Colorado
Henry Wiltfang
Vernon, Colorado

Nebraska
Kenneth Carpenter
Lyman, Nebraska
Ray Lind
Lyman, Nebraska
Charles Reisig
Scottsbluff, Nebraska

Montana
Joe Alles
Billings, Montana
Ishmael (Babe) Yost
Billings, Montana

Wyoming
Paul Rodriguez, Jr.
Powell, Wyoming
Dennis Smith
Powell, Wyoming
The merit of petiole (leaf stem) nitrate testing has been the object of much discussion in the sugarbeet industry. This is the technique of analyzing sugarbeet leaf petioles for nitrates (NO₃⁻) and using the results to determine fertilizer requirements. Some feel this practice is useful, while others are not enthusiastic.

The GWS agricultural staff has used petiole testing for a number of years, and believes it is a valuable tool, used in conjunction with other practices. But although it is useful, it should not be relied on to do the whole job of nitrogen testing.

How does it work? There are two popular methods of determining nitrate content of petioles. (1) Use of a reagent known as diphenylamine, and (2) a laboratory method using a nitrate ion specific electrode. The laboratory method is more accurate, giving results in parts per million (ppm). Unfortunately, this method is more difficult and time consuming than the diphenylamine test, and requires special laboratory equipment. Naturally, it is not feasible for use by the average grower.

The easier method (diphenylamine reagent) is not as precise, but is practical and can be used effectively by anyone with a minimum of training. Another advantage is that no special, expensive equipment is required. Since this method is the most practical for an accurate "on the spot" analysis, let's look at it more closely.

Equipped with the reagent and the knowledge of how to use it, an individual can determine the current nutrient status of sugarbeets in relation to nitrogen; he can predict when a beet field will need additional nitrogen; and in some instances he can predict when the crop will deplete the nitrogen supply in the soil. All of these determinations can be useful to the grower.

**blue indicates nitrogen**

For instance, it is possible to test plants in a given field at any time during the year and from the reaction of the diphenylamine reagent determine if more fertilizer is needed for optimum yield. The reagent, which is a combination of diphenylamine and concentrated sulfuric acid, combines with the nitrate in the juice of the leaf petiole and forms a blue color which varies in its intensity and rapidity of development with the concentration of nitrate present. Simply, this means that if the nitrate content of the plant is high, a dark blue color develops immediately when reagent is dropped onto the cut surface of the petiole. As the nitrate content decreases, the color becomes lighter and lighter blue and develops more and more slowly. Plants which are very deficient in nitrate will show no blue color at all when reagent is applied to the petioles.

In practice, two categories of nitrate availability are recognized — enough and deficient. If the reaction indicates a deficiency and there are more than eight weeks left before harvest, additional fertilizer* may be needed to obtain maximum sugar yields.

*Growers should keep in mind, however, that no nitrogen may be applied after the date specified in their contracts without written permission from the Company.

careful interpretation required

Some caution should be used when interpreting the results (and handling the reagent) of the diphenylamine test. The reagent is quite sensitive and differences in nitrate content between different areas of the same field can be easily determined. It is, therefore, necessary to take representative samples from the whole field before drawing any real conclusions. Things to watch out for are the head ends of fields which have moderate slope or head ends of fields where long irrigation runs are used. These areas are easy to get to and test but many times they show a slight deficiency in nitrate that is not characteristic of the remainder of the field. Also, watch out for small areas of the field which have had a different cropping history than the majority of the field.

It is a well-known fact that nitrate content of sugarbeet petioles starts out low in seedling beets and continues to increase, peaking sometime during the summer. There are a few exceptions to this pattern but generally this is true. In eastern Colorado, Nebraska, and Montana, the peak comes around the middle of July. After the peak, the petiole nitrate content decreases at a fairly constant rate. Ideally, the nitrate content at the peak should be low enough so the petioles reach 1,000 ppm nitrate or less about four to six weeks before harvest. Low nitrate content is one of the factors which stimulate the sugarbeet plant to produce sugar. Other factors are temperature and plant maturity.
what's new in root maggot research?

laboratory test

Using the laboratory technique to test for petiole nitrate, one can predict at what time during the year the petiole nitrate values will decrease to 1,000 ppm and, therefore, theoretically predict when to harvest the beet crop and obtain maximum sugar yield.

This can be done by sampling at two dates after the peak is reached and fitting this data into an equation. Then, Z!P! out comes the answer. But it may be something like this, "You should harvest this particular field on December 23, give or take a week." This somewhat ludicrous example points out one of the difficulties in using petiole nitrate values in predicting a harvest date. While it is true that this method is successful in areas where time of harvest is somewhat flexible, in our area where the weather plays an important role in determining when to harvest, such answers are of little practical use.

The diphenylamine test can be used by growers to determine which of two, or more, fields to harvest first.

In summary, petiole testing either in the laboratory with the nitrate specific ion electrode or in the field with diphenylamine reagent can be and is a valuable tool. But don't expect it to do too much.

Used in conjunction with—not in place of—deep soil testing, an excellent fertilizer management program can be developed on an individual grower basis.

The sugarbeet root maggot continues to be the most serious insect pest on sugarbeets in Colorado, Wyoming, and Montana. Crop damage caused by this insect is particularly severe in Wyoming because (1) unique climatic conditions there favor the survival and multiplication of the root maggot and (2) insecticides used for control are short-lived and often injurious to seeding beets.

The GW Agricultural Research Center is one of several agencies maintaining a continuing maggot research program to find better ways of controlling this insect pest so that a profitable beet crop can be produced. Some highlights of GW research programs are presented below.

wyoming research expanded

Recently, Robert (Bob) Vergara, formerly an agriculturist at Sterling, Colorado, joined the GW research staff to work on the root maggot problem in Wyoming. Bob is stationed at Powell, Wyoming, and is responsible for establishing large-scale research—demonstration plots in the Powell area. He will concentrate on evaluating various application methods using insecticides registered for root maggot control. Data obtained this season from the demonstration plots set up by Bob should provide additional information on effective root maggot control.

David Rademacher, research manager for the Montana-Wyoming District, will devote more time this year to root maggot research in Wyoming. His study will involve a comparison of various application methods with and without timely post-emergence irrigation.

Adequate soil moisture is essential to activate an insecticide in the soil, particularly in late May and early June when root maggot eggs start hatching. Normally, surface soil at this time is dry, which seems to be one of the main reasons that inconsistent insecticide performance frequently occurs in Wyoming.

in-furrow application

Prior to 1965, applying Aldrin in the seed furrow at planting was the standard practice for control of root maggot, but Aldrin and other chlorinated hydrocarbons have been banned by the FDA. The majority of the commercial insecticides available today are injurious to beet seedlings when they are applied in the seed furrow. Consequently, growers are relying on other application methods to avoid chemical injury. Research, however, has revealed that certain formulations of both labeled and unlabeled compounds are either harmless or less injurious to beets when they are applied directly in the seed furrow.

In-furrow application is probably the easiest and simplest way to apply an insecticide for control of a variety of soil inhabiting pests including sugarbeet root maggots and flea beetle larva. Extended field testing is planned in 1978 to evaluate the performance of some candidate materials under actual field conditions.
new insecticide

COUNTER, a new soil insecticide developed by American Cyanamid, is one of the most promising new compounds the GW Agricultural Research Center has screened for root maggot control. ARC data indicate that it is highly dependable and performs consistently in both Colorado and Wyoming under all conditions. A commercial label on sugarbeets is anticipated for the 1975 season.

juvenile hormones

Unlike most conventional insecticides, a juvenile hormone compound does not kill insects immediately. Instead, it prevents insects from maturing. ALTOSID, a compound manufactured by Zoecon Corporation, reduced the root maggot adult emergence by 70 percent when the material was applied early in the season. This compound, particularly in combination with other conventional insecticides, looks highly promising and may provide us with a new tool in our continuous battle against the root maggot.

'73 control measures

Fields planted to beets that have not been in beets for several years should be treated with a recommended insecticide if they are located close to fields which have been known to have heavy infestations. In fields with very light maggot infestations, a post-emergence insecticide application is a practical and economical method of control.

For post-emergence use, apply Diazinon or Temik at the above rates when sugarbeets have two to four true leaves. Use a five to seven inch band and scratch the insecticide into the soil. Plan to irrigate immediately after the post-emergence application.

<table>
<thead>
<tr>
<th>INSECTICIDE</th>
<th>PRODUCT RATE (lbs./A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Colo.</td>
</tr>
<tr>
<td>Diazinon 14G</td>
<td>11</td>
</tr>
<tr>
<td>Dyfonate 10G</td>
<td>11-15</td>
</tr>
<tr>
<td>Temik 10G</td>
<td>15</td>
</tr>
</tbody>
</table>

Bob Vergara (left) and his applicator-planter unit in action near Powell, Wyoming. This versatile applicator unit can handle five different types of incorporation.

In-furrow insecticide application unit using a modified belt applicator.
research on disease resistant varieties looks promising

Plants, like humans, are susceptible to diseases that ravage their systems and even destroy them if not checked. Fortunately, not all plants are susceptible to the same degree. For instance, certain sugarbeet varieties are more resistant than others to two important diseases of sugarbeets—Rhizoctonia root rot and Fusarium yellows.

In recent years, plant breeders have been able to create varieties having natural disease resistance by a method of intense selection under conditions of natural or artificial disease epidemics. This program is difficult and very time-consuming, and the breeders are faced with the problem of creating disease resistant strains without losing any of the desirable production characteristics.

Rhizoctonia unpredictable

Next to the sugarbeet nematode, Rhizoctonia root rot causes the greatest loss of any disease of sugarbeets. Chemical control of this soil borne disease has, so far, not proven feasible because of high cost and the impossibility of predicting with certainty which fields or parts of fields will be affected.

Varieties with built-in resistance to the Rhizoctonia organism would obviously be the cheapest and best method of control. But massive efforts by many sugarbeet breeders to select resistant varieties were unsuccessful until 1967, when John Gaskill isolated two groups of plants which were genetically resistant. At the time of his achievement, Gaskill was a researcher for the USDA in Fort Collins, Colorado. He has since retired.

Progeny of the plants he selected were resistant under conditions which caused other varieties to die from the most common type of Rhizoctonia, and they were also resistant to other Rhizoctonia races.

Great Western sugarbeet breeders obtained seed from those lines and produced experimental hybrids. These have proved to have an intermediate resistance which would prevent some loss from the disease. However, tests under disease free conditions indicate that the resistant strains have a poor combining ability compared to the pollinators usually used for Monohy seed production. Therefore, if the resistant strains were used as is in breeding commercial hybrids, they would probably reduce the loss from Rhizoctonia but production would be decreased 10 to 15 percent where the disease was not present. Obviously, these strains cannot be used as they are now, but research is continuing to improve them.

Researchers haven’t yet discovered whether the new sugarbeet strains and/or their hybrids will withstand the intensity of root rot as sometimes exists under natural field conditions. The use of hybrids involving the Rhizoctonia resistant strains in small plantings in many fields will have to be made to answer this question.

gws testing

What is Great Western Sugar doing to speed the development of Rhizoctonia resistant varieties? First, there is a search for male sterile parents which might impart some resistance to a hybrid and counter some of the poor combining ability of the resistant strains.

Severe Rhizoctonia root rot infestation.
If progress goes according to plan, a reasonably good Rhizoctonia resistant variety may be available to growers in three or four years.

Second, inbred lines and other variety components in Great Western's breeding stock will be screened for possible Rhizoctonia resistance.

Third, to achieve a combination of maximum production and resistance in the same variety, a long term program of breeding has been planned. Reliable selection techniques developed by Gaskill are available so that genetically resistant beets can be isolated. Hybridization of the GWS lines which have maximum combining ability is being made with the Rhizoctonia resistant strains. Following a number of backcrosses and selections, the Rhizoctonia resistance level of Mono-Hy varieties will eventually be increased.

**fusarium yellows**

An old and familiar enemy of sugarbeet growers in parts of the South Platte River valley in Colorado is a root rot disease called Fusarium yellows. Recently, the disease began again to cause economic losses in the valley, which is a beet producing area of long standing.

Two fields which had histories of the disease were selected for disease nurseries in 1972 so GWS plant breeders could screen existing varieties for resistance. In 1973, Mono-Hy F sugarbeet seed was made available to growers in the valley to help combat the disease.

None of the existing varieties were found to be immune in the screening field, but Mono-Hy F had more resistance than Mono-Hy A1 or the old open pollinated varieties, as show in the following table:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Sterling, Colo.</th>
<th>Hillrose, Colo.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-Hy F</td>
<td>56.0</td>
<td>38.7</td>
</tr>
<tr>
<td>Open Pollinated</td>
<td>44.6</td>
<td>33.3</td>
</tr>
<tr>
<td>Mono-Hy A1</td>
<td>25.1</td>
<td>16.5</td>
</tr>
</tbody>
</table>

Mono-Hy A1 is not recommended for farms known to have an infestation of Fusarium yellows, because of its high susceptibility.

In small plot tests, several inbred lines were identified as being nearly immune to Fusarium, which will make it possible to produce a highly resistant hybrid variety. GWS plant breeders are stepping up research so that commercially satisfactory varieties with Fusarium resistance may become available as quickly as possible.

Mono-Hy F is recommended only for those farms known to be troubled with Fusarium. Where the disease is not a problem, Mono-Hy F will probably not be as productive as Mono-Hy A1. So unless the field history indicates a significant loss may be expected from Fusarium damage, growers should use the variety recommended for their specific areas.
foam spells doom for weeds

Startled tourists driving through Colorado this summer may think the foamy beet fields they're starring at are being readied for some type of dish washing detergent commercial to be filmed there. But what they'll actually be seeing will be testing of a new foam application procedure for herbicides.

Among the new practices being introduced for pest control, foam application appears to be especially promising, and it can be done by either aerial or ground methods.

There are several advantages to applying pesticides as a foam, rather than in the conventional spray. For example, the big advantage of applying post-emergence herbicides in foam is drift control. Foam spraying systems produce large spray droplets without the misting which is common in fan type spray systems. Large droplets, being heavier, have less tendency to float in the air and move off-target, particularly in windy conditions. Another advantage is that chemicals, particularly translocated herbicides, can be applied with little loss into the environment, which is a worthwhile objective in itself.

Air generated foams produce a thin, soapy film on plant leaves. Spray adjuvant (a chemical additive) causes the droplets to spread over and to stick the chemical on the waxy leaf surface. It is thought that this wetting action promotes the penetration and toxicant absorption rate into weed leaf tissue without side effect injury to the crop.

Foam systems expand the spray mix by adding approximately four parts of air to one part water. Spray tank refilling is significantly reduced and ground coverage and flying time improved. Air emulsion foams are white in color and last long enough to permit the applicator to guide on the spray pattern. This helps improve application accuracy by enabling the applicator to avoid overlaps and skips.
Application of pesticides by the foam method is ideal for agricultural spraying because it minimizes drift and reduces the number of tank refills.

**Foam System Components**

Foam application systems consist of two parts—a venturi type nozzle and liquid additive. The venturi nozzle assembly contains an orifice disc and strainer, foam generator, nozzle tip and pipe adapter. The nozzle incorporates air and the liquid additive or detergent helps entrap it in the spray solution. The systems are designed to replace conventional fan spray systems by a simple interchange on existing equipment.

**Test Results**

Only limited tests have been conducted on foam application of post-emergence herbicides on sugarbeets. For example, Betanal tank mix (Betanal plus Betanal 475) was applied in foam overall by ground rig under a center pivot sprinkler at the Jim Schneider farm near Greeley, Colorado. Control of common (redroot) pigweed was excellent from foam application when compared to ordinary flat fan or cone nozzle systems.

**Test Plans for '73**

Because of widespread interest in foam application by growers throughout the country, GWS will expand testing this year. Post-emergence herbicide applications in foam are being fully tested at the GWS Agricultural Research Center and on growers' fields this season. Strip tests have been established in each factory district in which commonly-used chemicals, including Betanal herbicides, are being compared, applied in foam and also applied with the flat fan nozzle. Results from the tests will be reported to growers as soon as the trials are completed, promises Dr. Ed Sullivan, GWS herbicide specialist.

"The foam idea," Sullivan points out, "is only a small part of the substantial progress that has been made with respect to chemical weeding in sugarbeets during the past decade. The new herbicides that have greatly improved control of weeds which infest sugarbeets, and the new systems for herbicide application, have greatly enhanced and simplified beet production."

The startled tourists probably won't realize it, but what they'll be seeing is still another farming improvement that helps bring sparkling white sugar to their tables.
can help you lick water shortage problems

As America's population increases, so does its water usage. The demand for water is echoed by rural and urban people alike; yet, the amount of water available is limited. As urban areas enlarge their boundaries, water that once might have sustained crops now becomes the life blood for lawns, parks, and is soaked up by other urban uses.

The urban demand for water has even reached well water users through new groundwater regulations. Some areas face lowering water tables because aquifers cannot be recharged at the same rate they are being pumped.

It is easy to see why the need for efficient water use is being stressed more each day and why the topic is of prime importance to growers.

What can we do to alleviate the problem? One practical technique that will increase water use efficiency is the reuse of irrigation runoff. This includes the collection, storage and redistribution of runoff by a tailwater reuse system.

many now in use

Tailwater reuse systems are relatively new to Great Western's irrigated areas but many growers have already installed them where one or more of the following factors apply:

1. Water shortages arise during

Large capacity tailwater reservoir with floating pump.

2. Pumping and ditch water costs are high enough to allow for investment in a reuse system.

3. Runoff water is uncontrolled and damages a neighbor's land, county roads, or causes other problems.

4. Additional land becomes available for irrigated crop production if runoff is stored and reused.

5. Non-uniform irrigations occur because irrigation water must be shut-down before the field is irrigated, due to lack of runoff control.

6. Required by regulation.

Factors favoring tailwater reuse relate to the economics involved in crop production as well as to the efficient use of water.
The components of a tailwater reuse system may vary according to the needs of a particular grower and can be classified into three general categories. These are the collection, storage, and redistribution segments that were previously mentioned.

**collection**

The collection of runoff frequently receives less attention than it deserves because several problems that may crop up later can be prevented by proper runoff collection and conveyance to the storage area. Before collected runoff is allowed to enter the storage pit or sump, a major portion of the surface trash and suspended soil should be removed. Otherwise, this material will settle out during storage, or could plug gated pipe valves and siphon tubes. Floating trash can be removed by commercially available trash screens that fit in the collection ditch or by a homemade device that skims the surface of the water. If the surface trash can be tolerated in the storage area, various screening techniques can be used at the pump inlet.

Suspended soil in the collected runoff should be settled out before the water is allowed to enter the storage area. To accomplish this, the flow rate of the water must be reduced so that soil can settle. The easiest way to achieve this is to widen the collection ditch upstream from the storage inlet so that it functions as a settling basin. The size of the settling basin will depend on the volume of runoff expected and how often the sediment can be removed. Remember, it is easier and cheaper to clean a settling basin periodically than to dredge a large volume reservoir.

**storage**

The storage component of a tailwater reuse system is usually one of two types. The majority of systems currently in use are reservoirs or pits with a capacity of several acre-feet. The size of the reservoir is altered to best utilize available land or to handle expected runoff volumes.

The other alternative for storage is the sump, which has a much lower capacity than the reservoir. Here, only several hundred gallons can be accumulated before the sump must be pumped.

**redistribution**

Specific farm needs will determine the type of redistribution system to be used. Basically, the water can be pumped or allowed to flow by gravity. In addition, tailwater can be reused by distribution to the same field as supplemental water or to a separate field entirely.

**the overall system**

Design of a tailwater reuse system involves consideration of each of the three components and how they relate to each other. For example, a sump could be used where tailwater is elevated by a pump to a supply ditch for reuse on another field. Here the flexibility available with system design can be used to advantage in achieving a simple, low cost system that reuses runoff which previously might have been wasted.

The value of tailwater reuse for improving water use efficiency can be readily seen, but there also exists the possibility of added returns to the grower. Where restrictions do not prohibit the collection and reuse of tailwater, growers can increase profits by irrigating additional land or increase yields through more uniform irrigations. The grower can receive additional dollars for his efforts and at the same time make the most efficient use of a limited water supply.
it can happen

plant can generate nitrite to kill self


A University of Nebraska agronomic researcher has identified the mechanism by which herbicides kill plants.

Heretofore unknown, the discovery is believed to have far-reaching significance to agriculture. Most significant, perhaps, is a laboratory procedure based on the new information that can rapidly and accurately identify chemicals that possess herbicidal properties.

Announcement of the discovery by Dr. Lowell Klepper, Assistant Professor of Agronomy, was made at a news briefing at Lincoln recently, attended by top NU officials and representatives of the Agency for International Development, U. S. State Department and Agricultural Research Service, USDA.

Refinement of the technique with its potential application to a wide spectrum of problems across the entire plant science field was accomplished by Dr. Klepper while working as a plant physiologist under a contract between AID and the University to search for wheat strains with a higher protein content. The cooperative wheat improvement program involving NU and the Agricultural Research Service has been underway for many years, and was extended in scope in 1966 under the AID contract.

Dr. Klepper, who worked for 2 years at the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, joined the NU agronomy staff as a member of the wheat research team in July, 1972. His initial discovery of the technique came in October, in conjunction with his study of metabolism in high protein wheat varieties.

The discovery was a scientific spin-off from the wheat protein research. Dr. Klepper fortuitously used a commercial herbicide attempting to block a step in protein synthesis. The herbicide worked. Other herbicides worked also. In fact, they were the only group of chemicals investigated by Dr. Klepper that would accomplish this.

In the process of nitrate utilization by plants, which occurs throughout their life, nitrate must be reduced to ammonia so that amino acids can be formed. These amino acids are the building blocks of protein essential to human and animal nutrition.

Nitrite is an intermediate form of nitrogen in this reduction process and is not normally detected in plant tissue because it is reduced very rapidly to ammonia. Herbicides block this reduction of nitrite.

According to Klepper, after herbicide treatment the plant loses control of its carefully designed enzyme system and generates sufficient nitrite to kill itself. This is because nitrite is poisonous to the plant. The nitrite accumulates only briefly, then is rapidly converted into a different form of nitrogen and disappears.

Chemicals that selectively kill weeds and other undesirable plant species are the basis for a multi-million dollar agricultural industry in the manufacture of herbicides. The mode of action of these weed killers was not known until Klepper's discovery.

Armed with this new information, Dr. Klepper has been able to devise laboratory procedures that will quickly and accurately identify chemicals with weed killing capabilities. He believes that these procedures will permit the agricultural chemicals industry to quickly tailormake effective and acceptable herbicides for farmers.

Klepper's technique also makes it possible to measure the capacity of crop species to reduce nitrate nitrogen to nitrite nitrogen. This step may be the major limiting barrier to development of crops such as wheat with higher protein content.

"First, this country produces only a little more than half of the sugar it consumes, so we rely on imports for the rest. Second, history shows that sugar consumption increases in a country as its standard of living rises, which is occurring today in many countries throughout the world. Consequently, the world demand for sugar is rising, and will probably continue to do so for many years to come."

As transportation and communications methods improve, the world grows smaller and smaller. Dr. Army pointed out. And those who recognize that and go out to meet the world will be the leaders of tomorrow. The United States and its people simply cannot survive under a policy of isolationism today, he concluded.
great western sugar looks to foreign markets

Formation of a new subsidiary, the Great Western Sugar Export Company, marks the official entry of this Company into a concerted effort to market its products and expertise overseas.

For some time, GWS officials had felt that a potential market for Great Western’s Mono-Hy sugarbeet seed and modern sugarbeet production technology was being overlooked. Several studies were initiated, which confirmed that a market did, indeed, exist.

For example, Dr. T. J. Army, vice president-agriculture and technical services, reports, “Field tests conducted last year in twelve foreign countries showed that many of the GW hybrids are particularly well adapted in several of the beet growing areas there. We are all optimistic regarding the potential of this new venture and what it could eventually mean to Great Western.”

Dr. Army listed other factors that influenced the GWS entry into international marketing:

- The world market for sugarbeet seed is opening up in communist block countries.
- A market for sugar production technology exists in foreign countries.
- Training of foreign agricultural technicians will result in a more rapid adoption of modern production systems.
- Increased sugarbeet seed sales should be a natural result of acceptance and use of modern U.S. production systems in other countries.
- Ten of the primary sugarbeet producing countries in Europe have a combined total of 4,920,000 acres of beets. All are potential seed customers.

Preliminary contact with growers and farming organizations in several European countries has already begun to bear out the earlier optimism. For instance, approximately 3,000 acres were planted to Mono-Hy seed in Greece this year as a result of sales made in 1972.

J. V. (Vic) Ostermiller, vice president and general manager of the new export subsidiary, has made several trips to the sugarbeet-producing regions of Europe and the near East to explore potentials and to develop contacts for future business relationships. Ostermiller, a veteran of 31 years with GWS, was formerly assistant district agricultural manager for the Northeast Colorado/Kemp district.

Foreign countries that wish to study American beet sugar production methods to supplement their own technology may do so through a new program of the Great Western Sugar Export Company. The program was developed to provide and implement agricultural training on U.S. sugarbeet farms for trainees from other countries, and serves as a vehicle through which GWS technological expertise may be marketed.

Trainees enrolled in the program will spend a year in the U.S. participating in beet production under actual conditions on farms in the various GWS agricultural districts. During the year, they will also gain practical experience in factory operations and observe sugarbeet research at the GW Agricultural Research Center.

“Often the best candidates for such a program,” Ostermiller explained, “are the young men who are already well-educated and interested in a career as an agriculturalist in beet sugar production. But regardless of their education or background, they can spend a year in the U.S. under our program and return to their countries to become teachers themselves or to put into practical application the knowledge and experience they have gained during their training period.”

Will we be assisting our competitors by aiding other nations in improvement of their sugar production system? No, says Dr. Army.

Continued on page 18, col. 3.
Dear Growers:

The sincere welcome I've received from Ohio and Michigan farmers since my transfer from Colorado to our headquarters here in the Buckeye state has been heart warming and most appreciated. I've had a busy schedule in the past few months, learning new names, techniques, faces and places—in addition to the day to day activities associated with this office. I was most pleased to confirm my anticipation that the growers here, like the many others I've known, are friendly, interesting and practical.

Perhaps a little background would be helpful in becoming better acquainted with all of you. I was raised on a farm-ranch system in Colorado and attended Colorado State University in Fort Collins. After graduation in 1950, my wife, Gerry, and I went to Scottsbluff, Nebraska, to work for Great Western. We spent 19 years in the North Platte River valley, plus a brief period in Wheatland, Wyoming, before returning to Colorado in early 1969.

While in Nebraska, our family was expanded by three little Cornhuskers—Steven, who is now 19, Paula, 17, and Raymond, 15. Steven is a student at the University of Northern Colorado, Greeley; Paula will be a senior and Raymond a sophomore at Ross High School in Fremont next fall.

I've never been sorry about my choice of occupation, because each and every year I have worked for Great Western has been enjoyable. Being as deeply involved as I have in the beet sugar business, the people with whom I've dealt—growers, employees and supervisors—have greatly influenced my life and my family's life. A positive influence, I believe.

Now I'd like to set down a few of my impressions of the Northern Ohio Sugar Company area. My first impression is that growers here have always been progressive. Thumbing through some back issues of UPBEET indicates you've made herbicides work well here because of proper and timely use. Indications are that pre-emergence herbicides are a must and that they are most commonly TCA and Pyramin. A growing demand for longer, better weed control is promoting more post-spraying with good, tested herbicides. It is obvious that this is one area where many more economically labor-free fields can become a reality.

Electronic thinners were a first in the NOSCO districts, but an even more advanced method is space planting. More and more growers are gearing up to try a space planting type of management on at least a part of their acreage. Great advances have been made here in putting everything together. Already, large acreages of sugarbeets are produced with little or no hand labor...solid proof that the system works, saves labor headaches, and maintains yields at high levels. We should note, however, that while herbicides and seed spacing definitely complement good cultivations, they do not replace them.

As hand labor becomes more expensive, less available and often produces greater social problems for all concerned, it becomes a near necessity to try new methods, new materials and different techniques.

A final point of utmost importance is nitrogen management. The entire beet sugar industry is in great need of higher sugar content and better juice purity, and there is a proven correlation between these factors and nitrogen. The most practical approach to this problem is in the hands of the grower. He, more than anyone else, knows his fields, sugar contents, and previous fertilizer practices. He can study his own situation and make appropriate adjustments (usually reductions) in his applications of nitrogen on the preceding crop and sugarbeet crop.

It should also be kept in mind that time of application makes a definite difference in sugar yield and purity. After June 15th, no nitrogen fertilizer, in any form, should be applied to the beet crop.

The 1973 crop is now pretty well underway, and we offer a standing invitation to drop in and discuss any problems or ideas you may have. The door is always open.

Sincerely,
Bob Sanborn
District Agricultural Manager
Northeast winds have always caused flooding of low lands along the south and west shorelines of Lake Erie in Ohio and Michigan, but this was more or less expected and growers who populate these lake fringe areas learned to live in harmony with the watery giant.

The floods usually came in early spring and caused relatively little damage. Most of the farm land in the flood areas has been diked, ditched, and then pumped for drainage. This had always afforded ample protection against serious flooding until recently, when Lake Erie suddenly flexed its mighty muscles and began to rise.

The first disastrous flooding in the current cycle occurred on November 13, 1972, when strong northeast winds, combined with heavy rainfall, caused the lake to rise an astonishing 88 inches above its low water level. Flooding was severe and reached places where even the old timers could not remember an invasion by lake water. In many places, dikes were washed out or the water went over the top of them in great sheets.

The fall of 1972 had been wet, and most of the crops on the farm land affected by the lake were still unharvested at the time of the November flood. About 2,000 acres of sugarbeet land in Ohio and Michigan were affected, ranging from total crop loss in some fields to partial loss in others. Residential areas suffered damage that ran into millions of dollars. Some homes were totally destroyed, others badly damaged by the water.

The November 13 storm was unusual because it came in the fall, but local residents say nothing seems to be “usual” along Lake Erie any more. Several times during the winter, northeast winds again pushed lake water to flood levels, adding insult to injury. Farmers and others who live along the lake worked all winter repairing and raising dikes to protect them from future floods. Their efforts were fruitful in most cases...until April 9, 1973, when again strong northeast winds pushed the level of Lake Erie to an all-time high of 112 inches above normal.

This storm pushed flood waters far beyond the area covered in the November flood. Thousands of acres of farm land were flooded and many thousands of people had to evacuate their homes. Dikes...
controlling the last 15%

One of the most important new concepts in sugarbeet production for Northern Ohio growers is post-emergence herbicides and their application. As we move closer to the goal of eliminating hand labor it will be necessary for beet growers to add post-emergence herbicides to the sequence of their weed control program.

In northern Ohio and southern Michigan two excellent pre-emergence herbicides are available that under most conditions give up to 85% weed control. These pre-emergence weed killers are Pyramin and TCA. However, we are still faced with controlling the 15% that escape. In many fields this can be accomplished with the proper and timely application of a post-emergence herbicide.

Herbicides used in Ohio for post-emergence application are:

1. Pyramin — provides contact kill to control weeds already growing and remains in the soil to give residual control during the season. Pyramin is now cleared for both pre- and post-emergence application. A dormant spray oil should be used with Pyramin to give better post-emergence results. Growers should remember, however, that if split applications of Pyramin are used the total of the two applications should not exceed the limit stated on the label.

2. Betanal — will control lambsquarter, ragweed and mustard. There is also a new Betanal formulation, Betanal 475, an experimental herbicide which will control red-root or pigweed.

3. Herbicide 273 — an excellent smartweed killer, will work on almost any size smartweed.

4. Dowpon — gives good annual grass control; not effective on broadleaves.

5. Combinations of any of the above may be used, depending upon your specific weed problem. Your agriculturist will help you identify the weeds present and help you decide upon the proper herbicide.

A very important factor in applying post-emergence herbicides is timeliness. Weeds should not be over three inches high and beets should have at least two true leaves. This normally will not leave much time so it is very important to have your equipment ready when the conditions are right. With the exception of Herbicide 273, these chemicals are too expensive to broadcast. Therefore, it will be necessary to have equipment that can apply a band over the row. The position of your spray nozzle should be flexible so it can be adjusted to varying ground conditions.

All of the post-emergence herbicides are available at the Fremont or Findlay plants.

CAUTION — when daytime temperatures are above 80°F, spraying should be done in late afternoon or evening to prevent excessive leaf burning.

Check your growers’ guide or with your fieldman for exact rates for post-emergence applications.
Nobody will benefit from elimination of chemical use on farms...

everyone will benefit from proper chemical use!

The risk of injury from pesticide residues on food is small compared to a multitude of other daily risks...

...and...

IT'S A RISK WHICH IS LESS THAN THE HAZARDS OF AN INADEQUATE FOOD SUPPLY!

— Dr. Newt Flora
Univ. of Oklahoma Extension Staff Member

There's been ample fuss about the environment. The use of chemicals on farms and ranches has been lumped into the general situation. Consumers have been excited about the imagined hazards...but THEY WILL BE MUCH MORE EXCITED IF PRODUCERS WERE TO ELIMINATE VITAL TOOLS PROVIDED BY FERTILIZERS, INSECTICIDES AND HERBICIDES. Matter of fact, without herbicides, farmers will be in trouble finding enough hand labor to make up the loss. As for insecticides and fertilizers, any curtailment of these can end up leaving growers with lower yields which build up the useable supply of foodstuffs. Any shortage—as we see today—really does boom prices skyward. All of this high market will be ordinary IF consumers and their helpful environmentalistic friends go as far in chemical limitations as they might like. There is no reason to walk around chemical use in 1973...only that APPROVED chemicals are used in RECOMMENDED AMOUNTS and PROPERLY APPLIED!

So...producers, plan to make the most of your efforts in '73

Put AG CHEMICALS with FDA CLEARANCE TO MAXIMUM USE......but use only as instructed!
by Edith Enlow

Charter members of an exclusive club started by Great Western Sugar Company got a chance to see the amount of sugar that earned them memberships during a visit to the warehouse at Scottsbluff early this year.

Handling some of the bags of sugar from a pile consisting of 10,000 pounds of sugar are (standing, from left) Carl C. Nuss of the Bayard factory district, Dave Schuldies of Gering, Reinhold Meter of Bayard, John Schoeneman of Mitchell, Russell L. Hodge of Bayard and, kneeling, Alex Reifschneider of Scottsbluff and Dick Butcher of Mitchell.

They are charter members of the GWS Nebraska District 10,000 Pounds Per Acre 'Club. Nuss and Reifschneider first reached that production level in 1960. The others produced 10,000 pounds of sugar an acre with their 1972 crops.

Annual sugar consumption is 100 pounds per person. From each acre of beets they raised, the club members produced enough sugar to meet the needs of at least 100 people.

These seven men received charter membership certificates from GWS. Leonard Henderson, Nebraska District agricultural manager, said a plaque will be placed in each Nebraska factory and will have the names of the 10,000 pound producers in the individual factory districts.

Names of 10,000 pound growers will be added to the plaques as others reach that high level of production and certificates of membership to the club will be presented.

Story and photograph courtesy of the Scottsbluff Star Herald.
Sugarbeets in '74 - a Good Bet!

- Between Thanksgiving and the New Year — when this was written — America's farmers were counting their 1973 blessings as they were trying to "crystal ball" what 1974 prices would be.

Growers as a whole were ending their greatest income year in history. Yet they had reason to wonder how long the good times would last. Meantime sugarbeet growers in the Great Western area were expressing thanks for their record high beet returns, for the generally excellent beet harvest, and in several districts for the great comeback the beet crop made from a bad, slow start occasioned by poor spring weather.

And they could look forward to relatively good beet returns for 1974.

U.S. farmers know that the reason for most of their record 1973 returns can be summed up in one word — exports. So they ask: Will one of every four American acres again in 1974 be "shipped abroad"? Will U.S. counter the Arab countries' oil embargo by restricting its food and feed exports to them?

Another disturbing question is: What total acreage will American farmers plan in 1974? With only part of the 1972 50-million "set-aside" acres planted in 1973, with the rest of them available next year, with millions of other — never-broken — acres being cropped, and with growers free to plant from fence row to fence row — and free to produce surpluses — many are asking "What does it all forebode?"

In 1972 severe crop failures in such countries as Russia, China, and India swelled demand for American imports. But this is 1973 and 1974 is another year. The USSR, for instance, reports a record 1973 wheat harvest along with other excellent crops. Will that country continue to pay dollars for commodities it can adequately grow itself?

GW sugarbeet growers, however, know they can hedge their bets by planting a promising, dependable crop — a deficit crop like beets, which doesn't face the price uncertainties of crops usually in surplus like wheat and corn.

Late last month GW growers in five western states received their highest initial payments ever. The 1973 advance total averaged $19.33 a ton of beets, including $2.18 under the Sugar Act, which was 96% of the 1972 grand total of $20.13, including payments in April and October, 1973.

Depending upon their beets' sugar content in the two years, some growers received more last month than they received in three GW 1972-crop payments per ton. This was particularly true in the Lovell, Wyoming area where GW's 1973 initial payments averaged $7.87 a ton more than all of its 1972 payments.

Nobody can predict accurately now what next April's and October's payments will be. But, if last year is any criteria, when subsequent payments equaled 24½% of the 1972 initial payment, the 1973 total return to growers could exceed $23.50 per average ton, including the Sugar Act payment.
The question growers are really asking, however, is “What is likely to be our return for next year’s beets?” That, of course, depends upon what happens in the sugar market from next October through September, 1975.

Well, what is the sugar market outlook?

Most sugar experts say it looks good. GW certainly showed its confidence in the market by the size of its recent initial payment. Traders in raw cane sugar futures are buying and selling contracts for delivery in the next three trading months of March, May, and July at increasingly higher levels above late November, 1973’s spot price.

That November price, incidentally, was more than 22% greater than the spot price on the same day a year ago. At the same time last month, raw sugar at Caribbean ports for delivery to the world market was selling at higher prices than sugar offered there for delivery to the United States.

Such world premium prices did not exist when sugar was a glut around the globe. But now, for the fourth straight year, world sugar consumption is greater than production.

Because of all the above factors and others, 1974 beet prices are looking up.

Grower leaders who keep abreast of such developments, and who know the importance of continuing a healthy sugar beet industry in these parts, are stressing the need for substantial 1974 beet plantings — whoever owns the processing company.

GW, in reorganizing its Agriculture Department last September, showed that it, too, realizes the importance of next year’s beet crop. That particular action by GW also showed that the company recognizes the interdependence of growers and processor.

Now it is up to individual growers, landowners, beet grower association officers, each member of the GW agricultural staff, bankers, and everybody connected with the sugar beet business to do his part to make 1974 a great year of planting for this vital beet sugar industry.

IN THIS ISSUE: Realignment of the GW Agricultural Department . . . and other departments . . . . Pictorial commentary on the sugar beet harvest in Nebraska . . . Reference guide to the agricultural field staff at all locations . . . Vic Schneider and sons, a Colorado family with the third generation in beets . . . Two Viet Nam veterans find their future on farms in Colorado . . . Circular rows for sugar beets, another first for Kenny Hitchcock . . . Montana growers host international sugar beet society technologists . . . Grower-GW Research Committee members visit the Red River Valley . . . Review of root maggot research in the Big Horn Basin . . . news and views of agricultural personnel . . . and on the back cover, the striking beet harvest scene at Pompays Pillar in Montana.

COVER PHOTO: Dome Rock in the Scotts Bluff formation of Western Nebraska provides the focal point for this sugar beet harvest scene. It’s the operation of Melvin Schmidt and Wilfred Kaufmann. For their pictures and details, see Page 8. Photo by Jim Lyon.

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Edited by James S. Lyon, Manager of Agricultural Information

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Agricultural Advancements

Agricultural activities return to a single department with the single duty of providing experience and emphasis for advancement of the sugar beet crop and the sugar beet grower. Here, Upbeet introduces those who now head up the various functions at the General Office and in the Areas...

- Robert J. Fisher, associated with sugar for 35 years, takes over executive direction of all GW agricultural activities, except basic research, with his appointment as senior vice president.

For the past six years, Fisher was vice president-grower and government relations. Earlier, he was vice president and treasurer from 1961 to 1967, and treasurer and assistant secretary from 1950 to 1961.

Fisher began his GW career in 1945 as assistant to the President, the late Frank A. Kemp. He came to the Denver office from the War Food Administration. He also served earlier with the Sugar Division of the U.S. Department of Agriculture.

Just recently, Fisher was named to his second term on the board of trustees of the U.S. Beet Sugar Association. He served his first term with the 62-year-old trade group in 1967-68.

Among his industry assignments, Fisher was a beet sugar advisor to the American delegation at the 1968 International Sugar Conference in Geneva, Switzerland.

In addition, he is the only sugar industry member at the national level of the National Defense Executive Reserve.

Fisher was an officer of the American Sugarbeet Industry Policy Committee, chairman of the management committee of Western Beet Sugar Producers, Inc., beet sugar consultant to the Office of Price Administration.

- LaMar C. Henry, with 27 years in sugar beet crop management for GW, assumes the new post of director of agricultural operations.

His career in the last 17 years includes assignments as district general manager for North Central Colorado and agricultural manager at Kemp, Brighton and Ovid. In the same period, he was also assistant to late President Kemp.

Earlier, Henry was agricultural staff assistant at the Denver office and assistant agricultural manager at Scottsbluff and Gering.

Henry served as an agriculturist at Longmont and began his career in 1946 at the Longmont Experiment Station, where he worked on field trials of the GW mechanical thinning system.

A World War II veteran of five years in the Army, Henry earned his degree in forestry in 1941 at Colorado A & M College, now Colorado State University. He grew up on ranches in western Colorado.

- Waldo T. Peterson, with 23 years of field and staff assignments in agriculture, becomes the new director of grower relations and communications. He also continues as co-chairman of the Grower-GW Joint Research Committee.

In the last seven years at the Denver office, Peterson was manager of agricultural development and assistant director of grower and government relations.

Earlier, he was agricultural manager at Greeley, assistant manager at Billings, an agriculturist at Billings and in the Gering district at Kimball. He began his career in 1950 on the field staff at Brighton.

Peterson earned his degree in agronomy in 1950 at Colorado A & M College after farming near Kearney, Nebraska, his birthplace. Before that, he attended Kearney State College and served three years in the Army.

- William C. McGuffey, another veteran of 23 years in sugar beet field and staff management, advances to director of agricultural development.

During the last four years, McGuffey was general manager of the Nebraska district and earlier the Wyoming-Montana district.

Before that, McGuffey was assistant director of grower and government relations at the Denver office. In the field, he served as agricultural manager at Mitchell and Ovid, assistant manager at Scottsbluff and Gering, and agriculturist at Lyman, Nebraska.

McGuffey began his career on the field staff at Billings in 1950 upon graduation from Michigan State University, with master's and bachelor's degrees in horticulture. In World War II, he was a fighter pilot in the Navy.

A native of Ada, Ohio, McGuffey grew up on his father's farm near there.
Ralph W. Hettinger, a veteran of 27 years in sugarbeets, becomes area agricultural director for North Central Colorado.

For the past two years, he was district agricultural manager in the same area. Earlier, he was agricultural manager at Billings, assistant manager there, and an agriculturist at Chenoak, Montana.

Hettinger began his career in 1946 with the field staff at Windsor upon his discharge from three years in the Navy. He was born in Windsor.

James F. Gonyou, a second-generation Great Westerner with 25 years in sugarbeets, becomes area agricultural director for Northeast Colorado and Kemp.

For the past two years, he was district agricultural manager there. Earlier, he was assistant manager at Billings and agriculturist at Lovell.

Gonyou began his career in 1948 at Windsor upon graduation from Colorado A & M College. His father was the late Ed Gonyou, long-time GW factory manager.

Leonard H. Henderson, veteran of 31 years in sugarbeets, becomes area agricultural director for Nebraska.

For the past two years, he was district agricultural manager in the same area. Earlier, he was agricultural manager at Scottsbluff-Gering and Bayard and an agriculturist at Lyman.

Henderson began his career on the field staff at Greeley in 1942.

Born in Colorado Springs, he was graduated from Greeley High School and Colorado A & M College.

Lee E. Butler, veteran of 27 years in sugarbeets, becomes area agricultural director for Wyoming-Montana.

For the past three years, he was first general manager, then district agricultural manager there. Earlier, he was southern district manager (Colorado).

Butler was agricultural manager at Eaton-Greeley, Longmont and Ovid. Before that, he served at Denver, Brighton and Eaton. Butler grew up in Boulder and Loveland and graduated from Colorado A & M College in 1937.

Fred G. Holmes, a second generation Great Westerner, moves up to manager of agricultural administration. His functions continue to include the field labor program.

In his new post, Holmes draws upon nearly three decades in administration and field labor. He came to the Denver office in 1942 from Brush, where he began his career in 1939 upon graduation from the University of Colorado.

His father, Fred, Sr., was a pioneer Great Westerner, who started at Loveland in 1901.

George Lapaseotes, another second generation Great Westerner, advances to manager of grower service centers and local government relations.

For the past year, he was assistant to the vice president-grower and government relations. Earlier, he held assignments at the Fort Morgan district, Scottsbluff-Gering and the Denver office. He began at Windsor in 1958 upon graduation from the University of Wyoming.

He was born in Bridgeport, Neb. His father, Pete, worked on sugar factory construction in Nebraska.

Elmer E. Loose, who combines crop statistics with a beet farm background, becomes manager of agricultural economics.

For the past five years, since joining Great Western at the Denver office, Loose was assistant statistician and data system analyst.

Loose was graduated from Colorado State University in 1967 with a degree in history. During his youth, he worked sugarbeets on his family's farm near Wiggins, Colorado, his birthplace.

James S. Lyon, who worked in publicity and publications at the Denver office for 17 years, returns to become manager of agricultural information. His duties include production of "Upbeet."

For three years, until 1971, Lyon was director of information services. Earlier, he was editor and photographer of "The Sugar Press," the company's employee magazine.

Before he joined GW in 1954, Lyon worked in Denver at KOA & KOA-TV and The Rocky Mountain News.
Claude W. Petitt continues as senior vice president-sales with the added distinction of approaching his 50th anniversary with GW Sugar and a rightful claim to the title of Mr. Sugar for the industry.

Petitt first parked his bike at the Sugar Building on April 14, 1924 — the day he began his career as office boy.

One of Claude's bygone job titles was inherited by his son, Norman (below), but the designation of senior still belongs to Claude — by deed and devotion.

Norman R. Petitt, in the sugar trade for 16 years, advances to the new post of vice president-sales.

For the past four years, he was vice president-industrial sales. Earlier, he was sales manager for industrial products.

Petitt came to GW in 1968 from ten years in the sugar trade with Meinrath Brokerage in Minneapolis. He began his career in the New York trade in 1957 upon his graduation from the University of Colorado with a marketing degree. He was born and schooled in Denver.

C. H. Criswell, Jr., a second generation Great Westerner, becomes general sales manager in charge of both consumer and industrial products.

For the past five years, he was sales manager for grocery products. Earlier, he held various sales and merchandising jobs. He began his career in traffic in 1951, but worked earlier at Johnstown factory.

Criswell was born and schooled in Denver. His father was a long-time operations executive of the company.

James E. Hanna moves to sales in the new post of marketing director with duties in analysis of market trends and potentials.

For the past four years, he was supervisor of financial planning and analysis on the finance staff. Earlier, he was accounting manager for Colorado Milling, a former sister firm. He joined GW in 1967 with accounting experience at Denver companies.

Hanna earned his business degree at Colorado State University in 1958. He grew up on a sugarbeet farm near Longmont, his birthplace.

Helyn Kuhn joins the sales staff in the new position of manager of advertising and merchandising.

Most recently, she was a consultant and earlier the advertising director for the American Lamb Council in Denver. She came to Denver in 1958 from Wichita, where she was production and media manager for the Lago & Whitehead advertising agency.

Mrs. Kuhn majored in business at the University of Kansas. She grew up on a farm at Pratt, Kan., her birthplace.

Unique is the word to describe the staff of the Sales Department with the senior vice president nearing his 50th anniversary at the Sugar Building. He's Claude Petitt — Mr. Sugar himself, who figures in a father-son sugar sales team.

Advancements include another second generation Great Westerner, a marketing director who grew up — (guess where?) — on a beet farm, plus the becoming appearance of the first woman on the staff! 
Manufacturing and Environmental Advancements

Manufacturing also returns to single department status with experience the prime consideration in the administration and operation of sugar production facilities. And in keeping with the times, environmental responsibilities call for new departmental management.

• Jack B. Powell, a veteran of 26 years in sugar processing, becomes director of manufacturing in charge of all factories. For the past four years, he was district general manager at Fort Morgan and earlier in Ohio. Before that, he was a district superintendent and a factory manager at Gering, Brighton, Mitchell, Fremont. Powell began his career on the engineering staff at Denver in 1947 after Army duty. A native of Virginia, he earned his engineering degree at the University of Illinois.

• Robert E. Munroe, with 24 years in factory operations, becomes director of environmental affairs. In the past 13 years, he held various operating posts at district level. Earlier, he was factory manager at Ovid and Greeley, an assistant superintendent and a chief chemist. Munroe began his career at Johnstown in 1949 upon graduation from Colorado School of Mines with an engineering degree. A native of New Mexico, he grew up in Denver and served in the Army.

• L. W. (Bill) Feland, with 40 years in factory operations, becomes area manufacturing director for Northeast Colorado & Kemp. For the past two years, he was factory manager at Sterling. Earlier, he held the same post at Longmont, Gering and Mitchell. He was also an assistant superintendent at several factories. Feland began his career at Johnstown, his birthplace. He served in the Navy and attended Colorado State College at Greeley and the University of Houston.

• Dan E. Conwell, in sugar operations and engineering for 27 years, becomes area manufacturing director for Neb. For the past two years, he was factory manager at Loveland. Earlier, he held the same post at Ovid and Lovell. He also worked as a shift superintendent and engineering supervisor at several factories. Conwell began his career in 1946 on the engineering staff at Denver after Navy service. A native of Tennessee, he grew up in Denver and graduated from the University of Denver.

• Stephen L. Force, a veteran of 35 years in sugar operations, becomes manufacturing manager for special products and also for the Northern Ohio factories. For the past 15 years, he held various operating posts at district level. Earlier, he was factory manager at Billings, Gering, Ovid and Eaton. He also worked as a shift superintendent. Force began his career at Johnstown in 1938 upon graduation from Colorado School of Mines with an engineering degree.

• Jack W. Eastman, with nearly 30 years in factory operations, becomes area manufacturing director for North Central Colorado and Billings and Lovell. In the past four years, he held similar posts in other areas. Earlier, he was on the operations staff at Denver and a factory manager at Fort Morgan and Sterling. Eastman began his career at Fort Collins in 1944 upon graduation from the University of Colorado with a business degree. A native of Huron, S. D., he grew up in Loveland.

• Dan E. Conwell, in sugar operations and engineering for 27 years, becomes area manufacturing director for Neb. For the past two years, he was factory manager at Loveland. Earlier, he held the same post at Ovid and Lovell. He also worked as a shift superintendent and engineering supervisor at several factories. Conwell began his career in 1946 on the engineering staff at Denver after Navy service. A native of Tennessee, he grew up in Denver and graduated from the University of Denver.

• Stephen L. Force, a veteran of 35 years in sugar operations, becomes manufacturing manager for special products and also for the Northern Ohio factories. For the past 15 years, he held various operating posts at district level. Earlier, he was factory manager at Billings, Gering, Ovid and Eaton. He also worked as a shift superintendent. Force began his career at Johnstown in 1938 upon graduation from Colorado School of Mines with an engineering degree.

• L. W. (Bill) Feland, with 40 years in factory operations, becomes area manufacturing director for Northeast Colorado & Kemp. For the past two years, he was factory manager at Sterling. Earlier, he held the same post at Longmont, Gering and Mitchell. He was also an assistant superintendent at several factories. Feland began his career at Johnstown, his birthplace. He served in the Navy and attended Colorado State College at Greeley and the University of Houston.
Beet growers appear in this view of the cover scene in the Gering Valley, with Dome Rock in the background. Wilfred Kaufmann stands at left with Melvin Schmidt and his two nephews, Allen and Dick Rahmig. From 170 acres of 1973 beets, their yields averaged about 22 tons. Melvin, a beet grower for 20 years, attributed the good tonnage in part to fall fumigation of nematodes with Telone.

Nebraska - Nemesis of Nematodes

Sunny skies and smiles mark the harvest outlook in Western Nebraska for Ken and Cork Harriman and their landowner, Mrs. Rosina Hilpert. The Harriman brothers harvested 25 tons of beets per acre with sugar content averaging above 16.5%, both figures up significantly from several years ago. The Harrimans credit the advances to fall fumigation of nematodes and deep soil sampling to determine proper application of nitrogen, all with the sanction of Mrs. Hilpert. A 1924 graduate of the University of Nebraska, Mrs. Hilpert was the third co-ed there to earn a degree from the College of Agriculture. Her ties with the Valley date back to 1916.
East of Scotts Bluff, Dwayne Weiss stands out, at left, among the younger generation of beet growers. He's pictured with his GW agriculturist, Jerry Jarrell, along with Leonard Leis, his cousin Carl Weiss, Bud Smith and Bruce Greeb, son of a neighboring beet grower. Dwayne took over the family place ten years ago upon the death of his father, Herman, a beet grower since 1940. This year, Dwayne averaged about 22 tons of beets from 82 acres, but with sugar content still a problem at about 14.3%. He hopes to improve that with soil sampling for proper nitrogen rates, while continuing with his fifth year of fall fumigation for nematodes.

A graduate of Minatare High School, Dwayne rounds out his farm operation with unique mechanical ability and two years of business administration at Western Nebraska Junior College. Both mechanics and business training helped substantially in his progress on the farm.

Is Nebraska No. 1?
In the minds of the state’s football fans, it is — always! And among beet growers, in pounds of sugar per acre, it is, too!
Great Western ratings show Nebraska Area beets ranked No. 1 in sugar per acre in all the company areas for the past several years.

Here's Bob Sterkel, below, arriving at the Glenn station north of Alliance to deliver another load of beets from his 400 acres in the area. He also harvested 130 acres of beets near Oshkosh and another 80 acres near Northport station. Bob built up his acreage over the last five years from a start in custom farm operations. He learned the beet business with his father on rented land.

With his mechanical ability, Dwayne Weiss fabricated this front-end loader in his farm shop. It was built on an Army 4 x 4 chassis and it's demonstrated here by Agriculturist Jerry Jarrel, because Dwayne was too busy harvesting beets to come back to the barn.
Gering Valley

Grows Family Style

It's an up-coming sugarbeet harvest on a gentle rise in the Gering Valley for the Kaufman and Kiesel family farm operation. Bob Kiesel and his wife Aldora and son Randy stand at left, with Patty and Harvey Kaufman and his father, Henry, who started in beets in the Valley 40 years ago. Harvey got into the action seven years ago and Bob 13 years ago. Their 169 acres of 1973 beets averaged 22 to 23 tons with sugar content of about 16%. They say they keep their tonnage up by keeping the nematodes down, fumigating in the fall or the spring, depending on conditions at the time.
Sugarbeets and sideboards hardly do justice as a picture frame for Rita Schnell outside her truck delivering beets to the Ginn station near Alliance. Her husband, Jerry, harvested 150 acres of beets this year with an average of 18 tons. Rita says they've been in beets ever since they were married 13 years ago—but her looks sure don't prove it!

It's sort of high-rise, but definitely not a penthouse, where Marlene Garret surveys the harvest scene in a pause from catching tare samples atop the pile at the Alliance station.

Girls and More Girls!

Girls and more girls! That's the latest allure of the sugarbeet harvest in Great Western country. And not allure alone, for the girls drive the big beet trucks, catch the tare samples, and work the receiving stations and, as in years past, the scale houses. More and more, they help keep the harvest moving (and make this magazine more interesting!). So, more power to them.

Linda Best certainly makes the best of appearances with her hair blowing on the gentle Nebraska breeze outside her scale house at the Ginn station near Alliance. It was her first harvest as a scale girl weighing beet trucks.
Great Western Sugar

Agricultural Staff

At the General Office in Denver, above,
and in the Agricultural Areas and Factory Districts

RALPH W. HETTINGER
Area Agricultural Director

NORTH CENTRAL COLORADO AREA
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Area Office on Sugarmill Road near Longmont factory — phone 303/772-6061

JAMES F. GONYOU
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LEONARD H. HENDERSON
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LEE E. BUTLER
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• JOHN R. ELLIOTT
• AUGUST E. HELDT
• LEO HOEHN
• C. A. SPURGIN
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• HERBERT H. PEARCY
(Wheatland, Wyo.)
• DAME SHULL
• GLENN ZEMANEK

Ag. Maint. Supervisor
• EMMANUEL ZITTERKOPF

GROWER SERVICE CENTERS

PLATTEVILLE
Phone: 303/785-2954
Box 415, Platteville 80651
Located on Highway 85, just north of Platteville, Colo.

Service Center Manager
• ROBERT L. ABRAMS

Service Representative
• VINCENT C. ERICKSON

Secretary
• PHYLLIS SCHMIDT

SCOTTSBLUFF
Phone: 308/632-3414
Box 521, Scottsbluff 69361
Located just south of the Scottsbluff sugar factory

Service Center Manager
• PAUL BLOME

Service Representatives
• WILLIAM REIN
• CARL YOUNG

Secretary
• MARGE LANGHOFER

Wyoming-Montana Area

BILLINGS
Phone: 406/245-3115
Box 2508, Billings 59101

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Agriculturists
• DONALD R. CANDLIN
• ALAN MARTENS
• ROBERT L. PIERCE
• JEROME P. PYETE
• WALTER STOLLER, JR.
• STEPHEN STRATTON

Ag. Maint. Supervisor
• ROBERT C. DAVIS

LOVELL
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Agricultural Manager
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Agriculturists
• RICHARD BUTCHER
• ROLAND A. JACOB
• PAUL N. MCCULLAM
• STANLEY YUNG

Ag. Maint. Supervisor
• LESLIE W. CLINE

*Indicates Asst. Agriculturist
Victor Schneider with four of his sons who make the third generation in sugarbeets in his family. From left, the boys are Bob, LeRoy, Jim and Dave. Vic, on crutches because of a leg injury, dates his beet experience back to 50 years ago.

Beets are Better - the Third Time Around!

Performance and perseverance pay off for Vic Schneider, first in most everything for his sugarbeet crop near Greeley, with his sons making the third generation of Schneiders in beets.

The Schneider harvest operation, with Jim in the tractor cab, on one of three contracts totaling 200 acres of beets west of Greeley.
neder. who a man with nearly 10 every means to advance and enhance his advantages on slopes and on the variable soil unus ual in his locality, but he finds it pro­
crease each year from 15, to 24 tons per
1rce beets with more regular shape, with
w plow kit for fumigating, and among the
other: the electronic thinner, the first to use
hersity by winning the state garden championship two years in a row at the Colorado State Fair.
There is a lot to draw upon among the Schneiders — willing hands with workable ways, a reserve of resourcefulness, all backed up by Vic's own special brand of perseverance.
First in most everything, the Schneiders make the most of everything!

GW Sugar
Wins Out
in Goodland!

- Great Western Sugar (GW) won out! For several months, I have noticed a box of sugar, other than GW, on the coffee bar in the Council Chamber in the City Building. I had mentioned once that I didn't think that looked very good.
- So, at the most recent meeting, this past Tuesday night, I again voiced my displeasure with seeing a box of other than GW sugar on the coffee bar. His honor, Mayor Taylor, walked over to the table, took the box of sugar, and tossed it out of the Council room. He then instructed whomever one instructs as to what kind of sugar to use, to make sure that GW sugar is on the table.
- Maybe I'm an old fuddy-duddy about these things, but by gum we have a lot of sugarbeet farmers right here who raise the product that is processed in a factory a couple of miles west of town. It would only seem proper that because a portion of our economy is based on the success of GW, that GW Sugar should be the dominant product in local public places.
- Some of you might not agree with this, but it's almost like going out-of-town to buy your necessities when they can be purchased right here.
- GW is a part of our community. And it was not just by a stroke of luck they decided to set up shop here. A lot of factors figured in that decision several years ago, and a lot of work by some very dedicated people in our midst also figured in the ultimate decision.
- GW Sugar is a product we can all take pride in.

—Tom Dreiling
Two veterans of Viet Nam — one a city boy — find their future on the farm

- To Steve Jaouen, a city boy and a veteran of Viet Nam, there’s no place like Padroni — and his farm.

  "There’s room for your shoulders," Steve says of the country around Padroni, near Sterling. "And I felt welcome from the day I first came here. Everyone’s concerned."

  Broad in the shoulders himself, tall and handsome, just 30 years of age, Steve pretty much did a turnabout on all his upbringing. Born in Denver, raised in the suburb of Littleton, he earned a degree in industrial arts at Western State College at Gunnison, Colo. He wanted to teach — and he did, for two years at John F. Kennedy High School in Denver.

  Then came 1968, when the Colorado Air National Guard was mustered into federal service for duty in Viet Nam. As a member, Steve went along to serve as a jet aircraft mechanic at Phan Rang and other air bases under fire.

  Slit trenches changed his outlook on a lot of things.

  For Steve, it was a matter of getting away from crowds and orders, whether in the trenches or the city, to become his own man. And in Viet Nam, he acquired a love for the land, largely because of the devastation around him.

  There is no bitterness about Steve in recalling his duty in Viet Nam, but he does question the need for contaminating land in a nation so scarce of foodstuffs.

  As a result, he came to believe it was more important and more interesting to feed people than to teach them. Back home in 1969, Steve and his wife Paula tried farm life for the first summer because her father, Walt Gall, needed help on his place near Crook. Steve soon decided it was the best of all jobs. And

- Friday the Thirteenth in March of 1970 was more than just an apprehensive day in the young life of Kenny Gareis. For that was the date he joined forces with the U. S. Army and ended up in Viet Nam.

  Now he’s back on his family’s farm north of Sterling — and intends to stay there. Husky and healthy, handsome even in a fatigue jacket, with a boyish grin still beaming over his mature expressions at 25, Kenny believes farming is a good way of life.

  The only way.

  And in his belief, there are obvious influences of other ways of life with less appeal.

  "You’re your own boss. You don’t have to put up with the ridiculous. And you can take off if you want to — that is, if you’ve got your work done."

  First things seem to come first for Kenny, for all of his youthfulness. In looking back on Viet Nam, for instance:

  "There was a war to fight — and someone had to do it. And I wasn’t going to run off to Canada."

  Overseas for one year, Kenny served as a combat medic in helicopters with the 101st Airborne Division, out every three or four days picking up casualties, under enemy fire.

  "I learned a lot in the service. And I grew up a lot."

  But with that kind of ability to size up things, it’s a good guess that Kenny did a lot of growing up on the farm before he ever got to Viet Nam. His outlook reflects the teaching of his father, John Gareis, a High Ten grower a dozen times in more than 30 years of growing beets in the Sterling district.

  The Gareis men, including Kenny’s younger brothers Dick,
Merry-go-Round in Beet Rows!

- What's new and different in beet field patterns?
  
  The answer may be seen best from the air, as shown above, on the Hitchcock Farms south of Burlington, Colo. It's a field planted in circular rows, instead of straight furrows, to make best use of the circular sweep of the overhead pivot sprinkler.

  The circular pattern allows field equipment to work along the sprinkler wheel ditches, instead of bumping obliquely across them. The concentric rows also eliminate "wet rows" on uneven ground where water accumulates in parallel rows.

  In fact, the circular rows could almost be considered contour planting.

  While the field appears to be planted in complete circles, it was actually worked only in half-circles, since the tractor cab could not clear the sprinkler towers. Even with the unusual pattern, all the field work was done with the same equipment used for straight rows.

  Circular planting of sugarbeets under a sprinkler marked another first for Kenny Hitchcock, inset above, who with his 13th consecutive beet crop this year reached a cumulative total of nearly 9,000 acres.

  Starting with 61 acres of beets on rented land in 1961, Kenny became the first GW grower to plant 400 acres of beets and the first to harvest 10,000 tons in one season. His modest start pyramided over the years into Hitchcock Farms with 1,600 acres of owned irrigated land, sizable dryland wheat acreage, and substantial cow-calf and feeding operations.

  Likewise, his firsts extended to inventiveness in field equipment — multi-row bedders, tool bars, top windrowers, and harvesters. Whatever Kenny built in new equipment, his fellow growers wanted something "just like it." As a result, nine years saw his small shop mushroom into a modern fabrication facility, turning out a million dollars worth of Hitchcock implements and innovations.

  The Hitchcock Farms operate under Kenny and his brother, Curley, while the fabrication facilities work under Kenny's two sons, Royce and Duane.

  —LaMar Henry

Steve Jaouen ...

Now, with several years on his own place, he adds:

"Everything I learn is a new experience."

This last fall, Steve harvested 25 acres of sugarbeets with yields under 14 tons, partly because of the late start for the crop. For next year, he plans a full fertilization program with deep soil sampling of nitrogen.

Steve likes beets, he says, because of the cash returns and the feed they provide for his cow-calf combinations. As a newcomer on the land, he also offers some sound advice on machinery:

"Make do with what you have. Don't sign your life away for new equipment."

Far from his big city beginnings, in mind as well as body, he obviously enjoys his new life-style with Paula and their daughter, Stephanie, who just turned three. For relaxation, Steve rewrites poetry!

Kenny Gareis ...

and Jim, raise nearly 100 acres of beets and feed up to 200 cattle on their three places. This year, their beets made 25 tons with sugar content about 15.5%. Their rotation calls for beets every third year, but with a close watch on cropping conditions and nitrogen application.

In farm management, Kenny appreciates his study of accounting for two years at Northeastern Junior College in Sterling and another year at the University of Northern Colorado in Greeley.

"You learn to watch the pennies."

With the Viet Nam experience behind him, with the farm in front of him, Kenny lingers little in the past, but looks to the future for himself, his wife Marla, and their daughter, Julie, one-half year old.

Despite the forebodings of Friday the Thirteenth, there was always something for Kenny to come back to — this future, on this farm.
Billings Hosts

International Sugarbeet Society Technologists

By R. K. OLDEMEYER
Agricultural Research Center

• Some of the hosts for the Montana tour of international sugarbeet technologists. From left, Fred Rachel, Eddie Kuntz, and Harold Zent; Montana grower directors; Jerry Reed, then GW agricultural manager at Billings; George Bohl, Leo Bratsky and Bob Bernhardt, also Montana grower directors.

• Area Agricultural Director Lee Butler, left, describes cropping at the William Weber farm to Dr. Raymond Hull of England.
Members of the Institut International de Recherches Betteravières (IIRB) were guests of the beet sugar community of the Billings area on June 26, 1973. The hosts for the day were grower directors and Great Western Sugar Company agricultural and research personnel.

This visit was particularly significant because it afforded an opportunity for a group of American sugarbeet technologists to become acquainted with, and to exchange ideas with, a group of sugarbeet technologists from overseas. About 70 IIRB members and 25 wives from 15 countries made Billings a stop on their tour of the U.S. beet growing areas on the occasion of the fourth joint meeting (quadrennial) of the IIRB and its sister society in North America, the American Society of Sugarbeet Technologists.

The purpose of the visit was to acquaint the foreign guests with sugarbeet research, general farming, by-product utilization and the hospitality of Montana.

Feedlot 2 of the T-Bone Feeders, Inc., at Shepard, was the first stop of the day. Dave Drum, president, and his staff explained in detail the calculation of the ratios, procurement and sale of cattle and the financial operation of a limited partnership feeding operation.

Alan Black's field of beets, electronically thinned, was observed briefly by the group on their way to the Huntley Experiment Station of Montana State University. The station was the only state experiment station visited by the group on this tour. At Huntley, the group examined in detail an herbicide experiment laid out specifically for the tour by Don Baldridge of the Huntley staff.

In this experiment, a large number of plots treated with different preplant herbicides had post-emergence herbicide applied over them. Many outstanding combinations could be observed. A hydraulic soil probe, used in taking deep soil samples and mounted on a pick-up truck, attracted a lot of attention from the group.

A picnic lunch was served at the Huntley station by the Mountain States Beet Growers Association of Montana.

A display of the performance of several commercial — or near commercial — sugarbeet herbicides was arranged for by the personnel of the GW Agricultural Research Center. A sugarbeet field on the Gerald Bromenshenk farm displayed near-perfect performance of a number of herbicides.

Commercial sugarbeet varieties were observed on a trial plot by GW on the Milton Hein farm. The warm afternoon had caused some varieties in this excellent test to wilt at a time when others withstood the heat. Variety testing by GW was explained in detail from planting to data summarization.

The final stop of the day was at the farm of William Weber and Sons to see cropping operations consisting of sugarbeets, corn and alfalfa, along with the fattening of calves and the feeding and milking of cows.

Equally important as the informational stops was the personal exchange of ideas and information between the visitors and the hosts in attendance. Sugarbeet problems are similar the world over.

To bring an informative day to a memorable close in Montana, visitors and guests gathered at Jim Wempner's Eagle Cliff Ranch for a western barbeque and western entertainment. Heywood Big Day's Indian dancers intrigued the group with their dances in which many visitors participated. Tom Frye, western sharpshooter, amazed the crowd with his skill with shotgun and rifle and Gene Gabel's square dance group thrilled all who watched.
Research Group
Reviews Red River Valley Work

By DR. KENNETH P. DUBROVIN
Director-Agricultural Research Center

- The Grower-GW Joint Research Committee travelled to the beet fields of the Red River Valley in North Dakota and Minnesota last summer. Personnel of the American Crystal Sugar Company welcomed the group and arranged for a busy and interesting schedule. Members of the Red River Valley Co-op at Hillsboro, N.D., also hosted the group.

Committee members from Colorado, Kansas, Montana, Wyoming and Nebraska observed beet growing in the rapidly expanding area and also inspected receiving and piling facilities.

The tour bus travelled in and out of rain showers which fortunately let up when a stop was scheduled. Stops were made at several large sugarbeet variety trials which involved not only replicated small plots but also large observation strips. Several commercial GW varieties are well adapted for planting by growers in the area and are being tested along with new experimental ones.

One of the highlights was a tour of the new central tare lab at East Grand Forks, Minn. For the first time, American Crystal sugarbeet growers in the area will be able to find out the sugar content of the beets as they are delivered. Testing will be done in a large, modern facility which employs the latest techniques in washing, weighing, taring and analyzing samples of sugarbeets. This new lab will analyze beets from American Crystal growers throughout the Red River Valley.

The new sugarbeet processing plant at Hillsboro is going to process beets grown by members of the Red River Valley Co-op in the fall of 1974. Officers and members of the co-op graciously showed the committee members around the plant site and openly discussed the history and development of the co-op. The plant will slice 5,000 tons per day and plans have been made to permit capacity later to be doubled if desired. Although it looked like there was a lot to be done to get the plant ready to receive beets in the fall of 1974, the enthusiasm, dedication and ability of the people are what will get the job done.

The piling grounds at the Crookston, Minn., factory are huge because almost all sugarbeets grown in the district are delivered directly to the factory. To take care of the deliveries with a minimum of problems, the pilers run on long cement slabs and there are several new super pilers.

Herbicide research plots sponsored by North Dakota State University in cooperation with the University of Minnesota showed several materials or combinations which gave excellent results. The dark, heavy soils of the Red River Valley cause problems for growers which are entirely different from those in the irrigated inter-mountain areas. Although some irrigation was seen, it is used only for supplemental purposes and occurs on the lighter soils.

Farming in the Red River Valley is characterized by large fields and large equipment. Sugarbeets grow well in the black soil. With good rainfall, they are a profitable crop for growers in the north.
In the spring of 1973, an all-out effort was launched by the GW Agricultural Research Center in cooperation with the Lovell Agricultural staff and growers in the Big Horn Basin area of Wyoming to intensify and expand research work being done to control the sugar beet root maggot.

The main impetus of this effort was to find an insecticide and application method that gave consistent control of this pest.

The first phase of the program involved the planting of strip trials throughout the Big Horn Basin area. It was a great effort by all concerned, especially the growers who provided 83 strip trial locations on 64 different farms.

The strip trial locations varied in size from five to 12 treatments and included insecticides applied preplant only, preplant and post-emergence applications, and post-emergence applications in all combinations. Insecticides used in the preplant treatment included Dyfonate 10G, Diazinon 14G, Temik 10G and Furadan 10G—an experimental insecticide.

Each insecticide was applied using power incorporation, in a narrow band in front of the disc opener on the planter, Russ-Ken or side injection. Post-emergence insecticides were Dyfonate 10G, Diazinon 14G, Temik 10G and Thimet 15G. Post applications were made by applying a narrow band (3-4") over the row and lightly incorporating with spring tines.

On July 10, a tour of four of the demonstration strip trial locations was held. The tour was attended by growers, GW officials, bankers, implement dealers, and University of Wyoming and chemical company representatives. Following lunch in the Powell city park, there were brief explanations of the application methods, insecticides used and an explanation and demonstration of the method used to evaluate the results.

After this background material was presented, the tour began with stops at the Clarence Reed, Murraymere Farms, Lloyd Burgener, and Herb Jones demonstration sites. These four locations demonstrated to growers and other interested persons the most consistent and effective insecticides and application methods found in all of the 83 strip trial locations.

Each strip at each demonstration site was labeled with the insecticide used and the rate and application method. Beets from each strip were displayed and the rating indicating the effectiveness of the treatment was recorded on the signs marking each strip. This made it easy for the participants to observe the best methods of control.

Furadan 10G, a new experimental insecticide which shows considerable promise, is not yet approved for use on commercial sugar beets, and the beets treated with this material were diced up before harvest. Furadan 10G may be approved for use on sugar beets soon; and in the all-out effort to control sugar beet root maggot, it was evaluated in anticipation of forthcoming approval.

Yield data obtained from the tests, along with the root damage ratings, will provide a basis for recommendations which will be made for the 1974 planting season. The spring of 1974 will see another concerted effort with more testing of insecticides, application methods and rates to strengthen 1973 findings.

With continued fine cooperation and enthusiasm of growers in the Big Horn Basin, plus use of recommended control measures, it is hoped that root maggots will soon be under complete control.
Masters of Maintenance Meet

- Great Western's Old Reliabes with new job titles — now the "agricultural maintenance supervisors," instead of beet dumb repair foremen.


The picture was taken at a dinner meeting in Scottsbluff during their two-day "convention" last November, the first ever held for all of the supervisors in one group.

They were called together to discuss and then inspect problems and improvements in beet receiving station equipment. In two days, they toured stations at Scottsbluff, Gering, Bayard, Mitchell, and Alliance in Nebraska and at Sedgwick, Holyoke, Wray and Yuma in Colorado.

Overall, the emphasis of their meeting was on improving service and safety for growers delivering beets during the harvest.

- Dr. Bob Oldemeyer displays some of his photos in wild flower reference book.

Scientist Bob Oldemeyer Wins National Recognition for Wild Flower Photos

- Dr. Robert K. Oldemeyer, scientist at the GW Agricultural Research Center at Longmont, has been honored for his outstanding photographs in depicting wild flowers in color.

Seventeen of his pictures of Rocky Mountain and Plains wild flowers were selected for publication in "Wild Flowers of the United States." The premier showing of the volume, to be published this winter, was held at the Institute for Humanistic Studies in Aspen on Sept. 20. The publications are sponsored by the New York Botanical Gardens and publication costs are subsidized by gifts from various foundations and individuals, including National Geographic, Reader's Digest Foundation, and Rockefeller Brothers' Fund. Without this subsidization the cost of the books would be prohibitive because of the quality of colored flower reproductions and fine printing. The set of three books will be published by McGraw Hill Book Co.

Bob Oldemeyer has been taking photographs of wild flowers for 15 years in this area, and uses a Nikon F Camera with portrait attachment and natural lighting as the plant is growing in the field.

His accomplishments were the subject of an article published in the Longmont Daily Times Call entitled "Longmont Hobbyist Contributes Pictures to Flower Book."

Bob is manager of variety development at the Research Center with a background as a biologist and plant geneticist. He received his bachelor's degree in agronomy from Colorado State University, and his master's degree and doctorate at the University of Wisconsin at Madison in plant genetics and plant pathology.
Dr. Army Heads
American Research Institute

- Dr. Thomas J. Army, vice president of research and development for GW Sugar, has been elected president of the Agricultural Research Institute. In accepting the post at the institute's annual meeting in October in Washington, D. C., Dr. Army pointed out that recent food shortages emphasize the need for aggressive agricultural research at all levels. He added:

"We're faced with the paradoxical situation of increasing food and fiber production to meet the demands of an increasing world population, while restrictions on the use of chemical production tools grow tighter each year. Through research we must continually develop improved methods of food production, yet minimize any detrimental effects on our environment and safety."

The Research Institute's members come from industry, trade associations, scientific societies, and federal and state agencies throughout the nation.

- Dr. Dwayne G. Westfall has joined the staff of the GW Agricultural Research Center at Longmont as senior plant nutritionist. His assignment to research in soil-plant relationships will focus on the effects of soil nitrogen on the quality and sugar content of beets.

Dr. Westfall came from Texas A&M University, where he was associate professor of soil chemistry and a member of the faculty for the past seven years.

Earlier, he was a plant pathologist at the U.S. Army Biological Laboratory at Fort Detrick, Md.

Dr. Westfall earned his doctorate in soils in 1967 at Washington State University and his bachelor's degree in agronomy in 1961 at the University of Idaho. He was born in Aberdeen, Idaho.

His professional memberships include the American Society of Agronomy, Soil Science Society, American Chemical Society, Society of Sigma Xi (science honorary), and the Western Society of Soil Science, plus American Men and Women of Science.

- Robert L. Abrams, veteran agriculturist at Greeley, has been appointed manager of the GW Growers Service Center at Platteville, Colo.

Before he came to Greeley six years ago, Abrams was a weed specialist for four years at the Longmont Agricultural Research Center. He began his career in 1957 with the field staff at Ovid.

A 1952 graduate of Colorado A&M College, Abrams earned his degree in animal husbandry. He then served four years as a pilot in the Air Force, including duty as a typhoon hunter in the South Pacific.

Abrams grew up on a sugar-beet farm south of Loveland, where he attended high school. He was born in Milliken, Colo.

Working with Abrams at the Platteville Grower Service Center will be Vincent C. Erickson, who recently returned as field representative, and Phyllis Schmidt, secretary-bookkeeper.

Abrams replaces Carl Luft, who was recently promoted to developmental agronomy manager at the Agricultural Research Center at Longmont.

- It's that time of year when residents of the St. Vrain Valley should be reminded of the strong agricultural influence on life here.

The sugar beet and corn harvest is under way as farmers reap the fruits of a long summer of work. In a time of shortages, we all should be reminded of just how important this harvest is to the economy of the Valley.

While many of us are employed in the nonagricultural area, we should be aware that the richness of the farmlands in this Valley makes a major contribution to our quality of life.

We should all pray for good weather as our farmer neighbors strive to gather the crop they have spent so many hours in producing.

Today's farmer is called upon to feed more people than ever before in history. The farmer has been operating for many years without a just return on his efforts. This is beginning to change as new emphasis is being placed on farming.

As a result, many young people are again expressing interest in returning to the farm. This is good, because farming has always been one of the real strengths of the American way of life.

As we see the trucks delivering the harvest, let's all say thanks to the farmer for his continued efforts in producing the best crops possible.

After all, it is our living standard that we are talking about.

—Longmont Times-Call: Oct. 15, 1973
Pompeys Pillar - from Sacajawea to Sugarbeets

- Downstream on the Yellowstone, 28 miles east of Billings, Pompeys Pillar provides an historic setting for the harvest of sugarbeets. Here, 167 years ago, Captain William Clark (of Lewis and Clark) landed and inscribed his name and the date on the massive rock to furnish a checkpoint for later explorers who followed his maps. The rock was named by Clark for the infant son of the legendary Sacajawea, his interpreter on the expedition. His nickname for the child was Pomp, or Pompy, from the Shoshone word for chief. So the mass became Pompeys Pillar, already sacred to the Indians, a witness to westward expansion, eventually a National Landmark. Nearly 70 years later, General George Custer mounted the rock almost within eyesight of the Little Big Horn, 40 miles away, where he fell with his Seventh Cavalry. This fall, the Pillar looked down on the peaceful and productive scene of tractor and harvester operated by Wayne Hofferber, at left, who produced 73 acres of sugarbeets on three contracts in the area. Despite late planting because of wet weather, Wayne's crop made respectable tonnage and sugar content. In the history of Pompeys Pillar, Wayne the grower stands last in line in the passing parade of Indian, explorer, trapper, miner, soldier, pioneer, and settler.
Amid continued talk of Watergate, the State of the Union address, and the Federal budget deficit, two matters of vital concern to sugarbeet growers and the processor in the Great Western area were being seriously discussed in the Nation's Capital as February began.

Number one, of immediate importance, was: How soon would price controls on sugar be removed? Number two, of longer range interest, was: What would the new Sugar Act provide?

Happily for the beet industry, it looked as if both questions might be resolved favorably and shortly.

It appeared that the Cost of Living Council, after repeated petitions from sugarbeet growers and beet sugar companies, would shortly allow beet sugar to enjoy the same kind of price freedom that other foods have been permitted to have. Some indications were that action would be almost immediate. Others were that it might be a matter of a couple of months. While the timing was uncertain, the CLC director announced in a late January news conference that sugar definitely was being considered for decontrol.

On the Sugar Act front, the House Agriculture Committee set hearings to begin February 19. As this article was being written, the chairman introduced a bill to extend the present Sugar Act for five years. He called that action "admittedly only a beginning," adding that certain necessary changes will be made to "meet the present and anticipated economic situation."

Earlier the chairman had called a USDA trial balloon "damn foolishness" which would have gutted the time-tested Act, eliminated country-by-country quotas, and would have tied sugar prices in the United States to the extremely volatile so-called "world market". Such market in all but a few of the 40 years of U.S. sugar quota legislation offered only a dumping price that didn't even cover the cost of producing sugar in the most efficient foreign countries.

It's either feast or famine in that market. Famine most of the time, but feast now, with a world price of sugar almost 6 cents a pound above the equivalent U.S. price. A spread of this magnitude, however, was viewed by knowledgeable peo-

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**The Root of the Beet Business**

- The photo on the cover of this issue represents a classic in agricultural illustrations. It was taken nearly 48 years ago by Lyman H. Andrews, at left, retired district agricultural manager for GW Sugar. Long-time readers will remember seeing Andy's famous photo in past issues over the years and will probably see it again in the future. The seven-foot beet root appears again now to call attention to the lead article in this issue—on Pages 4 and 5, *The Nitrogen Crunch*, with the latest studies on soil fertility available for the sugarbeet, the deep-feeder. It is interesting, meantime, to recount how Andy took the photo. It was at the Winter Creek farm near Scottsbluff, far from a studio setup. The beets were planted near the irrigation ditch; at harvest time, Andy and his helpers dug a trench seven feet deep to expose the root system; then, carefully, he washed down the rest of the soil with water pumped from the ditch to obtain the clear profile showing even the hair-line tentacles. This photo was one of a series published with an article by Andy in *Facts About Sugar* in 1927 to show that, among other things, the beet root system should not be disturbed by deep cultivation and would not flourish if the plant was purposely starved for water. Andy recalls that his photo research project was conducted under the rather skeptical eye of Agricultural Supt. Gus Heldt. At the time, in 1926, Andy was a fieldman at Scottsbluff. In all, he served 48 years on the agricultural staffs at half a dozen locations until his retirement in Denver in 1968.
The chairman of the Senate Finance Committee and its ranking minority member, in a joint letter to the President, likewise stated that early Sugar Act hearings were contemplated by that committee. They asked the Government not only to “support renewal of the Sugar Act,” but also criticized the USDA “trial balloon” for causing sugar exporting countries to “de­ termine shipments to the United States” during the first half of 1974.

The foregoing letter also noted that, since November 9, 1973, the U.S. price for raw sugar had risen 1.78 cents per pound while the world price had increased 6 cents. (By press time, the world price had increased another 2.5 cents and the U.S. price 1.5 cents.) The letter further pointed out that foreign shipments to the domestic market were being curtailed “in the expectation that the U.S. price may soon rise to the world price level.”

Enactment of a Sugar Act generally along the lines of the law expiring December 31, 1974, would continue to assure U.S. consumers and producers of an adequate supply of sugar at stable prices which are fair to each of the two parties. The proposed Act, as did predecessor laws since 1934, would return a profit to the U.S. Treasury, since contemplated payments to domestic sugar growers would again total less than the excise tax on sugar payable by manufacturers which supply the U.S. market.

No one can predict accurately what levels sugar prices will reach in the next several months, and few will hazard a guess what the price will be in the year to end September 30, 1975. This is the 12-month period that will determine the returns GW area growers will receive for their 1974-crop beets. But market experts are unanimous in saying that world sugar supplies will be tight for several years and that therefore the price outlook is good.

The brightness of the price prospects was covered in a recent letter to growers by the president of The Mountain States Beet Growers Marketing Association serving Colorado, Kansas, and part of Nebraska. In it he said: “Every day the outlook for sugarbeets seems better to me. We have a good contract, the sugar market is at a high level and further increases seem probable...if the market goes up some more, as I expect, we will get our share of that too.”

Cost of Living Council regulations since mid-1973 have arbitrarily prevented sugar prices, for undisclosed reasons, from attaining levels reached by other foods. Now that it appears the rules of the price game are about to be changed, many growers are considering planting more sugarbeets than they had originally planned for 1974.

GW area growers recall that their record-high initial payment last November came at a time when refined sugar prices were substantially lower than now. These producers had good reason to anticipate a healthy second payment in April. They saw that the price outlook for sugar was good. And they knew the advantages that a dependable contract crop like sugarbeets had over the non-contract crops with no certain market at time of harvest.

Now, with GW agriculturists actually signing up contracts, growers and Company alike are confident that all the foregoing favorable factors would be reflected in an adequate total ’74 sugar beet acreage.
The Nitrogen Crunch
-and a Cost-saving Compromise

By
DR. DWAYNE G. WESTFALL
and
WILLIAM C. McGUFFEY

The impact of the current nitrogen crunch on the sugarbeet crop can be summed up in practical terms with the findings of two agronomy authorities — Dr. J. O. Reuss of Colorado State University and Frank Anderson of the University of Nebraska. Dr. Reuss finds that about half of the sugarbeet fields in Colorado have enough residual nitrate to produce an optimum crop of beets without the addition of fertilizer. Anderson reports, “nearly one-third of the farmers (in Nebraska) can probably grow more sugarbeets and produce more sugar to the acre by not adding any nitrogen at all to the sugarbeet field.” Anderson also finds that “in about 30 percent of the soils, there is a band of high nitrogen somewhere between the three and six-foot level . . .” For further background and other findings, study the article on these pages.

The efficient utilization of nitrogen in the production of sugarbeets is a compromise between supplying an adequate amount to obtain maximum tonnage and a lesser amount for the production of quality beets of high sugar content.

Figure 1 clearly shows the relationships between available soil nitrogen, yield and percent sugar. Yields increase to a maximum at about 175 lb. N per acre, then decrease, while sugar content decreases steadily at increasing nitrogen levels.

The relationship in Figure 1 has a dramatic influence on the economics of sugarbeet production. With the large increase in fertilizer costs in the last six months, judicious use of nitrogen is even more important. In Figure 2 the net return per acre, above fertilizer, harvest and hauling costs, and GW-Sugar payment per ton have been plotted based on the following assumptions:

1. $12.00/cwt net for sugar.*
2. Residual soil NO₃-N equalled 25 lb N/acre.
3. Cost of ammonium nitrate = $147.00/ton (22.5¢/lb).
4. $1.50 per acre to apply fertilizer.
5. Harvesting and hauling at $4.00 per ton.

The maximum return per acre occurred at a nitrogen level between 100 to 150 lb/acre. (This includes residual plus applied fertilizer nitrogen.)

Excessive nitrogen late in the growing season also depresses sugar content and lowers the purity which results in a reduced extraction in the factory. The application of manure results in the same relationship because much of the nitrogen in manure becomes available to the plant during the latter part of the growing season.

To establish a good balance of total nitrogen available to the sugarbeet crop, the deep soil probe is used to monitor the residual fertilizer NO₃-N (nitrate-nitrogen) carry-over from previous crops.

* This amount is used for illustrative purposes only. The 1972-crop net return was $10.203 per cwt., covering the 12 months ended Sept. 30, 1973. Initial payment for the 1973-crop assumed a net return of about $12.00 for the entire year to end next Sept. 30. Actual net return for the 1973 and 1974 crops will not be known until October, 1974 and 1975, respectively; but current sugar prices indicate they may be higher than the $12.00 used illustratively herein.
The photo on the cover of this issue shows graphically how the sugarbeet plant is a deep feeding crop that sends roots six to seven feet down into the soil profile in search for nitrogen and other plant nutrients. For this reason the soil samples must represent the entire soil profile that the sugar beet is feeding on.

Consequently, soil samples are taken to depths of five to six feet at many locations in each field to insure representative sampling or "to insure we are analyzing the amount of nitrogen that the sugar beet plant is feeding on." This method of nitrogen monitoring is proving very successful in developing sound, economical fertilizer recommendations that result in high production of quality beets.

Typically, 65 to 75 percent of the nitrogen available to the sugar beet is found below the surface foot of soil (Figure 3). This exemplifies the importance of deep soil sampling as contrasted to only surface sampling.

Dr. A. E. Ludwick of Colorado State University and Frank N. Anderson of the University of Nebraska have determined that the majority of the soils have a nitrogen distribution pattern similar to Figure 3; but nitrogen can accumulate in much larger amounts at lower levels in the profile in certain types of soils, especially following corn where extremely high rates of nitrogen have been used to produce maximum yields. This situation can be easily detected by deep soil sampling allowing the grower to utilize this nitrogen carried over from the previous crop, thereby reducing fertilizer costs and maintenance production.

The state universities in the GW area also recognize the importance of deep soil nitrogen monitoring. Dr. J. O. Reuss of Colorado State University, Dr. Gary Peterson, Frank Anderson and L. A. Daigger of the University of Nebraska have been instrumental in utilizing this technique to determine the total nitrogen available to a deep-rooted crop such as sugar beets.

An expanded effort is being made by GW to deep-soil sample as many fields as possible so growers can receive the benefit of this variable tool in making sound nitrogen recommendations. After the soil samples have been collected, they are forwarded to one of the university soil testing laboratories or the GW Soil Testing Laboratory in Sterling for analysis of NO₃-N. The top foot is also analyzed for pH, salts, organic matter, phosphorus, potassium, zinc, iron, lime and texture.

Research and experience have shown that it requires from seven to ten lb N per ton of sugar beets per acre to produce a crop of quality sugar beets. Using this information as a basis, along with yield goal, previous cropping history, etc., a complete fertilizer recommendation is made based on the university standards.

This fertilizer recommendation is a vital link in efficient sugarbeet production. Today's agricultural economy is so dominated by increased costs that it behooves all growers to have a good understanding of the sugarbeet crop's need for N, what is available in the soil, and then apply the balance needed judiciously. In doing so, he can control costs and capitalize on the additional income paid for higher sugar content beets. This is accomplished by deep soil nitrogen monitoring.
Paul Schmuck with his hailed beets that made 18.2 tons.

The "Old Reliable" - and Durable!

By ELTON H. PETERSON
Agriculturist — Gering

The Gering Valley was hit by a severe hail storm last September — hail the size of golf balls, piling up to six inches.

The heaviest damage was at Roubadeau and Riford stations — 1,300 acres hailed altogether, 600 heavy damage, 400 medium, and 300 light.

The pictures here show some of the damage.

But what survived?

Beets did.

Before the storm, Walt Heilbrun had an excellent crop of space-planted beets. Afterward, we estimated his crop would still make 20 tons per acre. It actually made 21.8 tons with 13.2 percent sugar content, while the station average recovered to 21.3 tons and 15.3 percent sugar.

The most severe area of the storm was near Paul Schmunk’s farm at Riford station. His contract of 79 acres, heaviest hit in the area, recovered to make 18.2 tons per acre and 14.1 percent sugar. Riford station averaged 21.4 tons with 15.1 sugar.

Beets — a durable crop?

Meantime, many bean fields in the path of the hail storm were heavily damaged. Most of the beans could only be salvaged, some left unharvested.

The pictures tell the story better than words, while the harvest figures again demonstrate the durability of the sugarbeet crop!
Keys to the Ease
of
Sugarbeet Production

By WILLIAM C. McGUFFEY
Director-Agricultural Development

- Simplified beet culture is a reality for those growers who recognize and adapt to their own situation the modern techniques of beet production.

These techniques are the key operations upon which a successful farming program is built. Each step is dependent upon the success of the preceding one. If a key operation is left out or not done properly, complete mechanization will not be realized and labor-demanding alternatives will have to be implemented.

The most important building block is the frame of mind or motivation of the individual. Once the grower makes up his mind that he wants to grow his crop easier and with a minimum of hand labor, then he can take a positive look at his farming operation and evaluate the building blocks that he can assemble with reliability year after year. He may already be at the plateau of planting 4-5 seeds per foot, thinning electronically and weeding by hand. Added encouragement and a refinement of his farming techniques may allow him to slip the last key building block, of planting to stand, into place.

Planning the whole procedure in advance and performing operations timely, as the need arises, insure the success of each step in the production cycle.

The emergence of the seedling and the resultant stand can be a stumbling block instead of one on which to build. Certainly the success of getting the seed germinated and emerged determines the option of having labor-free beets or the alternative of some form of stand adjustment.

Presently, most growers plant excess seed, gambling that enough will emerge to insure a stand without skips. Most of these stands are eventually adjusted downward by electronic thinners or people. In many cases below the level for maximum yields.

The success of planting to stand and emergence is dependent upon other key factors and starts with seedbed preparation. Seeds must have an ideal environment if they are to germinate consistently. A fine soil aggregate which can be firmed around the seed, enough nut-sized clods on the surface to prevent soil erosion and adequate subsoil moisture, as near to the surface as possible, is ideal.

Water relationships in the seedbed trigger the whole mechanization of germination and emergence. Sprinkler irrigation or early ditch water insures the germination process when used judicially. Irrigation for germination is an asset that some growers do not enjoy, but is highly desirable when planting to stand.

Next to water requirements, crust prevention is the most important factor in the emergence of the crop. It is related to seedbed preparation, soil type, weather conditions and should be prevented, if possible, by proper seedbed management, equipment and irrigation.

Seeds of high germinating quality are available, and the spacing (2”-6”) of bare or pelleted seed is possible with most well-maintained drills.

Adequate weed control with herbicide systems is practiced by many growers. Refinement is admittedly needed, however; in most cases weed control is or could be at a level that would lend itself to complete mechanization.

The importance of weed control should not be minimized. It is not, however, the controlling factor in complete mechanization. The ultimate success of emergence and stand establishment with random spacing varying from 6”-18” and providing a minimum of 28,500 harvested plants per acre, is the main key that unlocks the door to easier beet production.
Plant to Stand? - the Pros and Cons

Report from Holyoke by Agriculturist Gordon Friede .

- Plant to stand around Holyoke in the Northeast Colorado Area?

Yes, but . . .

. . . only with the best cultural practices and the best breaks in the weather.

Because, too often, if the grower takes special pains to space-plant on carefully prepared seedbeds, with extra irrigation, his plant population will not be thick enough to withstand wind, hail, crust, or weeds.

Because of these variable elements, one grower was able to harvest only one crop of space-planted beets in the last five years. The one year he got good stands and good pre-emergence herbicide control, the weed escapes took over so fast later on that he couldn't get workers into the field in time to save the crop.

This points up the fact, in this locality, that workers still must be readily available until we can get reliable post-emergence weed control.

Meantime, with our spring weather, we are lucky to get good stands when we plant six to eight seeds per foot. If the number were reduced to two or three per foot, then the harvested beet acreage might likely be half of that planted, in comparison with the normal loss of about two percent of the acreage.

For good tonnage and good sugar in the Holyoke area, with beets planted on 30-inch rows on beds, stands should be 140 to 180 beets per 100 feet of row after thinning. Most of the growers are willing to reduce their stands with machine work to provide additional weed control.

There could be many advantages to space-planting, but here the major disadvantage involves crop failure. If I were an agriculturist in an area with more favorable spring weather, I would be very much in favor of planting to stand. But in this area I don't push the issue because the losses are much greater than the gains in the long run.

Report from Yuma and Clarksville by Agriculturist Mel Pfau .

- To attempt to evaluate space planting by comparing it to conventional planting would be pitting farmer against farmer, or area against area, if yield data were the only consideration.

Too many variables are present which result in false information. However, for comparison purposes only, data from the Clarksville area will be shown.

Approximately one-third of the acreage in this district—627 acres—was space-planting. Seed spacing was five to six inches in 30-inch rows. An additional 607 acres were planted conventionally in 30-inch rows, and another 619 acres were conventionally planted in 22-inch rows.

Weather conditions were fairly constant, but 188 acres of space-planted beets were hailed more severely than the rest. Harvest data shows that the conventionally planted beets outyielded the space planted beets by 0.10 tons per acre, not a significant difference. Sugar percentage in the space-planted beets was slightly lower, but all 30-inch rows were slightly lower than the 22-inch rows. Total pounds of sugar per acre varied less than ten pounds per acre, not a significant difference.

Labor and seed savings amounted to an average of $18 per acre, according to the growers involved.

In the Yuma area, differences were more noticeable, but this probably can be attributed to varying weather conditions, mainly rain and hail. As a result, comparisons were made from farms which had both conventional and space-planted fields, with hopes that a satisfactory evaluation could be reached. Field size ranged from 71 to 150 acres, and grower size varied from 114 acres to 1270 acres. The largest acreage of space planting under one contract was 230 acres. Both sprinkler and flood-irrigated fields were studied.

In all situations, the difference in total pounds of sugar per acre was not noticeable to the grower, but accurate records were not maintained. Most growers felt there was no difference in yield. All growers agreed that seed costs were less than half of normal. Most growers did not notice any difference in labor cost for first-over operations, because these fields were used as bonus fields to insure a good job on their other fields. These fields were saved until last, however, and only one field required more than one trip, so labor savings were significant.

All growers who space-planted last year have indicated that they will space plant at least part of their acreage this year, and many of them will plant a considerably larger acreage this way.

A good space-planting program must include the following:

1. Use of a preplant herbicide, and sufficient incorporation to insure good control of weeds. Larger open spaces in the row reduces the competition to weeds, so it is necessary to control them with a herbicide.

2. Use of a good post spray, either Bananal or Dowpon, if necessary.

3. Timely and early irrigation for germination and activation of chemical.

4. Use of a high germination, high purity seed such as Mono-hy to insure early, good emergence.

 Kenneth Rogers with his six-inch spaced beets at Idaho, Colo.
During the past several years, much emphasis has been placed on acquiring a satisfactory final stand of beets without the use of hand labor.

Kenneth Rogers, at Idalia in the Fort Morgan district, feels that planting to stand is the answer—not mechanical or electrical thinning. This process has worked well for this grower over the past three years. His final stand and yield has been as good as the station average.

Rogers feels that on the average he can save $20 per acre in thinning costs but added that, in order to do this, particular attention must be paid to good weed control. Rogers says that by using pelleted seed, he can get excellent weed control. Rogers says that by using pelleted seed, all of his beets were planted to stand at a six-inch spacing and required only one thinning—no weeding.

"I like pelleted seed because I nearly eliminated doubles and acquired uniformly spaced plants."

Rogers says that during some years, when spring winds and rains are severe, he may end up with a thinner stand than he would like; however, he feels that with two seeds per foot and good management, the odds are still good that he will have a satisfactory stand. He says that even if only 50 percent of the beets are there when it's time to weed, he still has a 100 percent stand.

"Sure I have some skips, but so do growers who plant six seeds per foot."

Rogers has several suggestions for those who are thinking about a plant-to-stand program. First of all, think about what kind of stands you have normally had in the past at thinning time. Have you normally been able to prepare and shape the kind of seedbed that is conducive to good germination? Are your planters in good working order? Are you planting to a low of 75 plants. The low of 75 plants was in a field of beets planted at eight-inch spacing was the Milton. We had no trouble with grinding of pelleted seed with the Milton.

A prime requisite of planting to stand is irrigating twice for germination. We decided that, if possible, the beets should be irrigated twice for germination. This applies for bare as well as pelleted seed. A good even irrigation is also desirable.

In looking at the planting to stand for the last two years, I have come to these conclusions:

1. Planting to stand can provide adequate beet population for good beet production. Over the last two years only one of my fields of space-planted beets had to be replanted. This particular field was next to an old beet field and was lost in an 80-mile per hour wind last Memorial Day. None of my growers has replanted space-planted beets because of frost.

2. Tonnage per acre and percent sugar were equal to fields handled by hand labor or electronic thinners.

3. Optimum spacing for planting to stand is six inches. The fields planted at six inches had 120 to 130 plants per 100 feet average while those planted at eight inches were usually around 100 plants. At the four-inch spacing counts were 150 to 160 plants per 100 foot on last year's fields and I feel that the stand was too thick.

4. Planting to stand should be undertaken seriously by growers with good farming methods, adequate irrigation water, and good weed control.
The Minds and Hands Behind Mono-Hy Beet Seed

(A x B) x (C x D) = Mono-Hy

Where the sun never sets on sugarbeet breeding—the greenhouse of Great Western’s Agricultural Research Center at Longmont, Colo. Here, scientists and technologists draw upon the complex techniques of genetics and plant physiology to select and produce the parent stock of Mono-Hy sugarbeet seed, now winning worldwide recognition. Their work proceeds from the classic hybrid formula—the four-way or double cross—in the photo at left. These pages go behind the formula, back nearly 65 years, to present those who set the foundation of GW seed science and those who now build upon that foundation...
Asa C. Maxson

- To Asa belongs the title of the Grand Old Man of Great Western Seed. It is a legend now — rightfully — that he almost invented the modern sugarbeet. In 1910, Asa helped to set up the old Longmont Experiment Station — forerunner of the Research Center. He was given a job for one year, but was kept on until his retirement in 1945 because of his outstanding accomplishments. Self-educated in the sciences, he nevertheless developed home-grown varieties to replace stocks cut off by war in Europe and went on to select the foundation material for future seed. Asa lives in retirement at Longmont and maintains a lively interest in just about everything, especially the sugarbeet, at the age of 98 years!

Dr. Harvey E. Brewbaker

- It was Brew who introduced the modern concepts of plant breeding to Great Western's sugarbeet improvement program. In his work from 1937 to 1960, he won worldwide acclaim in the industry for breeding the first highly-productive varieties with resistance to leaf spot disease. Brew went on to set the stage for mechanization of the crop with his breeding program for monogerm beet varieties. And in another far-reaching step, he conceived the use of inbred lines for producing hybrid sugar beets. A farmer and rancher in his own right, Brew lives in retirement near Longmont, but not idly, what with past consultant work overseas and current water conservation work.

Herbert L. Bush

- Herb was an agronomist by profession who served on the sugarbeet improvement research team at Longmont from 1942 to 1968. But to agronomy he added the science of statistics for an understanding of both the inputs and the outputs of the beet. It was Herb who was responsible for the application of modern statistical methods to the research program. In this job, under Dr. Brewbaker, he provided direction for the breeding program by correlating and interpreting the mass of facts and figures of variety trials at various locations, at various stages, each year, from year to year. Herb now lives in retirement at Longmont.

R. Ralph Wood

- Ralph was an agronomist who began his service in the beet improvement program in 1942. Among his notable contributions was his development of varieties for beet areas in Wyoming and Montana. In addition, he introduced the method for mass production of laboratory analyses of this juice, a factor in determining varieties with higher purity for factory processing. Ralph was also called upon to investigate new areas for possible beet production, and was most recently technical advisor in the marketing of Mono-Hy beet seed in this country and overseas. Ralph retired this February and plans to continue living in Longmont.
Great Western’s plant-breeding team—professionals in pedigree planning for Mono-Hy seed.

In plotting the course for the sugar beet of the future they have to be right on target!

- Dr. Bob Oldemeyer, manager of variety development and team leader of the sugar beet breeders at the Agricultural Research Center, has won international recognition for his work. And in the American sugarbeet industry, he ranks senior among plant breeders. Bob began his career at Longmont in 1950, working at the right hand of Dr. Harvey Brewbaker, and took over direction of the beet breeding program in 1960 upon Brew’s retirement. A beet farm boy from eastern Colorado, Bob earned his doctorate in plant genetics and pathology at the University of Wisconsin after completion of his undergraduate studies at Colorado A&M College, now Colorado State University.

- Dr. Al Erichsen, senior plant breeder, provides a strong background in cytogenetics for overseeing the breeding of hybrids for the Montana-Wyoming area, polypolids, and development of stock with resistance to curly top disease, bolting, and, as a future prospect, resistance to nematode infestation. Al came to the Longmont Center in 1963 from South Dakota State University, where he earned his doctorate and earlier degrees.

- Dr. Akio Suzuki, plant breeder, designed computer systems for the beet research program while supervising variety trials in Colorado, Kansas and Nebraska. He also specializes in breeding of beets with a globe shape and leafspot resistance. Akio earned his doctorate in genetics at North Carolina State University after undergraduate studies at Hokkaido University in his native Japan. He joined the Research Center staff in 1968.

- Dr. Jimmy Widner, manager of agricultural research for the subsidiary Northern Ohio Sugar Company at Fremont and Findlay, conducts the plant breeding program for beet farms in Ohio and southeastern Michigan. From his office at the Fremont sugar factory, he supervises the variety trials and leafspot nursery in consultation with the breeding team at the Longmont Center. Jimmy began his career at Longmont in 1968 upon earning his doctorate at North Dakota State University. A native of New Mexico, he did his undergraduate work in agronomy at New Mexico State University.
The technicians—whose accuracy must be an actuality.

- Seed Foreman Dick Wagner and his assistant, Vince Duran, prepare tens of thousands of seed lots for planting with hundreds of thousands of stecklings to be accounted for at harvest. They also handle the seed for more than 100 experimental plots. All this requires absolute accuracy! Dick came to the Center in 1951 and Vince in 1963.

- Greenhouse Foreman Don Hansen and his assistant, Betty Pettie, plant, transplant, cross select, take readings and then harvest thousands of plants each season. Again, accuracy counts— for a mixup could cause the loss of years of work. Don came to the Center in 1967 and Bettie in 1970.

- Joy Groh, secretary to the plant-breeding team and seed clerk, keeps the inventory of more than 1,000 lots of seed along with information for each lot.

- Dave Radamacher, area agronomist at Billings, supervises extensive variety trials in Wyoming and Montana. Reared on a beet farm near Longmont, Dave came to the Center in 1968 upon his graduation from Colorado State University.

- Jerry Alanko, disease technician, specializes in development of disease epidemics for the selection of plants with the best resistance. A graduate of the University of Wyoming, Jerry came to the Center in 1968.

- Will Eitzman, chief plot technician, supervises variety trials in Colorado, Kansas and Nebraska, along with planning and supervising experimental seed plots. A graduate of Kansas State University, he came to the Center in 1971.
In the Gering Valley, Willard Ross applies Eptam layby to sugarbeets prior to thinning last May. At rear, Agriculturist Elton Peterson.

Layby — the Way to Apply

Report from McCook by Agriculturist Wendell Wagner...

- The use of a preplant herbicide has now become a fairly standard practice in sugarbeet culture in our Western areas. Nebraska growers have reached the point where 90 percent of the acreage is so treated.

  In most instances, the herbicide used is Roneet which has an effective life of about six weeks. It usually controls weeds in sugarbeets until about thinning time and then loses its effectiveness, permitting late germinating weeds to appear. These weeds must be removed by hoeing at least once and sometimes two or more times.

  The wage rates announced last year further increased a grower's opportunity for saving costs by substituting a $5 application of Eptam per acre for one or two $13 weedings. If one weeding per acre were eliminated on every acre of beets grown in our Western Nebraska area last year, the savings would have totaled $2,028,856.

  Put another way, Great Western growers could have earned an additional $2,028,856 if they had controlled the weeds with a lay-by Eptam application rather than a $13 per acre hoeing. If two weedings were eliminated in this manner the savings or earnings would have been doubled. The $5 per acre cost is based on the cost of chemical plus an application charge.

  The proper application and incorporation of Eptam, either as a spray or in granular form after the beets are up and before additional weeds germinate, will control late germinating weeds and eliminate hand weeding. To provide a continuous chemical barrier against weeds, the Eptam should be applied before new weeds have a chance to germinate following the degrading of Roneet. This means that it should be applied not later than six weeks after Roneet.

  The rate of application varies with the soil texture and will range from two to three pounds per acre active ingredient on the lighter textured soils such as those found in Nebraska. If banded, at least a ten-inch band over the row should be used. Incorporate the material immediately with any one of the following tools:

  - Flex harrow either down or across the row.
  - Rolling cultivator.
  - Spring tine scratchers.
  - Sinner or Bezerides weeders.
  - Follow the incorporation with a regular cultivation adjusted to work the treated soil to the beets.

  Other growers have noticed that their corn the year after sugarbeets treated with Eptam + Treflan was more weed-free than corn after corn.

Report from Nebraska by Area Agricultural Director Leonard Henderson...

- The first growers who used minimum tillage at McCook, Nebraska, realized they would have to take advantage of all the herbicides available for sugarbeets.

  The power driven tillers used for minimum tillage are excellent for incorporating both preplant and layby chemicals. Excellent results have been obtained with Treflan at 1-1/2 pints per acre, but if the grower continues minimum tillage this chemical might harm a future crop so we have been mixing Treflan + Eptam; 12 ounces Treflan + 24 ounces Eptam per acre.

  If there is heavy residue it would be advisable to use 1 pint Treflan + 1 quart Eptam. Adjustments up or down in rate should be made more by the amount of residue than by soil type.

  Some growers have noticed that their corn the year after sugarbeets treated with Eptam + Treflan was more weed-free than corn after corn.
Report from Montana by Area Agricultural Director Lee Butler...

Montana growers using a Treflan + Eptam combination or Treflan alone to control weeds that germinate after pre-plant herbicides have dissipated are generally well satisfied with their results. Beets are cleaner at harvest time and yield better.

Some growers have observed a 20 percent increase in tonnage on beets sprayed with Eptam-Treflan to control late sprouting pigeon grass and nightshade compared with fields not sprayed.

Acres covered in 1972 and 1973 were 4,177 and 5,375, respectively.

Timeliness in applying the material is critical as well as the method of working it into the ground. It appears that using a harrow twice over, once immediately after spraying and a second harrowing a few days later, results in better control than cultivating the material to incorporate it.

A recent label change prohibits use of *Eptalm* Treflan on sugarbeets. Recommended procedure is to apply Treflan as a broadcast, overtop spray when plants are between two and six inches tall.

A test was initiated this past fall using Eptam as a fall applied herbicide, the purpose being to eliminate weeds as they emerge in the spring, without damage to the beet seedlings.

A continuing effort will be made in 1974 by growers and company personnel to increase our know-how and use of herbicides to control late germinating weeds.

Post-spray 503

*It works -- with care*

Report by Area Agricultural Director Ralph W. Hettinger

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- Water Quality — Use soft water only. Well water with salts or certain ions tend to precipitate the mixture.

- Agitation — Sprayers with pressure agitators work o.k.

- Adjuvants — Amway L.O.C. definitely aids weed and grass uptake of herbicide (½ pt./acre).

- Correctly adjusted nozzles are a must.

- Rate — 1 Pt. Betenal and 1 Pt. 475 on a 6" band appears to be an average recommendation. A higher rate on big beets and weeds could be used. (Two fields had a double application and showed no real adverse beet damage.)

- Caution: Avoid the following conditions when using Betenal — 475 mixtures.

- Beets of four true leaves that have a damping off disease or other stress.

- Very small cotyledon beets on a hot day.

- Spraying very small beets in a dark, cool period and then have a following afternoon or day of bright sunlight.

- Water amounts of less than 12 gallons on a 6" band.

- "Hard" well water.

- Beets under a combination of stresses have a greater death loss risk.

- Weed control is poor on large, dry weeds and grasses.

- We are confident and satisfied as are the growers who used the above recommendations that 503 as a post-emergence herbicide will work for fast, sure weed kill. Some growers have expressed their views:

  "It works, received good control. Four days after application you have weed control!"
Microscopic and numbering in the millions, the nematode can rightly be called Public Parasite No. 1. It's a worm — feeding off the farmer's effort to supply the public with ample foodstuffs at reasonable prices.

To be more exact, in the case of sugar beets, the nematode feeds on the root of the growing plant. The result? If unchecked, the nematode worms its way into the grower's bank balance because of reduced beet yields from loss of vigor, stunting, irregular growth and wilting.

There are some 200,000 species of nematodes affecting other crops as well as sugar beets. The one that prefers beets was detected as early as 1927 in Northern Colorado and Western Nebraska.

Generally, nematodes infest the older areas of beet production. In Montana and Wyoming, although infestation has been extremely light and spotty, in recent years the infested acreage has increased and some fields require nematicide treatment. In the newer areas of eastern Colorado and western Kansas there is little if any evidence of nematodes.

In the infested areas, the nematode problem becomes more severe with shorter rotations of sugar beets and with overgrowth of weeds, since weeds provide a host for the parasite as well as the beet itself.

In the early years of infestation, the cure was to lengthen the interval between beets in the rotation and to keep fields free of weeds.

While these are always good cultural practices, they do not answer the need for controlling nematodes with more immediate effectiveness. And on smaller farms, longer rotations limited the acreage available for a good crop of beets.

With the need for a cash crop like sugar beets — with reliable yields — something had to be done to control nematodes. The first step was taken more than 20 years ago with experiments in soil fumigation.

Soil treatment with various nematicides improved and expanded gradually over the years until the late sixties — when advanced techniques and materials began to pay off with almost dramatic increases in yields in heavily infested areas.

So now there is effective nematode control, with proper application, either in the fall or spring, within the economic framework of beet production. While the various treatments fall short of nematode prevention — or permanent eradication — they can pay off handsomely, even spectacularly, in comparison with the returns from an infested crop of stunted runts.

There is a need, meantime, to detect nematode infestation and to determine proper and timely treatment. There are two practical methods of detection — study of farm's beet crop history and examination of the crop during the growing season. If yields are steadily declining from year to year, if roots in the field are lagging in growth, then there is reason to be suspicious.

With suspicious evidence at hand, either from the past season or during the one to come, it is time to consult with your GW agriculturist to diagnose the problem. With further study of your crop history, with laboratory analysis of soil samples from your farm, he can help you make a reasonably accurate decision on the extent of nematode infestation and the best means of control.

Soil samples can be analyzed for nematode cyst count at the Great Western Grower Service Center at Platteville, Colo., at state universities and commercial laboratories. The Grower Service Centers at both Platteville and Scottsbluff offer nematicides and application services along with agrichemical dealers in the areas.
At the Platteville Grower Service Center, Technician Phyllis Schmidt demonstrates phases of soil sampling. On the left, she uses the microscope to count nematode cysts in a sample. At center, she pours soil into the grinder to obtain a uniform sample. And at right, Phyllis separates the sample into two portions in the twin shell mixer. The divided sample is then sent to the GW lab at Sterling or Colorado State University for final analysis.

Nebraska’s Goal - No. 1 in Control!

By PAUL BLOME
Manager — Scottsbluff Grower Service Center

- Up 77 percent — that's the progress of nematode control in the Nebraska Area in the last five years!
Nematode control is one of the biggest goals of the agricultural staff to increase the yields of older sugarbeet farms in Nebraska.

It's part of a continuing program that dates back to 1951, when Agriculturist Jerry Jarrell attacked the nematode problem with the first fumigation test plots. The program gathered momentum in the early sixties with the purchase of Tote machines for experimental fumigation.

By 1969, with nearly 3,500 acres of beets fumigated in the North Platte Valley, the results were so good that many growers considered nematode control a necessity. They also found better yields in crops following sugarbeets.

It was in the same year, 1969, that the Scottsbluff Grower Service Center was opened to provide additional fumigation equipment in cooperation with the GW agricultural staffs in the four Nebraska factory districts.

From 1969 to 1970, fumigated acreage in the Valley increased 100 percent!
Last year, nearly 15,000 acres were fumigated or treated with another nematicide — an increase of 77 percent since 1969, and accounting for nearly one-fourth of the beet acreage in the Valley.

More indicative of good results was that 90 percent of last year's High Ten acreage was treated with some kind of nematicide!
That's progress — and another No. 1 for Nebraska!
Nematode Controls

• Until 1971, soil fumigants such as Telone and Shell D-D were the only form of chemicals available to the growers and these fumigants are still widely and effectively used to control nematodes. In 1972, a granular nematicide, Temik, was first introduced. A carbamate insecticide-nematicide, Temik is available in granular form only and is proved to be effective on certain species of insects, mites, and nematodes. Some of these pests, particularly foliage feeding pests, are controlled by systemic action of Temik.

The frequently asked question about Temik is: "Is Temik better than fumigants in controlling nematodes?" Let us compare Temik with fumigants and examine some advantages and limitations each material possesses. Research data and observations indicate the following:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Temik</th>
<th>Fumigant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil texture:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>Less effective</td>
<td>More effective</td>
</tr>
<tr>
<td>Heavy</td>
<td>More effective</td>
<td>Less effective</td>
</tr>
<tr>
<td>Soil moisture:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>Not effective</td>
<td>More effective</td>
</tr>
<tr>
<td>Moist</td>
<td>More effective</td>
<td>Less effective</td>
</tr>
<tr>
<td>Wet</td>
<td>Less effective</td>
<td>Not effective</td>
</tr>
<tr>
<td>Nematode control</td>
<td>Kills larvae mainly by contact</td>
<td>Kills cysts, eggs, and larvae by fumigant action</td>
</tr>
<tr>
<td>Systemic action</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Grower application</td>
<td>Easy</td>
<td>Less easy</td>
</tr>
<tr>
<td>Fall application</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Side benefit</td>
<td>Controls certain insects and mites</td>
<td>Controls certain disease organisms</td>
</tr>
<tr>
<td></td>
<td>Less carry-over benefit in succeeding crop</td>
<td>Greater carry-over benefit in succeeding crop</td>
</tr>
<tr>
<td>Approx. cost/acre</td>
<td>$40</td>
<td>$40</td>
</tr>
</tbody>
</table>

As you can see Temik is not any more effective than soil fumigants but it has certain advantages over the fumigants, particularly on heavy and moist soils. How do we apply Temik for nematode control? Follow these steps:

1. Immediately before planting or at planting, apply 40 lbs. of Temik 10G granules per acre in a 4 to 6-inch band using a commercial granular applicator.
2. Immediately work into the soil or cover with soil to a depth of 2 to 4 inches. A standard method recommended by Union Carbide is to apply Temik in a band layer about 4 inches deep in the soil by means of "Hawkins Shoes".
3. Plant seed in the middle of the treated band.
4. Irrigate the treated field immediately after planting if soil is too dry. The water not only helps germination of seeds but also activates Temik granules. Excess water is harmful since Temik is highly soluble in the water and easily carried away, vertically or horizontally, from treated zone.

It is apparent from the past two years' experience that Temik can be used quite effectively and is an excellent alternative to the soil fumigants in controlling the sugarbeet nematode. Those who suspect nematode infestation in their fields should contact their GW Agriculturist for more information regarding soil sampling and analyses for nematode counts.

—Dr. Y. Mok Yun
Entomologist
Agricultural Research Center

Spring-timely Tips...

• You will be planting the best seed available — make certain your drill is in good working order to insure a good uniform stand.
• The mis-use of water has more to do with disappointing yields than any other one farm practice.
• To stay strong in the beet business, let the chemicals and the machines do the hard work.
• When using any chemical, read the label — know what you are applying to your crop.
• To obtain best results, chemicals must be thoroughly incorporated into the soil to a depth of 1½ to 2 inches.
• The results from your chemical weed control will be no better than the equipment you use and the care you take when applying the material.
• Chemicals cost money — so do weeds.
• Take care of your beet crop — it will take care of you.

—Ralph Hettinger
Area Agricultural Director
North Central Colorado
Mechanization Moves Ahead

By LaMAR C. HENRY
Director — Agricultural Operations

- There is good evidence now that high sugar production—along with proper final stand—can be achieved with mechanization of spring-time work by the selectronic thinner.

The graph above breaks down the use of selectronic thinners, shown by the darker green bars, for each company area during the last crop season, first by all acreage, and then by High Ten acreage.

Both the acceptance and the performance of the machines can be gauged by the bars on the right for company-wide High Ten acreage. They show that the percentage of High Ten acres thinned selectronically almost approached the percentage of all acres thinned by the machine.

This demonstrates that the machine can be used effectively for higher yields—and higher returns. And it is further confirmed by the results in Wyoming-Montana, where the percentage of selectronic High Ten acreage far exceeded all acreage thinned by machines.

Just about the same results hold true for Northeast Colorado & Kemp, but with a lower percentage of acres thinned selectronically.

Nebraska and North Central Colorado lagged behind in selectronic High Ten acreage, but still maintained average overall use of the machines.

With the company-wide average of selectronically thinned acreage nearing 30 percent, rising from trial use in 1967, the machine assumes even more promising potential in future earnings and efficiency with further experience in operation and further advancements in chemical weed control.

As of now, the selectronic thinner can claim to be a High Ten helper. What could be better?
Root Maggot on the Run

... in Wyoming

Report by Agricultural Manager Stanley Walter and Research Agronomist Robert Vergara

- Research data obtained in the Wyoming area during 1973 indicates that sugarbeet root maggots can be controlled.
  With the cooperation of 64 growers throughout the Lovell factory district, 83 strip trials were applied by Bob Vergara, research agronomist, and the Lovell agriculturists. Root damage ratings on all 83 strips in late June and early July — and yield data from some 12 locations harvested during October — showed very successful control of root maggots with Dyfonate 10G granular soil insecticide.

The strip test program was aimed at evaluating three granular insecticides — Dyfonate, Diazinon and Temik — for use at planting time and post-emergence under different methods of application.

Results of the trials show:
- Dyfonate and Temik were the two most effective materials for controlling root maggots.
- Dyfonate was most effective when side-banded or applied with a Russ-Ken incorporator at planting time.
- Temik was more effective when side-banded than when power-incorporated. It performed more consistently in the Heart Mountain area than in the Powell area.
- A planting-time application was more reliable than a post-emergence treatment.
- Irrigation immediately after a post-emergence application slightly improved root maggot control at Powell, but not in the Heart Mountain area. This difference was mainly due to rainfall after the post treatment at Heart Mountain.
- Research data showed that two applications — one at planting time, plus a post-emergence treatment — generally gave better control of root maggots than a single application. Two applications, therefore, should be used by growers who expect a heavy infestation or who encounter heavy fly population at post-emergence time.

General observations of the plots were that any insecticide applied by any of the methods gave some control, and the addition of a post application enhanced the control received. Post-emergence applications only were generally less reliable than the pre-plant or pre + post applications.

Data obtained from the root damage ratings showed Dyfonate pre-plant and combinations of Dyfonate with a post-emergence insecticide to provide the best control.

Yield data bore this out with Dyfonate applications again ranking at the top in most trials harvested. However, in the Heart Mountain area — with considerably different climatic and soil conditions from the rest of the area — both the root damage ratings and yield data showed the merit of Temik for root maggot control.

General recommendations for control of the root maggot throughout the Lovell area are to apply Dyfonate 10G granular insecticide at 12 to 15 pounds at planting time. Heart Mountain growers who have been using Temik with good results are encouraged to continue its use. Other growers are encouraged to make planting-time applications of Dyfonate.

Dyfonate 10G was used by Don Eden, who raises 210 acres of beets in the Powell-Garland area. At harvest time, he says he saw a few maggot scars on the beets, but had no serious damage or loss of stand from using Dyfonate 10G. He adds:

“It cost me $3.50 or $4 an acre for the chemical and I have covered all my acreage with Dyfonate, so any reduction in maggot damage adds to the return on my investment. I feel the control I have gotten has paid for the cost many times over.”

Don Eden plans to use Dyfonate 10G again this spring. There are many growers in the Lovell district like Don, who incidentally worked out the side-banding method. They all agree that root maggots can be controlled with chemicals. Their results, together with the strip trials, show that Dyfonate gave the best and most consistent control.

For example, Jake and Kerm Jacobs, who raise about 100 acres of beets in the Willwood area south of Powell. The brothers suffered substantial yield loss when their 1972 crop was hard hit by maggots. In 1973, however, they estimate they got 95 percent control of the maggots with Dyfonate 10G at 10 pounds on all their acreage. Kerm says:

“When I was cultivating this year, I had to look awfully hard to find beets dying from the maggots, while last year everywhere I looked I saw dead beets. At harvest time this year, the beets had a few scars but were not seriously damaged since the scars were mostly up near the crown.”

This spring, the Jacob brothers plan to use Dyfonate again and will probably increase the rate to about 12 pounds per acre.

Another example, also in the Wildwood area, Paul and Dale Kasinger, who had extensive maggot damage in 1972. They applied Dyfonate 10G to their crop this past season and feel they received very good control of maggots. Dale says:

“I left a six-row check strip in my field and I could see it all season. The stand was much poorer, and the beets that were left required more water because the root system was probably damaged by maggots.”

Paul adds: “We still have some maggots in our fields, but we sure had a better crop this year. Also, I didn’t notice any toxicity to the beets from the application. We’ll use it again this year.”
...in North Central Colorado

Report by Area Agricultural Director Ralph W. Hettinger

• The sugarbeet root maggot has been one reason growers have hesitated to plant beets on some farms in the North Central Colorado area. In reviewing 1973 results, we find this problem is not as critical as it was in past years; namely due to better usage of insecticides, rates and methods of applying. Generally, most all growers were pleased with our maggot control work in 1973. To substantiate our findings, let’s take a look at the results made from our pre-harvest samples on 513 farms in North Central Colorado.

On the 513 farms sampled, 296 applied an insecticide to control maggots and/or flea beetle larvae. On these farms, 5,419 beets were dug and we found only 7.4 percent of the sampled beets showed some damage due to maggots. 98 farms applied Temik and 198 treated their soil with Thimet, Diazinon or Dyfonate.

Methods of application which work consistently are power incorporation 7” band 1½” depth, surface application and worked in with springtines, etc. Aerial spraying and applying an insecticide immediately ahead of drill are also used by some growers.

Aerial spraying for adult fly control is generally less effective than the ground application of a granular insecticide for larval control. Only spray material registered for adult fly control is Malathion.

Granted, early application of some insecticides will possibly require a later application. Some growers use the fly trap system to determine the possible need for a second application.

In North Central Colorado, we feel growers have a variety of insecticide material to use and various methods of applying for good control.

Recommended Insecticides and rates of application:
1. Diazinon 14G 11 to 14 lbs./acre in 7” Band
2. Temik 10G 10 to 15 lbs./acre in 7” Band
3. Thimet 10G 10 to 15 lbs./acre in 7” Band
4. Dyfonate 10G 10 to 15 lbs./acre in 7” Band

Under no circumstances should the insecticide come in contact with the beet seed.

We feel, there is enough evidence known today for the control of root maggot and flea beetle larvae that a grower can apply the above insecticides with confidence and grow a good crop of beets.

Joint Research Committee Report...

• The Grower-GW Joint Research Committee met in Denver on Jan. 22 and 23 to approve seed varieties for planting in 1974 and to approve university grant proposals.

In opening the meeting, Co-Chairman Kish Otsuka remarked that world food and fiber needs are increasing at a rate greater than had been projected even just a few years ago and that food shortages now becoming apparent require substantial increases in production. With regard to sugarbeets, Kish said that better yields and proper control for the sugar beet industry to survive.

Results of tests conducted in Nebraska under funds provided by the committee were presented by Frank Anderson and Louis Daigger. Anderson found that deep soil probes of 105 fields in the North Platte Valley showed that 40 percent had more than 200 lbs. NO₃-N per acre at planting time and 15 percent had less than 50 lbs. NO₃-N/A.

This points out the importance of soil testing. With high amounts already available, application of additional fertilizer costs money unnecessarily and decreases beet quality. On the other hand, if there’s not enough fertilizer available in the ground, yields could be reduced unless some is added. Comparison of soil phosphorus levels in 1963 showed almost twice as much as in 1972-3. Anderson thought high soil P levels may reduce beet yields, Daigger found that 80 percent of the fields he sampled for phosphorus could produce a good crop of beets without applying any phosphorus fertilizer.

Eric Kerr, working at the Scottsbluff Experiment Station, found an increase in bean yields following beets treated with fumigants for nematode control. Carry-over benefits of the fumigant were enough to pay for the chemical at current bean prices.

Dr. Ed Sullivan, of the Agricultural Research Center in Longmont, who just returned from a trip to England where he attended a worldwide conference on Nortron — the new sugarbeet herbicide for sugarbeets — reported that Fisons, the manufacturer, will apply for an experimental label this year. Limited quantities are likely to be available for use by growers in 1975 for testing. Nortron is being sold commercially in England this year as well as in several other European countries. Sullivan pointed out that Nortron seems to be the best herbicide to come along for sugar beets in 25 years.

The committee received 18 proposals for grants from universities in Colorado, Nebraska, Kansas, Montana, Wyoming and also from the USDA. Proposals for research which had been supported by the committee last year were approved, but proposals for new projects were postponed until later to give committee members an opportunity to study them in greater detail and in some cases to discuss the proposals with the researchers involved to get a better understanding of them.

Results of official trials on which the committee made its seed decisions were approved for distribution to Great Western agriculturists who also have the list of approved varieties.

In approving the varieties, the committee emphasized beet quality. It was pointed out that the important thing was pounds of sugar extracted per acre, while tons of beets per acre were much less important.

— Dr. Kenneth P. Dubrovin
Promotional transfers for three members of the Great Western agricultural staff were announced in February by LaMar C. Henry, director of agricultural operations.

Merle Riggs, agricultural manager at Ovid for the past three years, was transferred to the Denver office in the new job of assistant to Fred G. Holmes, manager of the agricultural administration.

Robert L. Abrams, manager of the Grower Service Center at Platteville, Colo., was advanced to agricultural manager at Ovid.

Vincent C. Erickson, field representative at the Platteville Center, was promoted to supervisor of the facility.

Before he came to Ovid, Riggs served at the Denver office and on the field staff at Fort Morgan and Greeley. A 1950 graduate of Colorado A&M College, he began his GW career in 1957.

Abrams came to the Platteville Service Center last fall after serving on the Greeley field staff and the Longmont research staff. He began his GW career in 1957 in the Ovid district after Air Force duty and graduation from Colorado A&M College.

Erickson came to the Platteville Center in 1968 with extensive experience in farming, including sugar beets, in the Platteville area. He was born and reared in Lucerne.

Herbert H. Pearcy, agricultural superintendent at Wheatland, Wyo., retires at Wheatland

Retirement from a Great Western career spanning 45 years comes in March for Herbert H. Pearcy, agricultural superintendent at Wheatland, Wyo.

A persuasive advocate of the sugar beet crop, Herb was a familiar fixture in the fields around Wheatland, where he worked with growers for the past 32 years. He was the last among a dozen personalities to hold the job title of agricultural superintendent, now no longer in use.

Before he became a fieldman at Wheatland in 1942, Herb was a typical all-around Sugar Tramp. Except for two years at Ovid working on the dump crew, he spent his earlier career at Wheatland in campaign and seasonal jobs such as handyman, warehouse foreman, maintenance man, feed foreman, dumpman, tareman, carman and fieldman’s assistant.

Herb began his career at Wheatland in 1929 working on construction of the sugar factory. As a result, he is probably the last man in the company with service going back to the first days at Wheatland.

Off the job, Herb was active in the community and agricultural organizations. But it was on the job that he will be remembered by growers and company people alike for his command of the language in praising and promoting the beet crop. It was the Pearcy touch, all his own, and inimitable.

Our Own Beloved Bert Ward

- One of the gifts for Bert Ward upon his retirement six years ago was a Great Western service pin with ten stars in diamonds, signifying fifty full years of service. It was a perfectly fitting gift, yet perhaps typical. And it was a typical Bert who acknowledged the gift with grins and blushes at an informal gathering in the President’s office. But looking back now, what could be given to a man like Bert who gave half a century to the company? For, in the current catch-words, Bert was something else. And he truly was in both his personal ways and his professional work. Here was a man who combined a great mind with gracious manners. Here in the photo, in 1958, Bert glances around with his impish smile, with a trace of the quizzical, facts and figures at his finger tips, if not his lips, or forthwith from the ancient calculator at his side. Here was a man who could compete with a computer. His job at the General Office was agricultural statistician, not a very impressive title for one whose work encompassed an encyclopedic knowledge of the company’s resources and operations. Bert did have an agricultural background, he began his career at Brush and then worked at Fort Morgan as a fieldman, armed with a degree in mathematics from the University of Denver and another in agronomy from Colorado Agricultural College. But in the sense of the words, Bert was never armed, he was disarming with his grasp of the essentials, with his kind and gentle ways. In the estimation of his fellows, he was as high as the stars and as precious as diamonds — was Bert, who died on Jan. 25 at the age of 78.
Eaton
High Ten

Front row, from left, with figure for pounds of sugar per acre: W. H. McKay, 8,865; Larry D. Miller, 7,862; R. J. Blemm, 7,788; Darriy Woods, 7,830. Middle row: Ray Weinmeister, 7,905; Dennis Isakson, 8,021; Albert Harding, 9,068; W. E. McKay, 8,865; Gerald Rasmussen, 7,856. Back row: George and Robert Tateyama, 7,976; Jack Boegel, 7,802; Hiroshi Tateyama, 7,976.

HIGH TEN GROWER GALLERY

Greeley
High Ten

Front row, from left, with figure for pounds of sugar per acre: Robert Joe Wagner, 8,025; George Lenz, 7,585; Edward Fritzler, 7,048; John Alles, 7,015; Leonard Peterson, 7,126. Back row: Lynn Ottoson, 7,512; Daryl Ottoson, 7,036; Bob D. Strickler, 7,093; William and Larry Leafgren, 8,345.

Loveland
High Ten

Front row, from left, with figure for pounds of sugar per acre: LeRoy Waag, 8,596; Harlan Seaworth, 8,594; Kenton Brunner, 9,393; John Nelson, 8,149; Roy Roth, 8,519. Back row: Harold Dreith, 8,816; Richard Seaworth, 8,594; Victor Koehler, 7,951; Neill Brunner, 8,321; Rodney Roth, 8,519; Edwin Schick, 8,241; Albert Kraft, 7,978.
Lonmont High Ten

Front row, from left, with figure for pounds of sugar per acre: Gary and Randall Lebsack, 6,979; Floyd Adler, 7,525; Joe Drieth, 7,396; Herman Wagner, 7,112. Back row: Walter Nygren, 7,006; Larry Hell, 7,809; Wallace Lebsack, 6,979; Walter Mayer, 7,027; William Mayer, 7,047; Roland Weis, 8,324; Lyle Hell, 7,809.

Brighton High Ten

Front row, from left, with figure for pounds of sugar per acre: Mark Kauffman, 6,763; Brian Schlager, 7,118; James Schlager, 6,911; Lee Kauffman, 6,763; James Tegtman, 6,312. Back row: Gordon Rupple, 6,302; William Sargent, Jr., 6,312; Edwin Hualva, 6,350; Conrad Bauer, Jr., 6,127; Nikolaus Arnusch, 7,471; Harry Becker, 6,257.

Ovid High Ten

Front row, from left, with figure for pounds of sugar per acre: Kiyoshi and Kameo Otsuka, 7,993; John Schneider, 7,728. Middle row: James Jimenez, 9,048; Raymond Nelson, 8,589; Calvin McClung, 7,973; Michael Kimberly, 7,756; Harold Bieber, 8,332. Back row: Bernard Powell, 8,158; William Rickerson, 7,758; Laddie Halinsky, 7,919. Absent: John Jimenez, 8,805; Jacob Schneider, 7,728.
Sterling High Ten

Front row, from left, with figure for pounds of sugar per acre: Harold Kautz, 9,140; Albert Brandt, 8,032; Alex Hettinger, 8,292; Burt Randall, 7,592; Jack Schell, 8,051. Back row: William Devie, 7,863; Donald Schell, 8,051; Victor Helmut, 7,947; Alvin Brunkhardt, 8,014; Vernon Stumpf, 8,461; Gene Rizzolo, 8,352.

Fort Morgan High Ten

Front row, from left, with figure for pounds of sugar per acre: Ed Amen, 7,511; Arthur Wacker, 7,600; William Wunsch, 7,887; Emanuel Kembel, 7,684. Center: Leonard Sagel, 7,243. Back row, Duane Bruntz, 7,376; H. E. Forrest, 7,808; Arlen Rico, 7,602; Edwin Schauer, 8,376. Inset: Eugene Devlin, 7,725.

Kemp High Ten

Front row, from left, with figure for pounds of sugar per acre: Wayne Woodmancy, 7,407; Robert and Linda Henry, 6,898; Ewald Hartman, 7,262; Rex Hinkhouse, 7,505. Back row: Gilbert Bolwinkle, 7,021; Melvin Sall, 7,227; Glenn Burk, 7,181; Fred Darnauer, 7,275; Arthur Johnson, 8,099; Bill Hinkhouse, 7,505. Absent: Raymond Struckhoff, John and Murray Bauman, 8,268.
Scottsbluff
High Ten

Front row, from left, with figure for pounds of sugar per acre: Victor Ruppel, 8,658; Russell Dougherty, 8,465; Karen McPherson, 9,270; W. O. Barbour, 9,187; Larry Becker, 8,523. Back row: John Reichert, 9,163; Dave Stricker, 8,618; Victor Rien, 8,912; John Bauer, Jr., 8,453; Daniel Helzer, 8,796.

Gering
High Ten

Front row, from left, with figure for pounds of sugar per acre: Wilford Kaufman, 8,492; Lon Nichols, 8,607; Gerald Keller, 8,098; Harold Ruppel, 9,119; Wilbert Ruppel, 9,209. Back row: Clarence Maupin, 8,278; Robert Ott, 8,061; Don Tripple, 8,319; George Bett, Jr., 8,800; Harold Tripple, 9,119.

Bayard
High Ten

Front row, from left, with figure for pounds of sugar per acre: Elmer Kraus, 9,047; Norman Kuxhausen, 8,606; Herman Schumil, 8,936; George Kambus, 8,848. Center: Kenneth Reis Schneider, 8,931. Back row: Ernest Nuss, 9,062; Elmer Meininger, 9,051; Harvey Eirich, 9,826. Inset, left Dale Eirich, 9,871. Inset, right, Russell L. Hodge, 9,201.
Mitchell High Ten

Front row, from left, with figure for pounds of sugar per acre: Alvin Lebruska, 9,291; Marion Hessler, 8,957; Jake Schwartzkopf, 9,468; John Morimoto, 9,017; Daniel Hara, 9,025. Back row, Jake Schlotthauer, 8,841; Phillip Johannes, Jr., 9,170; Morris and Robert Hessler, 8,957; Robert Thomas, 8,987. Inset: Don Weinmeister, 9,178. Absent: Henry Hoff, Jr., 9,630.

Billings High Ten

Front row, from left, with figure for pounds of sugar per acre: Steve Rosh, 9,630; George Bohl, 9,696; Ira and John Welch, 9,337; Ron Wetsch, 9,706. Back row: Alvin Cole, 9,768; Conrad Gabel, 9,624; Harold Hert, 10,100; Ernie Icopini, 9,643; Alex Wetsch, 9,706; James Krum, 9,257.

Lovell High Ten

Group photo, from left, with figure for pounds of sugar per acre: Douglas Miller, 8,044; Frank Mosegard, 8,534; Wayne Sparks, 8,077; Garold Orr, 8,045; William (Bud) Arnold, 9,175; Don Burgener, 8,377.

Single photos, from left: James Cox, 8,128; William E. Arnold, 9,175; Charles Ando, 9,105; Lowell Baker, 7,902. Absent: Jerry Lewis, 8,202; Melvin Green, 8,202; William Fisher, 8,128.
1. Robert Poitz, who produced 7,321,931 pounds of sugar in the Fort Morgan district to rank first among the High Sugar Producers.

2. Bill and Rex Hinkhouse, who produced 5,974,867 pounds of sugar in the Kemp district to rank second in High Sugar.

5. Ernest Eskam, who produced 4,066,436 pounds of sugar in the Mitchell district.

6. Sharon and Vernon Parker, who produced 3,839,158 pounds of sugar in the Ovid district.

10. Wilbur Miller, who produced 1,914,612 pounds of sugar in the Eaton district.


12. Irvin Kindfater, who produced 1,841,649 pounds of sugar in the Longmont district.
3. L. E. Smith, second from left, with his sons Gene, Stan and Les, who produced 4,747,980 pounds of sugar in the Sterling district to rank third in High Sugar Production.


13. The late Jake Marker, who produced 1,419,600 pounds of sugar in Scottsbluff district.


15. Robert Joe Wagner, who produced 823,894 pounds of sugar in the Greeley district.
• Did you know that there is more sugarbeet research going on at Great Western's Agricultural Research Center at Longmont, Colo., than at any other place in the United States?

... that sugarbeet growers around the world recognize the importance of the work at the GW Research Center?

... that the GW Research Center has been engaged in basic sugarbeet science longer than any other private facility?

... that the GW Research Center began work on better ways to grow sugarbeets back in 1910, operating for many years as the Longmont Experiment Station?

... and that the purpose of the Research Center has always been to provide growers with the best and most up-to-date information on beet production?

From the beginning much effort was put into obtaining the best possible sugarbeet varieties to Great Western growers. At first, only seed that came from Europe was tested; but just before World War II, a breeding and variety development program was started to improve the existing effort.

The high yielding, mono-germ, disease resistant seed that growers now plant is the result of many years of hard work. According to Bob Oldemeyer, who is in charge of all plant breeding, it looks like they will be giving growers even better seed in the near future.

One of the exciting things just beginning is breeding sugarbeets that are resistant to nematodes. Just think how it would be if you didn’t have to think about nematodes anymore! It will take at least five years before these varieties can be developed to test in trials and possibly ten years before growers will be able to plant them, but the scientists at Longmont are working on it.

Everyone knows how important weed control is in growing a good crop of sugarbeets and that the work force to hoe the weeds is diminishing. The workers that are available choose the clean fields first and work the weedy ones when and if they get to them. So herbicides are necessary to get the job done. There are good chemicals available, but Ed Sullivan and his coworkers at Longmont are always looking for new chemicals that are less harmful to beets and do a better job of controlling tough weeds.

By DR. KENNETH DUBROVIN
Director — Agricultural Research Center

Better Ways for the Beet Crop

Dr. Bob Oldemeyer . . .
... manager of variety development

Dr. Ed Sullivan . . .
... agronomic supervisor

Gary Jardine . . .
... irrigation specialist
One of the chemicals that Ed obtained a few years ago was NC 8438, from Fisons, a British agricultural chemicals company. The chemical, which was named Nortron just this year, is probably one of the best for sugarbeets because it causes no injury even at rates more than twice as high as needed to kill weeds, because it gets weeds that the herbicides now in use do not, and because it lasts longer in the soil.

After a lot of work by the scientists at Longmont, it appears Nortron will soon be on the market. If all goes well, there should be a temporary label by the end of 1974 and some will be sold in the spring of 1975. You can be assured that the researchers will keep on working hard to get Nortron to you as soon as possible because they know that the weed control it gives will make beets easier for you to grow.

Of course, you can't grow beets without water and in some places water is not as plentiful as it used to be. Almost everywhere the cost of irrigation is going up even if there is plenty of water. Gary Jardine, irrigation specialist at the Research Center, is working to find ways to make water more efficient in order to stretch the supply if it is short.

Then too, even though water may be cheap now, that does not mean that it always will be. Gary is also trying to find ways to make it cheaper and easier to get the irrigation done. Maybe the number of irrigations can be cut down — everyone would like that!

One of the areas investigated last year was trickle irrigation in which a tube supplies water constantly in the area around the plant. Because of the difficulty in getting the tubing laid, it does not appear practical for beets, but it makes a little water go a long way.

These are just a few of the things going on at the Longmont Research Center. We also have research underway on sugar beet quality and better use of fertilizers, reduction of pile storage losses, seed quality and processing efficiency, seedling emergence and growth regulators.

And remember, we always like to hear of new ideas.

So when you are in the vicinity of Longmont, Colorado, stop by and share your sugarbeet problems and ideas with us.

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The Grower . . . a Researcher in His Own Right

By CARL LUFT Manager — Agronomic Development Agricultural Research Center

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On-the-farm research seems to range in scope from planting by the light or the dark of the moon, "eye-balling" a crop response to a designated treatment, or the study of precisely designed and documented replicated tests. In any case, it is here to stay and growing rapidly as farmers' interest, knowledge and farm efficiency become a more critical measure of economic survival.

The individual farmer's research and development can be ordinary curiosity or a serious effort at solving a specific production-limiting problem. It is vital to economic stability and agricultural progress.

No business or farm can progress without a viable program in research and development. Most commercial developers of seeds, feeds, chemicals and machines maintain strong research programs and extension facilities to provide product performance, to beat the competition and to meet government standards and controls.

It would seem that many research products are delivered to the farm ready for immediate use. But there remains the need to adapt a scientifically-developed seed, chemical, or machine to the individual environment of the user. This is the research and development realm of the farmer.

Some commercial developers extend their service to the sales field in guidance and training to insure the desired performance of a production item. But field testing, experimenting and operation of a new production tool without a specific plan can be unprofitable and expensive, if not disastrous.

It would be simple to adopt the slogan, "leave research to the researcher." But who would make the final commercial adaptation? Sound production research and development requires input from the user in the beginning.

Grower research continues to expand and can well be of benefit, if properly handled.

A common example of grower research is a strip trial of herbicide, insecticide or nematicide which might very well provide the answer with an "eyeball" statistic or a measured yield difference if properly weighed and recorded. This same response can be possible with different varieties. If all of the factors such as soil, weather, disease, soil moisture for the strip trial area are identical, the response can be acceptable.

However, a single strip through a comparatively large field could provide a very misleading response. This can be especially costly if there is no response in an area that has had a definite problem history. Accuracy and profitability can be more assured if the test is simply planned.

These several simple steps in planning will help to provide accurate results:

1. Identify the problem and area involved and locate by map or stake out accurately and permanently.
2. Select the desired control agent and rate to be applied.
3. Lay out the plot to be tested in an area free from wide variations in moisture and fertility.
4. If the test or strip trial is to be small, keep the treatments closely grouped to reduce effect of soil variations and other factors that would be more uniform in a small area.
5. If the area to be tested is a larger field, several strips and/or checks can be replicated across the field, preferably in truckload lots. This will provide an average result of influences by differing environmental factors. Repeat each test two to four times for more meaningful data.
6. Accurately measure each treated and check area, so that yielded data may be accurately determined.
7. Record dates, rates, and abnormal weather events that would influence test responses. Keep a general log of cultural practices followed.

It is important to remember that on-the-farm research can provide useful guidelines only with proper interpretation of the results. And this always requires replicated trials to obtain meaningful statistical differences. The rewards of your research benefits can be invaluable in farm programming for a profit!
A Man for the Ages...

and for Agriculture

The very spot where grew the bread
That formed my bones, I see.
How strange, old field, on thee to tread,
And feel I'm part of thee!

ABRAHAM LINCOLN
from his own poem written upon revisiting the farmstead of his youth in Indiana in 1844

... No other human occupation opens so wide a field for the profitable and agreeable combination of labor with cultivated thought, as agriculture. I know of nothing so pleasant to the mind, as the discovery of anything which is at once new and valuable — nothing which so lightens and sweetens toil, as the hopeful pursuit of such discovery. And how vast, and how varied a field is agriculture, for such discovery. The mind, already trained to thought, in the country school, or higher school, cannot fail to find there an exhaustless source of profitable enjoyment. Every blade of grass is a study; and to produce two, where there was but one, is both a profit and a pleasure.

ABRAHAM LINCOLN
from an address to the Wisconsin Agricultural Society in Milwaukee in 1859
Confirmations and Expectations

- Predictions that 1974 would be a good year for sugar beets and that grower returns from 1973 crop beets would be at record-high levels have more than come true. Such forecasts were made in these editorial pages of the last two UPBEET issues. But what has since taken place has far exceeded our hopes as expressed six and eight months ago.

While total acres of 1974 beets contracted by GW are less than last year, total planted acres are actually above a year ago, thanks to the good Lord and to growers and Company field personnel.

Mid-July results of GW beet field sampling were generally excellent. While results varied among the far-flung areas, for GW as a whole the number of beets per hundred feet of row, weight of roots, and weight of tops all were better than in 1973 at such time. We know that what happens during the next two or three months will determine final yields and sugar content. We also know it is wise to count chickens before they are hatched. But we also know that it takes a thriving calf to make a superior steer. So we share with many growers and GW agricultural personnel guarded optimism as to the now bright crop prospects.

Price-wise the indicated returns for 1973 crop beets are almost unbelievable. Last December, on these pages we hinted at possible average returns in excess of $23.50 a ton of beets. GW growers have already received $26.20 on the average, with more to come. The average returns to date are about $8.00 a ton more than at this time a year ago and are already about $6.00 a ton more than the $20.13 average received for the entire 1972 crop. Details are shown below in the box.

In light of increased costs of farming and returns from other crops, we have publicly stated that growers are entitled to the benefits of higher sugar prices. In our news release regarding the July 2 additional beet payment, we stated that "the record-breaking returns for the 1973 crop could not be considered windfall profits for beet growers because this year they must absorb much higher costs of fuel, labor, fertilizer, machinery and other farm materials."

Meanwhile sugar prices are at their highest levels ever and, while no one thinks they will last forever, the outlook is still good for many months to come, as evidenced by the raw sugar futures market. As this is being written, raw futures prices for March 1975 delivery are more than double what spot raw prices were last December.

On the somewhat negative side, which might have long-range but certainly not short-range implications, the Sugar Act has not yet been revised and extended beyond the December 31, 1974 expiration date. Opinions are divided as to what Congress might eventually do about this important matter. In some quarters it is believed that no action will be taken until at least early next year. Who knows? But, regardless, growers are assured of their Sugar Act 1974 crop conditional payments, and both spot and future raw sugar prices are greatly in excess of the current "target price" in the Act. Hence, failure to extend the law this year is not likely to stand in the way of beet growers receiving satisfactory prices for many months to come.

The beet sugar industry — grower leaders and company executives together — are not disturbed by what the Sugar Act will or will not do for the present. What has bothered them — and what should bother sugar consumers — is the question of what might happen down the pike in the way of adequate sugar supplies if the domestic sugar producing industry is not given assurance that in future years America will close its floodgates against an unlimited outpouring of foreign sugar produced at non-American wage levels. And then, when sugar becomes short in the world, as is presently the case, the United States, if it should not have a viable domestic sugar industry, would not have enough sugar to fill the grocery shelves and the industrial sugar bins.

Something also will have to be done to arrest the continual drop in recovery of sugar per ton of beets that is being experienced by GW as well as the rest of the domestic beet sugar industry. The reasons have not all been identified, but certainly one culprit is the availability of excessive amounts of nitrogen in the beet fields. GW is attacking this problem with vigor.

Beet growers will be hearing much more about this important activity in the months ahead. With their respective cooperation, GW will seek to restore sugar recovery to levels that prevailed prior to 1969. Growers have already seen the effects of the national decline in beet sugar extraction per ton of beets in their reduced Sugar Act compliance payments. But that is much less than the serious cost GW has faced by the decline in sugar recovery per ton of beets.

So, as far as the beet sugar industry is concerned, there is good news and a couple of problems. There is no question that something will be done about the problems. And, while we are all working on them, let us enjoy the good features of excellent sugar prices and bright current prospects for a good 1974 beet crop.

Average Total Gross Returns to Growers in GW Area per Ton of Beets, 1972 and 1973 Crops

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Environmental Protection—an Editorial

... EPA — the Environmental Protection Agency — is less than four years old, yet this agency has already had a profound influence on American agriculture and is certain to have even a greater impact in the future on all farming and ranching activities.

All of us will be directly or indirectly influenced by regulations promulgated by this Federal agency.

EPA became an official agency of the U.S. Government on Dec. 2, 1970. By an Act of Congress, it was given the broad responsibility of policing and regulating all aspects related to the preservation of air, water and soil. At the latest count, EPA had a total of 10,318 employees. 9,203 are permanent and 1,115 are temporary. Last year—fiscal-1973/74—the agency had a budget of $516,000,000. The Appropriations Committee handling the EPA budget recently approved a 1975 budget request for $644,250,000.

Recently, EPA published three sets of proposed changes to the Federal Insecticide, Fungicide and Rodenticide Act which could have had a serious impact on farming operations. These proposed rule changes pertain to “Farm Workers Dealing with Pesticides”, “Certification of Pesticide Applicators”, and “Shipments of Pesticides for Experimental Use”.

All of these proposed regulations are highly complex legal articles, and space does not permit detailed discussion. It appears that the author or authors of this complex set of regulations are all trained legal experts, but with very little technical or practical experience in facts pertaining to raising crops of sugarbeets, corn, beans, etc.

The regulations dealing with farm workers have been finalized and appear to be workable. Certification of pesticide applicators is still a controversial subject, and unless changed could result in a license requirement for any grower who uses agricultural chemicals.

The proposed regulations dealing with experimental permits, if adopted as originally written, would have essentially prohibited Great Western Sugar and similar private research organizations from conducting research with agricultural chemicals. In the opinion of directors and deans of agriculture from several leading state universities, these regulations, if adopted without change, would have seriously interfered with the scientific freedom of our agricultural scientists in both the state and Federal research systems.

The regulations would also have greatly curtailed and probably eliminated the widely used demonstration and education programs that GW conducts in cooperation with many growers directly on their farms.

Like all good citizens and legitimate businessmen, we all want to comply with the laws, but, when the law is confusing or contradictory, this often becomes impossible or at best extremely difficult — even with the best of intentions. Hence, by working through the Grower-GW Joint Research Committee and others, we were able to bring to the attention of key high-level personnel in EPA’s Washington office the deficiencies and undesirably restrictive passages of these proposed regulations for agricultural research.

We are happy to report that we were cordially received by key EPA officials in the Pesticide Division, and are convinced that our suggestions will be seriously considered. These regulations are presently being redrafted. However, with the attitudes and misinformation regarding agriculture that now prevail in many segments of our urban population, it behooves us all to take a positive interest in the affairs of government and the affairs of agriculture on a continuing basis.

—Dr. Thomas J. Army
Vice President
Research & Development

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The High Road to High Sugar

Mr. and Mrs. Felix Carrizales in front of their farm home near Emblem, Wyo., south of Lovell.
Most storybook dreams of success would collapse under the weight of self-education, resourcefulness and hard work.

But this is a story about a man who wasn't dreaming, a man who knew that the road to success isn't paved with rose petals. In fact, he knew he would have to pave the way himself.

With the tools of observation in one pocket and determination in the other, Felix Carrizales set himself upon that road. It was uphill all the way to his present farm operation at Emblem, Wyo., where his capital requirements now reach $500,000 a year.

A native of Texas, Felix and his dad, Steve, and the rest of the Carrizales family came to Montana in 1948 as beet workers. After he was married in 1953, Felix began preparing for his trek by working for farmers in the Lovell area, where he learned first-hand about the business of raising sugar beet crops as well as other crops.

"We did a lot of thinning before that, but we didn't have any idea why it was done or anything like that."

In addition to experience on the farm, Felix worked for the Lovell sugar factory beginning in 1962 in the warehouse.

His growing knowledge of the business was supplemented by his experience as foreman at the warehouse, where he learned even more of the sugarbeet story, including such things as the importance of sugar content.

From out of nowhere, six years ago,
Felix Carrizales worked his way up
in sugarbeets to High Sugar Producer
in the Lovell district and to an
overall capitalization of $500,000.

Here's his story — on the high road,
for sure, but also the hard road,
hard for any man, even with help.

Bob Fisher, then agriculturist at Lovell and now at Fort Morgan, was instrumental in getting Felix started with GW at the factory. And, the nine years that he worked there, stacking sugar, hauling tare samples and beets, and the foreman's job, kept his farming operation going during the first years.

The man who pointed the way to farming on a larger scale for Felix was "Smokey" Grabbert, from whom Felix now leases most of his land with the exception of the 160 acres Felix owns.

Felix recalls: "We went by one day, and we saw a lot of hay laying in the fields. We turned back to his place, and we asked him if we could stack the hay for him. It started out that way."

By 1965 Felix was able to buy his own haying equipment. He then began doing custom work for Grabbert. When the previous operators on Grabbert's place bought their own land three years later, Smokey asked Felix if he would be interested in farming.

That first year at Emblem, Felix farmed 150 acres, then 200 the next year, and on up until he farmed almost 1000 acres in year.

Again, it was Bob Fisher who encouraged Felix to get into sugarbeets in his second year of farming.

Felix was high sugar producer of the Lovell factory district for 1973. About raising such a fine crop, Felix says:

"Well, first of all, you've got to start with a good job of plowing and the rest of the soil preparations. You've got to have the right workers to do it with, the right machinery, a sugarbeet fieldman, a chemical man, a fertilizer man. It's mostly just a lot of help from a lot of people.

"I listen to a lot of ideas and put in the ones that I think are right."

The Carrizales operation of today, headquartered on his own 160 acres, not only involves farming 1000 acres, but also custom planting, custom harvesting and a sizable trucking business. He custom planted over 400 acres this spring. "We've got the machinery. We've got the men. And when we get done with ours, we just go out and help the neighbors out all we can."

Success hasn't changed Felix. The soft-spoken, humble man attributes his achievements to those people who have contributed to his self-education.

The need for his help at home kept Felix from returning to school in Wyoming. And he believes that his education has really come from men like Paul McMillan, Bob Fisher, Jim Gonyou and Chuck Johnson (now retired) of the GW team at Lovell when he was getting started.

"If you just listen to these people and get their ideas, you can learn a lot, probably just as much as going to school. If you're in the farming business or trucking, you learn as you go and that's a very good education."

What's the payoff for listening and profiting from the advice of others?

In 1973 Felix averaged nearly 19 tons of sugarbeets per acre, with sugar content as high as 19.4 percent. It averaged 18.02 percent. That's a total of about 3,340,000 pounds of sugar from 492 acres.

But the most important element in his success, Felix says, is "the help that a guy can get."

His own employees are given the credit for maintaining his operation. "There are a lot of people involved in an operation like this that I've got to thank. Without them it would be pretty hard to make it."

Felix employs about 15 people year-around. And sometimes he has as many as 40 during harvest. From those, "I have eight men that I call the basic operation here, and those are the boys that keep the whole thing going."

The fellows entrusted with this responsibility are Saltavio Alaniz, Leo Garza, Raymond Ochoa, Ismael Gonzales, Salvador Lozoya, Felix Delion, Dave Gilman and W. R. Boyles.

And these men are communicators, in a sense, with the other workers. "I think being able to communicate with people is very important."

Since he trains his people himself and then relies upon them so much, Felix sincerely appreciates the ones who really take the job seriously. As a result, he pays his people probably the highest going rate in the area and furnishes them with a house, pickup truck and gas. And, he also allows for a bonus, depending upon crop returns.

So, where does the road lead from here?
"We're doing new things all the time. I believe in changing things . . . sometimes they work, sometimes they don't."

Felix believes that changes are warranted because of the short season. "It is because of the time . . . time is a very important factor here."

The foothills of a man intending to reach the summit passed many milestones on the way up because of his willingness to listen and learn from others, his humility that gives credit where credit is due, and his wisdom to appreciate the opportunity to work.

Felix Carrizales is no dreamer. He didn't see an illusive pot at the end of a rainbow. He wasn't misdirected by a mirage in the desert. He decided which road he wanted to take — and he took it!
The Wyoming/Montana sugarbeet crop appears to be headed for record yields. A relatively mild winter for the north country allowed for early spring work and for earlier than normal planting. Early planting on good seed beds gave a good start. In the early stages of the crop the Billings area was a full two weeks ahead and Lovell a week to ten days ahead.

Timely rains during the early spring resulted in excellent stands of beets without irrigation for germination in Montana. Wyoming, as usual, irrigated for germination in Montana. The month of May was marked by a period of three weeks of wet, cool weather which kept thinning machines and workers out of the fields much of the time in Montana. Even normally dry Lovell received over an inch of rain which was a real boost to the crop there.

All rivers had very high runoff as a result of unseasonably high temperatures in June, with the Yellowstone River breaking a long-time record for flooding. Some loss of acreage was suffered as a result of floods. The delays experienced during thinning were quickly overcome when June set a record for high temperatures. Many days temperatures approached the 100-degree mark. With hot days the beets began rapid growth.

Pre-emergence chemical weed control did a first-rate job of controlling weeds which was especially helpful since workers and machines were kept out of fields by weather.

The time-proven PreBeta I, PreBeta II and Roneet showed once again that no grower can do without them and get the job done timely and economically. Of course, such specialized chemicals as herbicides 272 and 283 were essential in certain cases where the need was apparent.

The root maggot research program at Lovell continued with outstanding success and again proved that the proper use of Dyfonate or Temik gives promise of good control for this pest. Growers using these materials are quite pleased with the results.

Considerable work on receiving facilities is being pushed to be ready for harvest. Our major jobs are the consolidation of stations into larger stations with dual piler capacity and large scales at Hysham, Montana, and Starr, Wyoming. An additional piler is installed at the Lovell factory along with a new large scale. Many other smaller jobs will help speed up the harvest.

Growers and the business community are very enthusiastic about the beet prospects. Record high receipts for the 1973 crop show the way for 1974 with the promise of a good crop this year.

Already there is considerable interest among growers about the 1975 acreage that we will be able to contract. The beet crop is very popular among growers and their interest is high as to the future.

- The 1974 crop in this area got away to an excellent start this year. It was a year when the crop had to be irrigated for germination, and all but a few growers were able to overcome this adversity through forethought and planning. When their fields were planted, they were set up so they could be irrigated for germination if natural moisture didn’t come on schedule.

Again this year, over 95 percent of our beet fields received preplant herbicide, and enough workers were on hand so that the fields were cleaned up as needed. A half-and-half mixture of Betanal and Betanal-G7 resulted in some of the finest post-emergence weed control we can remember, and was a real help in getting the field workers over the ground. Results like these are made possible by research people and cooperating beet growers.

Many research people work for years with very little recognition, despite all the help they render in furthering our knowledge. Gail Wicks, who is a researcher working for the University of Nebraska at the North Plate Station, has added much to our knowledge of selective herbicides.

Through the years, Gail’s research plots have provided needed information on the kind of herbicide and the rates that are most effective in the Ovid factory district. This year, some of Gail’s plots appear very promising. Among them are Nortron applied either as preplant, post-emerge or in combination. Nortron plus Herbicide SN-503 was a very effective mixture, removing weeds selectively from sugarbeets.

Gail has also been working with corn herbicides, and his research has allowed growers to substitute effective one-year residual herbicides for corn that do not limit the crop to be grown the following year. The plots are located at the North Plate Station and are available for observation throughout the summer. Gail will be glad to show the plots and explain the results to anyone interested.

Growers are also instrumental in any testing program because most of the work must be done in a sugarbeet field. Studies under way in this area on grower’s fields include crust control, seed variety, seed emergence, starter fertilizer, fertilizer rates, deep fertility, irrigation, and fusarium resistant variety tests. A total of 41 growers have made space available in their fields for testing this year. They are:

- Ovid
  W. H. Palser Farms
  Charles Stewart

- Sterling
  Russell Krueger
  Ted Ruf
  Al Crum
  Roy Norden
  David Naibauer
  John & Robert Molloend
  Richard Hirsch
  Fort Morgan
  Ernest Snyder
  Lee Cordentino
  Emmohvic Bros.
  Melvin Teter
  Arlen Rico
  Osmus Bros.
  Loren Dickson
  & Sons
  Dave Fix
  Marion Chapman
  Henry Wittfang

These growers deserve a big “thank you” for their interest and cooperation, because without them, no advancement could be made.

Looking ahead to harvest, we have made some receiving station improvements which will improve our service to the grower. We have added hydraulic dumping struts to five pilers, constructed three new delivery stations, and relocated another. Some scale improvements have been made and the balance of the receiving equipment will be reassembled and ready to go at the start of harvest.

Northeast Colorado & Kemp Area Report by Jim Gonyou
positive is the word that describes the attitude of Nebraska beet growers. More acreage was contracted, planted, fumigated and herbicided than last year. As it turned out, it is a good thing there is a real desire to grow the beet crop because we experienced the driest April, May and June in years. This drought spoiled the effectiveness of the herbicides, required irrigation for germination and caused the most ragged appearing fields we have ever seen. Opportunity to use selectronic thinners was almost completely eliminated. Only the growers’ determination to grow the crop regardless of these conditions has saved a great proportion of the planted acreage. Credit also is due the field workers who turned in a real job under trying circumstances. We have great variation from field to field with yield prospects all the way from a thirty ton per acre potential down to six or seven tons per acre, and everything in between those extremes. We do have a good acreage. The crop on the whole, while stacking up as something less than the record-setting averages Nebraska has enjoyed for several years, is better than we used to expect not too long ago. With sugar prices as they are, growers are still optimistic about beets and we expect to harvest more than 57,000 acres.

In order to handle this crop in a more businesslike and orderly manner, we are installing two new super pilers and one new 50-Ton Print-O-Matic scale in the area. The Mitchell Factory station is the largest single receiving point in Nebraska and to improve service to those growers we have installed an additional scale at a new piling ground at the factory. We will also relieve the traffic congestion experienced there for several years by providing a new access road to those who can approach the factory from the north. This new piling ground and scale will accommodate one of the new super pilers. The Bayard Factory station will also receive a new super piler to speed up the receiving there.

Each of these super pilers replaces a smaller but good piler that has already been moved to a new location for the 1974 harvest. One of these is moved to West Alliance, and the other to the Bridgeport station. They will be operated along with the stationary dumps at those places and this change will significantly improve our ability to receive beets at all four of those locations.

In addition to these new equipment purchases, considerable improvement has been made to other pilers in order to increase their capacity or to make them easier to man. One improvement of real value that will be found on all the hydraulic pilers in the Nebraska Area is a hydraulic sideboard lifter. This attachment will remove the back-breaking-est job at a receiving station and increase the receiving capacity by allowing the unloaded trucks to move out more quickly. Because of these and other improvements we are looking forward to a harvest that should mark a reduction in waiting time for growers and improved beet quality for the Company.

North Central Colorado Area Report by Ralph Hettinger...

- The North Central Colorado area, with good weather conditions holding out for 1974, faces prospects of the best sugarbeet crop produced here in recent years. For most of the area, we have seen almost reverse weather conditions this year from last, when no matter how hard the growers tried, it was impossible to get the crop planted timely. This year our spring was dry, permitting growers to plant their crop with excellent timing; and in spite of the lack of natural moisture these last few months, they are keeping the crop wet and it is growing very well.

Pre-emergence herbicide, mostly Ro-Neet, was used on an ever-increasing number of contracts. Post-emergence application of Betanal tank mix (Betanal and Betanal 475) seemed quite successful. At the recommended rates, it gave good to excellent control of red root, lambs quarter and Kochia, where good growing conditions existed.

In North Central Colorado beet fields this spring, nearly 40 percent of the acreage was selectronically thinned. Several new thinning machines moved into the beet fields this spring. The John Deere grower-owned machines did outstanding work, especially where three to five seeds were planted and it was noted the most common thinner knife used was the 6-inch knife.

Some growers who used the Eversman machine with the black-light improve-
Colorado State University receives Great Western check for research in nematode-resistant sugarbeets. From left, Dr. Robert K. Oldemeyer of the GW Research Center, Dr. Robert S. Whitney and Dr. Takumi Tsuchiya of the CSU agronomy faculty.

Nortron test plots look promising to Dr. Rudi Pfeiffer of England’s Fisons, Ltd., at left, Dr. E. E. Scheizer, center, research plant physiologist for USDA at Fort Collins, and Dr. E. F. Sullivan, senior agronomist at GW Research Center.

Nematode Resistance... and Nortron Research...

By DR. KENNETH P. DUBROVIN Director-Agricultural Research Center

- Last spring the Agricultural Research Center started a long-term cooperative program with Colorado State University leading to development of nematode-resistant sugarbeets. USDA discovered a species of wild sugarbeets which had shown resistance to nematodes. After working for several years, USDA made a small amount of seeds obtained from those sugarbeets available to sugarbeet breeders in the U.S.

- Realizing the importance of this development to Great Western growers, ARC plant breeders quickly began working with the material sent by USDA and soon confirmed USDA findings that the plants were resistant to the sugarbeet cyst nematode. The beets, however, had low tonnage and low sugar. Furthermore, they had 19 chromosomes instead of 18 as in commercial sugarbeets, which means they cannot be used to develop commercial nematode-resistant sugarbeets without special techniques.

- Those special techniques exist at Colorado State University and steps were taken to develop a cooperative program under which CSU researchers would provide their special facilities and capabilities and Great Western scientists at the ARC would conduct the evaluations to determine the degree of nematode resistance and the productivity.

- The program is under way and a number of nematode-resistant plants have been provided to CSU to start their efforts to get the resistance into commercial beets.

- Great Western is the only sugarbeet company working to develop nematode-resistant sugarbeets and the experience of the plant breeding staff together with the unique assistance from CSU scientists hopefully will one day make concern over nematodes no greater than growers now have for leafspot.

- Understandably, sugarbeet companies around the world have shown interest in the project.

- Nortron, the new experimental herbicide, continues to look outstanding in several research plots for controlling weeds in sugarbeets.

- Some of the tests this spring were located in areas where serious drought occurred right after planting. Application of herbicides to dry soil followed by drought reduces their effectiveness. Under these conditions, Nortron did not give the degree of weed control it had in earlier tests or in areas where some rainfall occurred after planting.

- Several herbicide combinations with Nortron look especially promising because of excellent safety to sugarbeets together with good control of a wide range of weeds. Some of these are with experimental compounds that are being tested for the first or second year and others are now being used by growers commercially to kill weeds in beets.

- Fisons Limited, the manufacturer, is testing Nortron extensively throughout the world. Dr. Rudi Pfeiffer, head of the Applied Biology Department, Cambridge, England, visited the Great Western Agricultural Research Center at Longmont two months ago. He observed Nortron research plots in Colorado, Nebraska, Montana and Wyoming with Dr. E. E. Schweizer, research plant physiologist, USDA, Fort Collins, and Dr. E. F. Sullivan, senior agronomist at the GW Research Center. Dr. Sullivan and Dr. Schweizer work closely together to bring growers the best herbicides as quickly as possible.

- Dr. Pfeiffer said that Fisons hopes to have EPA approval to supply small amounts or Nortron to Great Western growers next spring.

Upbeet Research Update
A Report from The Great Western Agricultural Research Center
Irrigation...

- Sugarbeet irrigation — this job arouses varied feelings in all beet growers about this time of the year. The spring rush of field preparation, planting, thinning and cultivation is past and now the task of irrigation is with us.

Sugarbeets use up to one-third inch of water per day on hot, windy days, while through the month of August daily use will usually average about one-quarter inch. Most important, well-managed irrigations through the last couple of months of the growing season are essential for optimum sugar production.

Some key points to remember in these months:
- Under-irrigation results in yield reduction. Plant growth slows down from lack of water moving through the roots to replace that lost from evaporation and transpiration. At the same time, with lack of water, the plant fails to take up and use all the nitrate-nitrogen in the soil profile.
- On the other hand, over-irrigation in the growing season can also cause problems. Excessive leaching of valuable fertilizer can reduce yield potentials and waste dollars. Likewise, plant growth can be retarded by a reduction in soil air from frequent, heavy irrigations. And if the condition persists, the damage can be serious.
- The best reasons for not over-irrigating? It wastes water, it wastes energy, and it wastes time and labor in doing the job.
- There is also the problem of irrigation delayed until late in the season. Like fall rains, late irrigation releases undesirable nitrogen in the soil and triggers leaf growth when the plant should be storing sugar. Leaf growth may look good in the field, but not on the beet check, because of lower sugar content from “watered-down” beets.

—GARY JARDINE
Irrigation Specialist
Agricultural Research Center

Variety Trials...

- Research effort in sugarbeet seed development will be in evidence once again this fall with the inspection of independent beet variety trials in various parts of the Great Western territory.

Growers are urged to view the trial plots by the Grower-GW Joint Research Committee, Inc., the non-profit sponsor of the evaluation of potential varieties for commercial beet seed.

The plot locations appear in the box on this page.

This will be the fourth year of independent testing of beet varieties by professional agronomists at experiment stations or on farms of cooperating beet growers. The systematic evaluation was set up in 1971 by the Joint Research Committee to provide a selection of the most productive and most adaptable sugarbeet seed varieties for the several GW territories.

A variety can only be approved for planting in GW territory by the vote of at least six of the nine directors of the Joint Committee. Their action, at their annual meeting in January of each year, follows consideration of all data submitted from at least two years of tests of the variety.

These statistics, recorded from replicated plots, rate the variety in terms of yield of sugar per acre, yield of roots, sugar content, thin juice purity percent, disease resistance, reliability, and adaptability to specific areas.

U.S. Department of Agriculture scientists conduct the testing for disease resistance.

Seed suppliers, including GW Sugar, must pay for the cost of variety trials.

The Joint Research Committee considers requests for variety testing from any sugarbeet seed firm, but requires supporting evidence from production trials that the variety is adaptable for planting in the Great Western territory. These requests for testing require approval by the committee directors.

In addition, the Joint Research Committee reserves the right to terminate approval of any variety after a certain date in cases where a new variety proves superior.

Research Reviews...

- The Joint Research Committee has adopted a new approach in determining priorities for research projects. The needs for the various beet-producing areas will now be appraised at the local level by a new research review subcommittee appointed by Co-Chairman Kish Otsuka and Waldo Peterson.

The appraisals will be made in late summer and early fall in discussions at various locations with growers and research scientists from state and federal institutions. Their findings will then be passed on to the full Joint Committee for consideration in January.

The new sub-committee consists of Joe Alles of Billings, Denny Smith of Powell, Charlie Reisig of Scottsbluff, Bill Davis of Goodland, Kish Otsuka of Sedgwick, Colo., Roy (Ole) Johnson of Eaton, Dr. Ken Dubrovin of the GW Research Center at Longmont, and Bill McGuffey, chairman, GW director of agricultural development at Denver.

The sub-committee will be assisted in each local area by additional growers and company personnel.

Variety Trial Locations and Cooperators

Colorado:
CSU agronomy farm, Fort Collins
Russ Krueger farm, near Amherst, ten miles northeast of Holyoke
Ross Porter farm, six miles north of Yuma
Harold Tateyama farm, three miles south of Ault High School

Nebraska:
Panhandle Experiment Station, near Scottsbluff
North Platte Experiment Station, near North Platte
Art Pieper farm at Haig, southeast of Mitchell

Kansas:
Colby Experiment Station, near Colby

Wyoming:
Howard Hart farm, near Powell

Montana:
George Reiter farm, three miles northeast of East Laurel Exit
Kob Brothers farm, two miles northwest of Hysham.
Beet Country Bankers

The Nelsons at Lovell ...

Three generations in country banking match the tradition of family farming around Powell, Wyo.

At the First National Bank of Powell, it's the Nelson family with three members tracing their strong interest in the sugar beet business in some capacity. The area is very fortunate to see a transition from father to son or younger people. He of the agricultural customers in the area, having around 75 percent of those people in the sugar beet business in some capacity. Established by the fact that Bob Nelson was born and raised and schooled in the area is very fortunate to see a transition from father to son or younger people.

Dick acknowledges that the First National Bank of Powell services 90 percent of the agricultural customers in the area, with about 75 percent of those people in the sugar beet business in some capacity. Dick believes that agriculture in the Powell area is very fortunate to see a transition from father to son or younger people. He adds:

"It's been very stimulating to us as a bank and also to agriculture as a business to see these younger people getting involved, and from my observation, they have gotten involved in the same capacities as their fathers or the people that they purchased places from, and in general have continued the same type of crop rotation, including sugar beets.

"We still like to see our farmers raising sugar beets and think that the crop has a lot of potential in the area in the future. It's been a tremendous crop and a big factor in the economy of Powell and the surrounding area."

Dick believes that the trend of recent years in handling crops makes sugar beets raising an even more secure venture because of the increasing knowledge of the individual farmers, their management capabilities, their understanding of new techniques in agriculture that lead to efficient production, and greater utilization of acreage and water.

His father, Bob, remembers those early years after his own dad started the bank: "In those days, there were five banks in our trade territory around Powell, and, of course, at that time it was nearly 100 percent agricultural. After the depression, there was only one bank left, and that was ours, and for many years we were the only bank in the area."

Bob was graduated from high school in Powell and from the University of Washington in 1933, when he returned to Powell to work full-time in the bank.

Over the years, Bob says, agriculture has changed from a way of life to a highly technical and skilled business. He adds:

"Farmers had generally grown up on a farm and just followed the practices of their fathers. The use of capital in machinery and that sort of thing was not much of a factor in those days. It was mainly how hard you could work and how little money you spent on the side, if you were successful.

"As time has gone on, the farm business has changed, where now a good beet grower is primarily a manager employing a lot of capital and buying a lot of machinery and using it quite differently from the way farmers did in the old days."

Art Erickson at Bridgeport, Neb.

Main Street in Bridgeport knows Art Erickson, president of the Bridgeport State Bank.

The street recalls the nostalgic sight of Art, the resourceful boy of ten, out early on wintry mornings, going from one business house to another, building fires and sweeping out. One of the places was the old Bridgeport Bank.

After graduation from high school, Art was invited to lay down his shovel and broom and come to work in the bank full time. His first jobs, some 50 years ago, were running errands and writing remittances.

Art's still there. But the name of the bank changed to Bridgeport State Bank and the bank itself moved across the street into a friendly contemporary structure. Everything's open and ac-

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* At the First National Bank of Powell, Wyo., from left, Bob Nelson, chairman; Dick Nelson, president, along with Don Lindshield, the new agricultural manager at Lovell.

* Art Erickson, left, long-time president of the Bridgeport State Bank in Nebraska, stands in front of the contemporary bank with Red Johnson, agricultural manager at Bayard.
It's evident from the views of these bank officers — the first in a series — who relate their experiences over decades with the beet crop and beet growers. Bankers from other localities will appear in later issues.

John Bloedorn at Fort Morgan...

Farmers State Bank in Fort Morgan was one of the first country banks in Colorado to move into contemporary quarters. The circular shape of the modern building literally provides “banking-in-the-round” with officers and other personnel within reach at almost every turn.

The friendly atmosphere was the idea of the late John H. Bloedorn, for nearly 50 years president of Farmers State and for ten years a member of the board of directors of Great Western Sugar.

John Bloedorn was a man with many friends in the beet business. And his constructive influences continue at the bank in the hands of his brother, Howard, chairman of the board, and his son, John, Jr., president.

John likes to recall that his father was elected to the sugar company board because, being a banker, he was close to the problems on the farm. He adds: "Dad was very fond of the Great Western organization. I can remember in my early banking experience my father saying that if the customer is in the sugarbeet business, you are pretty well assured that your loan will be taken care of.”

John began his banking career working summers while in high school and in college before World War II. He was graduated from Pomona College in California and returned to the bank in Fort Morgan after the war.

These days, John says the bank relies heavily on sugarbeet production and encourages producers to raise beets whenever possible.

“We also extend that encouragement to young potential growers.” That includes those who have some background and knowledge of beets, as well as those who have a desire to get back to or to begin a rural life style.

John explained that many of them see a distinct advantage in raising families in a community like Fort Morgan, and he believes more and more people will come to this realization. And, he views the sugarbeet industry with a great amount of respect for its profit potential:

“I would say over half of our growers have sugarbeets at one time or another, and..." (Continued on next page.)
the income derived from beet production would be about the same. The income to the bank and growers is almost guaranteed. The expense has increased materially in the crop’s production, but so has the income.”

The “good old summer-time” finds John stalking the beet fields whenever he can, and he welcomes the opportunity to visit with the growers and look at the crops and new equipment.

And, back at the bank, John ponders the problems of today’s sugarbeet growers, such as weather, machinery and labor, and says he believes that one of the biggest problems is getting the proper number of acres to go with an investment.

But that concern also enables John to view beet payment time with personal pleasure as well as business interest.

“Naturally, our customers are very pleased and, of course, that makes bankers very pleased. It’s a boost to our economy, not only locally, but statewide and nationally.”

“The demand for sugar has always been constant and sugarbeet growers are looking forward to an even better year. Bankers have been dependent on the sugarbeet industry for as long as I can remember.”

John’s inherent attachment to the beet business comes on strong when he points out the metal relief sculpture his father commissioned for the new bank building. It depicts the Fort Morgan sugar factory and prompts John to recall again: “Dad was always speaking in a family way of his friends that he knew in the Great Western organization.”

North Central Colorado Area Report by Ralph Hettinger . . .

Continued from Page 7.

At this writing, it appears in most areas that growers have the root maggot under control where proper watering and rates of materials are applied timely.

As you begin making your plans for the 1975 crop, remember that soil analysis and nematode count services are available.

As the 1974 harvest draws near, the following items are submitted as suggestions for a successful harvest:

1. One top beet grower advises that a slower harvesting speed and keeping the machine on the row is worth at least one extra ton of beets per acre.
2. A top windrower with flails is recommended, not only to deliver clean, beets, but also to allow for more shallow topping, harvesting more tons per acre and rows that are easier to follow.
3. To prevent the spread of nematodes, return dirt should be placed in a pit, not in a non-infested area, or where they can spread. Grab roll screens on a harvester allow for cleaner beets and leave the dirt in the most desirable place.
4. A few hours repair time before harvest may mean a smoother harvest and may save a lot of costly down-time. All vehicles should be pre-inspected — windshield, brakes, lights, etc.
5. Plan ahead for parts and repairs.
6. Beet trucks equipped with heavy-duty side-board door springs will save time at the receiving station and a lot of wear on you.

Tim Weigand of Ault, Colo. . . .

- Sugarbeets and banking just go together naturally for John L. Weigand, who’s better known by the nickname of Tim in his work as president of the Farmers National Bank of Ault, Colo.
- That’s because from earliest memory Tim was familiar with the beet crop on the irrigated farm where he grew up near Rocky Ford, Colo., his birthplace. His father, I. L. Weigand, was among the early growers who produced beets for the Rocky Ford sugar factory.
- In banking circles these days, Tim is something of a rarity since he never went to college. But he used his farm background to work in on-the-job experience in finance with agricultural agencies.
- His first job, midway in the depression days, was with the Agricultural Adjustment Administration in Rocky Ford. From AAA, he moved to the Farmers Home Administration in Otero County and then to the Production Credit Administration in La Junta.
- Banking offered his next move, in 1952, when Tim became associated with the First National Bank of Fowler, Colo. It was in 1958 that he came to the heart of Colorado’s sugarbeet country with his appointment to the Greeley National Bank. And it was then that he cemented his working combination of a beet farm background with beet farm finances.
- When Greeley National acquired interests in the Farmers National at Ault in 1967, Tim was the one who was picked to be president of the Ault bank. Here was a bank in a busy community of 900 with farm support dating back to its founding in 1906.

Now known as the Highlands financial center, in a convenient and contemporary structure erected in 1971, Farmers National Bank of Ault serves a farm area representing two-thirds of the sugar beets grown for the Eaton factory district. This same area, Tim points out, offers stability and continuity with strong diversifications in cattle feeding, confined hog feeding, dairying, dairy production and other cash crops.

In terms of continuity, Farmers National goes back in history within several years of the start of the beet crop and the Eaton sugar factory. With that in mind, Tim Weigand put his views in simple perspective:

“The sugarbeet crop has always been a good crop — a stable crop.”

And from recent visits around the countryside, Tim adds:

“There’s sure a good beet crop going out there now!”

- “Food prices are ridiculous,” the city dweller told the farmer.
- “Never have farm products cost so much.”
- “You’re right,” agreed the farmer, “but understand, when a farmer is supposed to know the botanical names of what he’s raising, and the entomological name of the insect that eats it, and pharmaceutical name of the chemical that kills it, somebody’s got to pay for that education.”

— Eaton Herald
Back to Beets at Hardin

There's a familiar sight once again on the farms around Hardin, Mont.

It's the sight of sugar beet fields, for the first time since 1971. Beets came back to the confluence of the Big Horn and Little Big Horn, 60 miles east of Billings, when Hardin growers arranged to contract with Great Western. This spring, there were 1,540 acres contracted by 17 growers, including the sons of some of them. Their beets were left without a home when Holly Sugar closed its factory at Hardin.

The Hardin beet crop got off to a flying start with an inch of moisture right after planting. Now, what's the potential?

It's outlined by Agriculturist Chet Bounous, who worked with the Hardin growers to get back in beets with Great Western. Chet, a veteran of 37 years' experience with beets in Montana and Wyoming, was agricultural manager for Holly at Hardin at the time of the shutdown.

Over the years, Chet says, Hardin beets have yielded 18 to 20 tons per acre, with sugar content from 16 to 17 percent. He adds that Hardin's sugar content probably ranks fourth highest in the nation. But at the same time, Chet believes these figures may be bettered now with improved crop practices and newer seed.

Hardin growers practice the same general methods of beet farming used around Billings and Lovell. And, Chet adds, they're equipped better than the average beet grower in the country. Most of them, he says, bought new machinery this spring to get back in beets. Chet, who knows Hardin beet fields like the back of his hand, sums up their potential in terms of the growers:

"They're serious about what they're doing!"

Back in beets for the first time in three years, Webber Farms planted 366 acres near Hardin. Here's Fred Webber, left, with his son Darrell, Agriculturist Chet Bounous and Fred's son-in-law, Ralph Menke, who gave up a petroleum engineering job to farm for the first time. They're working on a 12-row cultivator of their own design.
Soils Lab Analyzes Nitrogen Needs for Good Sugar Content

What happens to soil samples? Here's the answer, step by step in photos at the Sterling Soils Lab, where scientific analysis helps to solve the underground mystery of low sugar content.

By WILLIAM C. McGUFFEY and JERRY W. STEINMEYER

Many factors affect the sugar content and quality of the beet crop, but excess nitrogen fertilizer is one culprit easily identified and known to exist.

A deep feeder, the beet plant can tap the nitrogen reservoir in the soil to a depth of six to eight feet. At these depths, excess nitrogen can exist, especially in rotation with corn, where large amounts of nitrogen were applied or heavy applications of manure have been historically used.

To promote proper fertilization practices — and especially to pin-point fields where excess nitrogen causes low sugar content — Great Western has expanded a soil sampling and analysis service for beet growers. The facility is located at the Sterling sugar factory under the direction of Jerry W. Steinmeyer, quality control chemist.

The Sterling soils laboratory was set up to analyze samples for nitrogen, phosphorous and organic matter content — and to provide proper fertility recommendations based on data from soil probes taken throughout the GW territory.

The photos here illustrate the main steps in analyzing soil samples at the Sterling lab with the use of mechanical, chemical and electronic equipment.

These complex tests and measurements provide the actual analytical figures for the Soil Information Sheet to be sent back to the factory district where the sample came from. There, the company agriculturist uses the Information Sheet to advise the beet grower on the judicial use of nitrogen fertilizer to improve beet quality and control field production costs.

To obtain a sample, the pulverized soil is divided into two: one for the actual analysis and the other for storage or for use testing at a later time.

Tubes of the blended soil and water go into the centrifuge, operated by Mina Higgason, for rapid separation of insoluble soil from the solution containing dissolved nitrate. Centrifuge eliminates slow filtering.

Clear liquid samples undergo test for nitrate-nitrogen content by Dorothy Helmut with Orion specific ion electrodes. Meter dial gives nitrate content to be converted into pounds per acre for use of grower.

The treated samples move on to the shaking machine for 30 minutes. Then Chris Knudson transfers the slurry to the centrifuge for separation of the phosphate solution from the insoluble soil.

The clear phosphate solution is pipetted into small beakers by Mamie Ball, right, while Chris Knudson adds distilled water and a phosphate color developing reagent to each so that each sample will turn to blue.

Chief Chemist Jerry Steinmeyer observes while Chris operates the colorimeter to measure the blue intensity of the sample expressed in parts per million phosphorous. It is then recorded on the Soil Information Sheet.

Soil samples, drawn from probes up to six feet deep in farm fields, arrive at the Sterling Soils Lab in varying conditions. At left, the cloddy raw sample straight from the field; at right, the sample pulverized.

To preserve the chemical composition of the soil, the sample is dried immediately. Here Euretta Rowles displays a pulverized sample in the drying rack with a tag identifying the grower and his field.

Now thoroughly dried, the raw sample is poured into the pulverizer by Euretta Rowles to obtain a working sample with uniform fine grains of soil. The pulverized sample is then bagged and numbered like the one at left.

By W.E.M.

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I, Nematode

The confessions of a sugarbeet nematode—a diary of destruction down through farm history for nearly 175 years, freely admitted, without fear of prosecution, until now, when he faces fumigation and extinction . . . zero population growth.

Here’s his testimony before the San Diego convention of the American Society of Sugar Beet Technologists in a translation by one of the first agriculturists to penetrate the nematode underground. For nematodes, it’s nematicidal!

- I am a sugarbeet nematode. Before we were named Heterodera shachtii by Schmidt in 1871, the damage we caused to beets was known as beet weariness, bearded roots, or hunger roots.

We nematodes have caused heavy losses in sugarbeet fields since 1802, when the first commercial beet sugar was produced in Germany. We had done our thing in that country, and by 1888 our life cycle was well known.

We moved to the United States in bags of beet seed containing soil from the infested fields where the seed had been grown. This may account for our presence in the beet fields of western United States about 1907. We were reported to infest 13.6 percent of the acreage surveyed by 1920.

1910 marked the beginning of commercial beet sugar production in western Nebraska. The sugarbeet crop was the surest method to convert the labor of man and beast to cash. But intensive production without adequate crop rotation furnished ideal conditions for our population explosion in this new area.

1926. A Department of Agriculture survey reported finding us on two farms in the Gering area. The sugar company fieldmen had been aware of the damage we were causing for several years.

1927. Representatives from the beet growers association, the Farm Bureau and Great Western recommend very strict rules for our control. All sugarbeet farms would follow a five or seven-year rotation, the only practical method of nematode control at that time. Under the crop rotation system, about half of the farm land was used to produce livestock feed. The elimination of continuous beets in the fields depressed our population and the sugarbeet yields increased under the crop rotation.

1930. Tractors are coming to the irrigated farms. We see another generation of beet growers on the farms. Cash is in demand, and the crop rotation system is being disregarded. Our population is on the increase, and we will put sugarbeet production on the skids again.

1940. A soil fumigant is being investigated that may go a long way toward our control. The cost is too high and very little is known regarding the handling, the application, and the economics of its use. It is such a long way from laboratory investigations to practical application and control in the field. It appears we will continue to rob sugarbeet growers for some time.

1950. Now the combination of lower prices and crop diseases encourages the farmers to increase the acreage they plant to beets. An economical method of controlling us must be accepted by the growers to maintain a dependable tonnage for efficient factory operation.

1954. The nematode hot-line tells us that a Great Western agriculturist has a limited supply of an experimental soil fumigant. He will try to make our lives more difficult. He and a grower applied the material with a single chisel applicator. They ruined the injector pump and now have a much better understanding of the many problems that must be solved before soil fumigation will be accepted.

We know the first experimental fumigation was done in 1871 and even now, 83 years later, there is no soil fumigant accepted for commercial use in the sugarbeet fields of western Nebraska. To our surprise, a couple spots in this field treated with the experimental fumigant produced beets with unusually large top growth and roots that showed no signs of our handiwork.

1958. A chemical company representative joins the GW agriculturists. They will work on the problems of soil fumigation in the Scottsbluff area.

Those two induce a grower to fall inject the fumigant in a harvested bean field that will be planted to beets the following year. To our dismay, the equipment worked very satisfactorily and they applied several different rates of the fumigant.

Spring is here and fumigant is chiseled into more strips, some before plowing and others after plowing, again at several different rates. These treated strips were conspicuous all through the growing season. Sugarbeets harvested from these strips show no signs of our having been there and the yields are very good.

But we really did our thing in the untreated areas; the sorry beets went through the screen of the harvester, for no other commercial yield at all. The grower is impressed and offers other fields in which they can continue experimenting. He is still our friend, he will not fumigate for himself, even with the offer of free fumigant.

1960. Another spring is here and our grower plants sugarbeets in a field we have controlled for several years. He must be crazy, he won’t even get his seed back. Here come those two experimenters again. They meter the fumigant into the water being used to irrigate for germination. They are applying several different rates. The heaviest rate kills the young beets; still these rows were replanted and at harvest time the yield was excellent, but the untreated strips are hardly worth the effort of digging.
1961. Spring again. Time to plow. The fieldman rigs a gravity flow applicator with two outlets per bottom, on a two-bottom tumble plow to apply fumigant while plowing. A packer is pulled behind the plow to seal the soil surface. Again, different rates of the fumigant are used. These strips are all planted the same day. Six weeks later, we are not doing our thing in these treated strips, even in a strip fumigated three years ago and planted to sugar beets again, we are doing only minor damage. These two are fouling up our environment.

1963. The Scotts Bluff County Fair exhibits a group of us to the public to show the value of proper fumigation. We were moved from the sugar beet field and exhibited growing on the beet roots in water under glass. It is interesting to hear growers relate the troubles we had caused. Their plans in the future for us are very discouraging.

Just being able to see us made believers of many. Now there is a real desire to do something about our control. Great Western agriculturists assure growers fumigation would increase their yields where our population is really the limiting factor.

1965. The North Platte Valley fertilizer dealers are trying to handle the demand for fumigation, but their equipment cannot cover the acreage or handle the fumigant that is needed. In this area the growers all want to fumigate the fields we infest the same day before planting their beets.

From the beginning of all these trials, Great Western agriculturists brought both growers and landowners to observe the effect of fumigation on us, and to demonstrate what they might expect to gain from the use of fumigant on their own farms.

1969. The GW Grower Service Center is set up to do custom work for beet growers. Their equipment includes a number of tete rigs to loan the growers. The Service Center very quickly learns programmed custom use of their equipment gets more acres fumigated.

Next, they improve the plow applicators and mount them on plows of growers who do custom plowing and fumigating. They now handle the fumigant in bulk, using nurse tanks, complete with transfer pumps and sufficient hose for rapid handling.

1968 and 1969. Growers who fumigate for the first time are allowed $5.00 per acre credit by Great Western as an incentive to try fumigation.

Great Western agriculturists convinced many growers one at a time to take advantage of fumigation. The challenge: “Try it, you’ll like it.”

1971. Information gained by the younger growers about fumigation spread rapidly among their relatives and friends. Now we hear, “Fumigation has made him extra money, surely it will do the same for me.” Fumigation in western Nebraska restores the economic production capacity of many farms, while on other farms, production exceeds the hopes of either landowner or operator.

1973. Some 250,000 gallons of fumigant applied. Our life style has been changed by these fumigation practices and we find it more difficult to survive and multiply. The fumigant properly applied to permit even gas penetration with a good seal of the soil surface prevents our activity and reduces our population.

This condition allows the beet to establish a vigorous root system and healthy plant before we can recover from the effects of the treatment. By the time those of us who survive the gas attack recover, it is too late for us to cause much damage and we must re-establish our population before winter temperatures come.

1974. Yes, we long for the good old days when we were unmolested and could carry on with a normal way of life as soon as spring soil temperatures would permit. We can no longer take any pride in degrading beet yields, because the grower has learned to control the damage we cause. Woe is we!
Though she probably wouldn't agree, gold stars, blue ribbons, certificates of achievement, bell-ringing, and applause ought to be part of her reward.

After all, she's one of those persons who does a job, does it well day after day, year after year, and doesn't get thanked by too many people, except by her family.

When she rises at 5 A.M., a little weary from the 17 hours she worked the day before, she doesn't need to be a mind-reader to know what lies in store for today. It's sugarbeet harvest time, and when it's over, it culminates the year for the beet grower.

That's her husband ... the beet grower. And today she's going to help him harvest a few more beets. She's going to be that extra pair of hands.

Now he's thinking of breakfast, and she's thinking she'll probably eat as much as he does ... nothing's wrong with her appetite these days. But who worries about calories ... there are plenty of ways she will use them up.

She could drive the John Deere with the lifter-loader on it, or the one with the top-saver, like some of the others. Or, after the kids are off for school, she could hold down an eight-hour job somewhere. She could babysit for relatives or neighbors while they work out.

But instead she's going to drive a truck and help make sure those beets get where they belong soon after they're out of the ground. She'll probably pick up some repairs of machinery parts, deliver the fuel and grease, and give the fellows out in the field some of her strong-brewed coffee, too.

She'll do a lot of things today ... all for the same reason. It's more than a way of life and a way of work, it's the family's business. That makes it her business.

There, she's pulling the big truck up to the gas tank. While it's filling up, she checks the oil, the water, the tires, and checks and tightens the sideboards and makes sure the chains are in place. Every man takes care of his own truck . . . or woman.

Chores done, she returns to the house and sets out some things for the kids. They'll be getting off to school again by themselves. She remembers how much fun it was yanking them out of bed in the mornings ... was it really just last week? Now, they must do for themselves until mother is just a mother again.

Roast in the oven, things laid out for dinner ... that's the noontime meal out here. Seems like an awful long time away, but time goes so fast when you're busy.

By dawn's early light, she crawls into the truck. Beside her are her thermos and snacks ... there won't be time for any coffee stops once the harvesters get going. Now, down the road to the field.

Her husband says they're going to set records today. The crew is there, and when they get lined up, away she goes starting on her first load of the day. She has to know how to drive a rig like this, and she quickly adjusts herself to the feel of it . . . almost by reflex.

As the load comes down, she has to make sure the beets are evenly distributed on the bed of the truck. With the full load, and her thermos lid in one hand and the wheel in the other, she heads off to the receiving station. Her husband always likes to have a load in by the time the receiving station opens.

She is very adept at maneuvering the big truck, and now it seems almost to know its own way to the station. Weighing-in is routine, once you learn to get all four wheels on the scale. While they're unloading, she has to make sure they don't lose any beets under the truck or on the platform.

Next, she picks up the return dirt ... they only had to talk to her once about letting the dirt fall on the ground. Then she weighs out, and she's back on the road. So far, she's making good time . . . maybe they will set that record today. After all, they say the best drivers are women . . . isn't that what they say?

She remembers to stop by and pick up the machinery part that was repaired; she wouldn't dare show up at the field without it.
When she gets back to the field, first she dumps the return dirt in the washout, then proceeds down the line to pick up another load.

Her husband is much too busy even to smile when she shouts the tonnage of the first load, but she knows he will be pleased when they sit down to the figures tonight.

Mid-morning she makes a run by the house for coffee for the crew — she never really appreciates coffee any other time like she does at harvest time.

The rest of the morning goes quickly after she has that third cup. Several loads later, a growl somewhere in the bread basket says it's time for her to leave the men and head for the house.

They are never unappreciative of the hot meals she fixes at noon, and she knows they'll all be starved when they come hurrying in for dinner. She could eat most all of the roast herself if there was more time, but they'll be coming soon, and they can't keep this operation at a standstill for very long.

She wasn't really surprised at the compliments on the meal; she would have been worried if someone hadn't been hungry. But that never seems to happen.

She's given a one-load leave while she clears up the things — just enough so she won't have to face a kitchen full of dishes when she gets home late tonight. . . . the kids will pitch in and straighten up the rest when they get home from school. She leaves them a note.

The afternoon passes more quickly than anyone expected — more smoothly too, since nothing broke down. She keeps picking up those loads and delivering them until suddenly they'll have to make good time to get that last load in before the receiving station closes.

The last load is in, and she heads for home, the hunger pangs again calling her attention. The fellows will clean up and make repairs or adjustments to get ready for tomorrow. This sure makes it a long day.

The last meal of the day is late and after she cleans up from that she wonders if there's enough energy left to do the rest of the chores and get some things ready for the next day. No time for extras, that's for sure.

Maybe when this is through, there'll be time for getting her hair done, the sewing and mending; maybe there'll be time for the house and for cooking a meal at her leisure. Maybe there'll be time for sleeping a little later and a long, lingering bubble bath. And maybe there'll be time to be with the kids. She knows her notes are not quite the same as having mother around.

She also knows there'll be time for all these things, but not before this job is finished.

She's a woman who is realistic about things. And she can face what's real. She is unpretentious about her part in the scheme of things. There's a job that somebody has to do, and she does it.

She's also a woman who knows that this sugarbeet harvest is an important part of her husband's good business. There are a number of ways to help, and she lends that helping hand.

After all that she has accomplished today, there may be one or two things that get left undone.

But the beet check will help her to forget all the other things she didn't have time for. Her husband is a big one for showing his appreciation, too . . . maybe some new furniture or a trip later on . . .

But, when life returns to normal, she'll really miss that old truck. And just when the truck was getting used to that female touch.

So, let's get together, when she least expects it, and bang the drums, pin a gold star on her, and let her hear the roar of our applause.

Or, to save her the embarrassment, we might just sit back in our easy chairs and admire her. She's quite a woman — in more ways than we can count.

Mrs. Mel Pfau of Yuma, Colorado's Young Mother

• There are no sugar beets on Broadway . . . .

That's the report of Linda Pfau of Yuma, who was awarded a trip in May to New York City for winning the honor and the title of Colorado's Young Mother of the Year.

But Linda wasn't disappointed with the big city. She took the trip with her husband, Mel Pfau, GW agriculturist at Yuma and member of the Agricultural Publications Committee. They have two children — Kelli, nine, and Jon, six.

At the convention at the Waldorf Astoria Hotel, Linda represented Colorado. The convention was held for the purpose of conducting meetings and forums for the state Mothers of the Year and Young Mothers of the Year. This was to enable the participants to return to their respective states and lead new or existing organizations.

At a formal reception for the honorees, television's Garry Moore acted as master of ceremonies. The State Mothers of the Year, including Linda, were awarded trips to New York City for winning their respective state Mother of the Year honors.

While in New York, Linda and Mel were able to see the Statue of Liberty, Times Square, the Empire State Building, the United Nations, as well as to attend two Broadway Shows, and at NBC Studios at Rockefeller Center the filming of “Three on a Match” with Bill Cullen, emcee.

Linda said the whole trip was “super” and “New York is a busy, bustling, exciting place, but we were glad to get back to the prairie.”

Linda was sponsored by the Yuma Young Mothers Council Service. Young Mothers organizations are dedicated to raising children in a Christian environment.

—Jean Hurst
A Westerner with a twinkle in her eyes, always, Mrs. Rosina Hilpert appears about to rustle the seven-gallon Stetson belonging to Charles Reifschneider, the agriculturist for her sugarbeet acreages near Scottsbluff.

Vivacious Valley Veteran

Vivacious — full of life — aptly describes Rosina Hilpert; but she’s also voracious in her quest for knowledge, and gracious in working with her farm operators.

Continuing education plays a vital role in the success of the sugarbeet grower today. That’s the firm opinion of Mrs. Rosina Hilpert of Scottsbluff, vivacious veteran of more than four decades of farm management in the North Platte Valley. And she practices what she preaches.

Mrs. Hilpert shows up without fail at agricultural meetings, she attends beet grower association sessions, she studies farm bulletins and publications, and she consults on the farm with her grower-operators.

It’s all part of the agricultural education she began at the University of Nebraska, where she was the third co-ed to be graduated from the College of Agriculture. She earned her degree in bacteriology in 1924.

“Most of my education after finishing college has been on the reading level... articles in agricultural magazines that pertain to things that are of interest financially for the good of my farms.”

Mrs. Hilpert manages three farms owned jointly by herself and her sister, Miss Helen Brecht of Chicago, who will move to Scottsbluff in the next year or two to join Mrs. Hilpert.

Their ties with the Valley date back to 1915, when their parents purchased the first parcel of land north of Scottsbluff. Their father’s health was failing, and at that time people thought moving to the West would improve his health. They had intended to move to the farm north of Scottsbluff.

When their father’s health worsened, instead they moved to Falls City in the southeastern corner of Nebraska. The property out west was rented and looked after by agents from Scottsbluff. After Mr. Brecht’s death in 1917, their mother moved to the Gering Valley and purchased more land. At that time the land was planted and rotated each year in alfalfa and sugarbeets. Since then, beets have been grown every year.

During her college days, Mrs. Hilpert was determined to learn how to manage the family property.

“Somebody had to learn to do the job. In this day of science, women have to learn how to handle those problems, if they are fortunate enough to be left with farm property.”

Her marriage to Adolph H. Hilpert took her to Kansas where he taught vocational agriculture until 1932, when they moved to Alliance. At that time Mrs. Hilpert and her mother actively took over the management of the properties. Upon her husband’s death in 1948, Mrs. Hilpert moved to Scottsbluff.

The farms are now operated by three brothers, Ken and Cork Harimon at the farm north of Scottsbluff; and Riney Harimon at the farm east of Minatare. Each brother farms between 100 and 150 acres each year.
Mrs. Hilpert’s relationship with the brothers is a very close one for landowners and operators, because she is determined to give her farmers the encouragement and cooperation they need to be successful. Mrs. Hilpert explains: “I feel that we have chosen these brothers as our growers because they are well able to farm the farms. I let them do just as they please with the acreage and rotation. I do not interfere in any way.”

But Mrs. Hilpert does sanction such progress and expense as underground irrigation tiling, use of Telone for fumigation of nematodes, chemical fertilizers. She is not only willing, but happy to pay her share.

Along through the years, Mrs. Hilpert has seen the introduction of self-propelled machinery as well as innovations of all types of farm mechanization, soil testing, commercial fertilizers, and chemicals.

The Harimon brothers were among the first farmers to fumigate in western Nebraska. Mrs. Hilpert recalls the days of that first effort:

“I read about the fumigation in the Business Farmer and Through the Leaves. We were having a problem with nematodes. At that time, people were beginning to test the soil and we found it was very badly infested with nematodes. We agreed to try the Telone, and I think it was the second year that we used Telone on the place east of Minatare that we made High Ten for that vicinity.

“It paid off and has been paying off since, because we would certainly have had to stop raising beets because we were not getting the yield that we should have had.”

In 1973, the Harimon brothers harvested 25 tons of beets per acre with sugar content averaging above 16.5%, both figures up significantly from several years ago. They credit the advances to fall fumigation and deep soil sampling to determine proper application of nitrogen.

Mrs. Hilpert believes that sugarbeets have always been a very successful crop for her family — the proceeds put Mrs. Hilpert and her sister through college and enabled her mother to remain at home, rather than leave home to work.

“After I was left a widow I took care of my mother and kept my family. The beet checks from the farms down here have educated two sons.” They are John, an attorney in California; and Fred, a computer education instructor at the University of Wisconsin.

In addition to her activities in the management of her farms, Mrs. Hilpert finds time to keep house, sew, take a tailoring course at the junior college at Scottsbluff, take a course in farm management, as much gardening as possible, and she has just recently learned to play bridge.

Mrs. Hilpert is optimistic about the future in farming, not only for herself and her growers, but also for agriculture in general.

As far as sugarbeets are concerned, she says: “I think sugar is one of our stable farm products because we have the legislation that takes care of the economy of sugar. We will stay with the same rotation that we have in the years past because the Harimon brothers have worked out a system of rotation that is adequate for their needs.

“As I said, it is their needs that I am interested in — what they do is all right with me.”

**The Nebraska Area Field Staff**

Nebraska Area agricultural staff members sit for a group portrait early this summer in their last field meeting before the retirement of two senior members, Herb Peary and Augie Heldt.

- Front and center, from left: Marjorie Langhofer, secretary at the Grower Service Center; Herb Peary, who retired as agriculturalist at Wheatland, Wyo.; Rose Ann Tritten, area agricultural secretary.

- Seated at table, from left: Augie Heldt, who retired as agriculturalist at Bayard; Abe Spurgin, agriculturalist at Alliance; Red Johnson, agricultural manager at Bayard; Al Auger, agricultural manager at Mitchell; Leonard Henderson, area agricultural director; Gordon Hobert, agricultural manager at Scottsbluff and Gering; Jim Davidson, agriculturalist at Alliance; Carl Luft, agriculturalist at Wheatland.

- Standing, from left: Jack Elliott, agriculturalist at Bayard; Paul Blome, manager of Grower Service Center; Carl Yung, representative at Grower Service Center; Roeland Elliston, agriculturalist at Mitchell; Dale Shull, agriculturalist at Mitchell; Charlie Reifsneider, agricultrist at Scottsbluff; Glen Zemanek, agriculturalist at Mitchell; Rich Langhofer, agriculturalist at Scottsbluff; Elton Peterson, agriculturalist at Gering; Jerry Jarrell, agriculturalist at Scottsbluff; Leo Hoehn, agriculturalist at Bayard; Lyle Shaughnessy, agriculturalist at Bayard.
• A strong backer of beet tops for livestock, Walt Nygren appears at left planting his 107 acres of sugarbeets west of Johnstown with his partner-son, Mark, 21, and his landowner, Glen Chandler of Fort Collins. In the High Ten for the past 11 years, Walt is president of the Johnstown growers association.

Beet Tops Better Yet

• Historically, surpluses of grain, forage and roughages have been available at cheap prices. Not so any more. Consequently, beet tops are more valuable than ever as a nutritious and economical feed available to beet growers.

The easiest and most popular way of utilizing the feed value of beet tops is to pasture them with cattle or lambs. Simplicity costs something, however. Adverse weather and livestock themselves deteriorate tops in time with a loss of part of the protein volume and vitamins.

The best way to capture the greatest amount of feed and nutritional value is to ensile tops. This can be accomplished either by wilting to 60 to 65 percent moisture in six to eight days in the field and then chopping and putting the tops into a pit or slab, or by chopping directly the green leaves and piling them on a slight slope where the excess moisture can drain away. This dewatering process takes the beet leaves from 85 percent moisture to about 60 to 65 percent — mandatory for good ensiling conditions.

The ensiled tops are equal to corn silage, when fed on a 50-50 basis. The unwilted beet top silage yields from 8-10 tons/acre, and the wilted silage about 6-8 tons/acre. The labor requirement to properly handle beet top silage comes at a critical time of year, but present-day feed prices make the work well worth the grower’s time and management to put up economical livestock feed.

For example:

George William Reiter, a beet grower near Laurel, Montana, considers his beet tops worth $100 or more per acre. The past year George has siloed his tops in November, using a New Holland field cruiser with a hay pick-up.

“No problems,” he says, “we harvested 35 acres a day. We used a three-man crew, a truck, rake and a chopper.”

A complete feed analysis of beet top silage by the Triple S Testing Laboratories shows 13.8 percent protein, with total nutritive feed value 13 percent more than corn silage. George said his silage is as good as a crop of barley and sure makes sugarbeets a high profit crop.

By WILLIAM C. McGUFFEY
Director-Agricultural Development

In Colorado, Walt Nygren usually feeds about 300 head of cattle in an operation with his landowner, Glen Chandler of Fort Collins. Walt adds:

“At times, we silo the beet tops for the cattle. When we don’t, we sell them in the field for sheep pasture. Last year, the tops were worth $42 an acre, plus the manure from the lambs running the field comes to another $10.”

Walt uses a Barnes six-row top windrower in his typical on-the-farm feeding operation, with emphasis on as much roughage as possible for his livestock.

In Nebraska, the value of beet tops was summed up earlier this year in the Scottsbluff Business Farmer by Lionel Harris, retired superintendent of the Scottsbluff Experiment Station. He says:

“Beet tops are harvested, stored and fed with great care in Europe, where grains and forage are limited. The present high prices this year will make it possible for beet growers to realize large financial gains from beet tops.”

• George William Reiter, center finds high dollar value in beet tops on his farm near Laurel, Mont. Here Agriculturist Don Candlin displays a handful of George’s silage with Agriculturist Jerry Pyette at left.
Two Growers Take Beef Expo Honors

By LESTER B. GARNER
Agricultural Manager-Sterling

Men involved in the growing of sugar beets took both the top honors in the Great Western Beef Expo feeding and meat production tests at Sterling ending on June 20.

Taking the grand championship trophy honors was Max Fulsher of Amherst, a landowner at the new Hodges station in the Ovid factory district.

Ed Summers, a beet grower and livestock man from Crook, was reserve grand champion winner in the fifth annual Great Western Beef Expo.

The Expo was started five years ago by a group interested in trying to find a practical way to get a more accurate check on the meat producing ability of types and breeds and cross-breeds of cattle regardless of popularity or other factors.

Any breeder who wants to enter the test may do so. Five of his yearling steer cattle of his selection are put into the Expo lots when the test begins. After a “settling down” period all cattle are weighed and started on a regular feedlot fattening ration. This year the test ran for 175 days. Not only is the group checked for total gain and daily gain, but each animal has its daily gain weight and gain per day of age calculated.

The “proof of the pudding” comes when all animals are processed by the Sterling Colorado Beef Company, graded by government inspectors and all carcasses put on display. The grand championship series of awards take into account the test lots feedlot weight gain, feed efficiency utilization and lean yield. The cattle must “grade” to be included in these awards.

There were 208 cattle entered in the 1973-74 Expo representing 42 sire groups. Entries came from seven states. Attending the June 21 and 22 activities upon completion of the Expo tests were visitors and observers from four foreign countries and all areas of the United States.

Each year The Great Western Sugar Company participates as one of the award sponsors of the Expo. This reserve championship award for feedlot gain sponsored by Great Western was won this year by Hyland Ranch of Ree Heights, So. Dak., with their entry of five cross-bred Friesian-Charolais-Angus.

Max Fulsher is a long-time breeder of Hereford cattle and is recognized widely for the excellent quality cattle his herds produce. The Fulsher ranch and farms are in the recently developed well irrigation area between Julesburg and Holyoke, Colorado.

Ed Summers has a small Shorthorn herd which he started in 1947. Ed pointed out that his winning group was from his grade cows, not his registered cows. All were sired by his own registered bull. The Summers farm 160 acres of irrigated ground and have a section of dry land pasture.

Upbeet Uptake... by Janet Shay

You're collecting it! What about my cattle?
Automatic sideboard lifters—or beet box closers—offer several important advantages for safe and efficient delivery of the crop during harvest.

At the piler, they eliminate exposure to moving machinery and slippery footing since the driver can remain in the cab of the truck at all times.

On the farm, on trucks with hoists, return dirt can be dumped without manhandling the sideboard back to the closed position.

These two advantages become increasingly important with more and more women driving beet trucks during harvest.

In addition, the general use of sideboard lifters will help to speed the movement of trucks through the receiving station by eliminating two steps in the work of dumping beets.

There are now available at least several different designs of automatic sideboard lifters that can be installed commercially or fabricated on the farm. Generally, each works on the mechanics of counter-balance.

The drawing above shows the design for a simplified lifter with only a few working parts. It can be built by any grower who's handy with tools for an estimated cost of $50 to $100 for two units, depending on the spare materials on hand at his farm.

The lifter mechanism here must be installed on both the front and the back of box to provide even action and to prevent breakage of the sideboard from over-loading with beets on the down-swing.

The shaded portion of the drawing shows the beet box in the dumping position, while the broken lines show the position of the cable actuating the sideboard. Here's how it works:

The cable, in constant tension at a fixed length, rides over three sheaves, including one at the top of the upright bracket, to let the sideboard open and close with the raising and lowering of the beet box.

In building the unit, the cable should be flexible and should be adjusted for actual operation, while the angle iron for the upright bracket should be bolted to the truck frame or bed stringer so that it can be adjusted to the action of the cable.

The locations of the other two sheaves and the cable attachment can be determined from drawing's scale of ½ inch = 1 foot.

Here are the materials needed for each lifter unit:
Flexible steel cable—¼ inch diameter, about 11 feet long.
Angle iron—3 x 3 x ¼ inches—2½ feet long.
3 sheaves—3 to 4 inches in diameter.

For those who want to check out the lifter mechanism in operation on a beet truck, working models will be on view and available for demonstration at the GW Grower Service Centers at Scottsbluff and Platteville, Colo.
Beau Brummel Bob Barton of Scottsbluff models the latest two-tone pumps for harvest work by retired agriculturists, while Ag Manager Al Anger of Mitchell points out the generous clod clearance of the heels. Bob retired at Gering in 1971.

Around the Territory

Upbeet Up boosts to four public officials who got together to work out traffic safety controls during harvest on the downhill highway in Wray, Colo. They are Hy Whyte, Wray city manager; Milo Ballinger, state highway district supervisor; Mervin Miller, Jr., a state traffic engineer; and Tom LaQuey, Yuma County extension agent and coordinator of the safety project. They were aided by John Campbell, on behalf of beet growers in the vicinity, and Wendell Wagner, GW agriculturist.

Doug Foos of Kersey, Colo., a sugarbeet grower for eight of his 17 years, was elected governor of Colorado Boys State at its Fort Collins convention. He’s the son of Mr. and Mrs. Raymond Foos. Doug attends Platte Valley High School, where he’s president and treasurer of his junior class and will be student body president next year. He plans to study law and enter politics. Doug worked his first youth beet contract at the age of 9.

Take a lesson in golfing from Alan Abrams, 20, who works at the GW Grower Service at Platteville. Alan was the winner of the Lloyd T. Jensen Memorial Tournament at the GW family outing at Estes Park in June. He’s the son of Bob and Joyce Abrams of Ovid, where Bob’s now ag manager. With 142 for two rounds, Alan seems well on the way toward his ambition to become a golf pro. His secret of success? Start playing at the age of ten!

It’s now Dr. Asa Maxson! An honorary doctorate of science degree was conferred upon Asa by the University of Colorado in June for his 35 years of work at the old Longmont Experiment Station. It was a notable commencement for Great Western’s Grand Old Man of 99 years. Dr. Maxson retired at Longmont nearly 30 years ago.

J. V. Ostermiller, vice president of Great Western Export, was honored by the Colorado State University Alumni Association for outstanding service to the university and the state. A 1932 graduate of CSU, Vic was one of two presented awards at June commencement. He is president of the Fort Morgan Heritage Foundation, president of the CSU Alumni Foundation, first vice president of the alumni association, and listed in Who’s Who in the West. A Great Westerner for 32 years, Vic was agricultural manager at Fort Morgan and Longmont.

Wedding bells rang on June 9 for Larry H. Dorn, one of the new beet growers at Hardin, Mont. Larry was married to Miss Barbara L. Hill of Shepherd, daughter of Mrs. Lorraine Bartz and E. W. Hill of Billings. Barbara attended Billings Senior High School, while Larry attended Hardin High School and Montana State University at Bozeman. He is the son of Mr. and Mrs. Henry Dorn of Worden, Mont.

For Upbeet Uptake, those cartoons in this issue featuring the lighter side of farm life, thanks go to Janet Shay, who appears below with some of her serious work. Jan is the talented wife of Marc Shay, GW agriculturist at Imperial, Neb. Self-taught in art from the time she could hold a crayon, she now works in oils and acrylics for commissions and exhibitions and serves as president of the Southwest Nebraska Artists Guild. Jan also looks after the four Shay youngsters and grows vegetables and collects things, most anything — except barbed wire!

Cartoonist Janet Shay with some of her serious art work.
Around the Territory

- It isn’t all sugarbeet agriculture for two Great Westerners who work in the Lovell factory district. Stan Yung, agriculturalist, and Bob Vergara, research agronomist, made quite an historical discovery while looking for rocks in the Big Horn Basin. They discovered the first skeleton of a fishlike reptile that lived in Big Horn Basin when it was a prehistoric sea... in the Mesozoic era. Dr. Harold McCracken, director of the Buffalo Bill Historical Center at Cody, estimated the age of the Ichthyosauridae (fishlike reptile) at about 120 million years. Yung and Vergara found the remains about six miles south of the Lovell-Big Horn Mountain Highway.

- Rock hunting provides both recreation and rewards for Rinard and Freda Goss, at left, when they’re not growing beets on their farm near Mitchell. They also cut and polish agate to make butterflies and other jewelry. Their butterflies won second place at the Rocky Mountain Rock Show in Cheyenne. The Gosses also entered national competition at Lincoln and acquired valuable experience for the Nebraska state show.

- The Olympic Torch burns brighter than gold in the eyes of Dave McGuffey, 22, a senior at Montana State University and member of the All-American College Rifle Team. He’s the son of Bill and Norma McGuffey of Denver, where Bill’s now director of agricultural development. Most recently, Dave won the collegiate section of the National Rifle Championships and also took silver medals in the English match and small bore free-rifle shooting. Now his aim is to compete in the 1976 Olympic Games. “To me,” Dave explains, “that’s a better goal than becoming rich.”

- Now it can be told that the first new cocktail since the Harvey Wallbanger has been invented by Phil Smith, retired and renowned general agriculturalist. At lunch in Denver recently with Sugar Building cronies, Phil was so busy catching up on the news that he mistook a little jar of salad oil for a second helping for his long-stemmed libation. The result was the new Smith & Wesson. Quoth Phil, puckering his lips: “Lots of muzzle velocity!”

- A newcomer to Great Western, Jean Hurst, at left, doubles in the Agricultural Information office as secretary and assistant editor of Upbeet. She came to the Sugar Building from seven years with the American Sheep Producers Council in Denver, where she assisted in public relations and publications. Earlier, she worked for Lockwood-Seilon in Gering. A native of Iowa, Jean was graduated from high school in Yoder, Wyo.

- One hundred years in sugarbeet management for one family marked the retirement of A. E. (Augie) Heldt, agriculturalist in the Bayard factory district. Augie closed out a career of 42 years in a family association dating back to the earliest days of the sugar beet crop pioneered in the Valley by his late father, Gus Heldt, whose work spanned 58 years.

- Augie was born in Scottsbluff. While Gus was firmly establishing the crop in the Valley as agricultural superintendent for Great Western, Augie attended schools in Scottsbluff and then the University of Nebraska.

- Augie earned a degree in geology in 1932, but turned to agriculture with GW at Lyman. In 1933, he moved to the Minatare district as an agriculturalist. In 1948, the year Gus retired at the age of 74 from a lifetime in sugar beets, Augie was transferred to the Bayard district, where he remained for the rest of his career.

- The Heldt association with the sugar industry also extends to Augie’s wife, LaVonne, who worked almost every campaign as head beet clerk for several decades.

- Retirement from a sugarbeet management career of 38 years came in May for John Stewart, agricultural manager of the Brighton district.

- Before he came to Brighton seven years ago, John was agricultural manager at Windsor, Fort Collins and Ovid. His career in that position spanned 25 years, one of the longest in recent Great Western times.

- While keeping close ties with farm interests, John also maintained an active role in community affairs. His service in different locations included board memberships in school systems, hospitals, health societies, charitable organizations, community improvement groups, and Rotary.

- John first came to Brighton in 1945 as an agriculturist upon completion of five years in the Army with the rank of lieutenant colonel. In 1948, he was promoted to assistant agricultural manager. He began his Great Western career in 1936 with the field staff at Longmont.

- Upon retirement John and his wife, Belle, moved back to their native Utah.

- Death has taken two veterans of Great Western agricultural management who lived in retirement in Greeley.

- Frank Whiting, agricultural manager at Loveland when he retired in 1959, died on May 9. In his 42-year career, Frank was also agricultural manager at Wheatland from 1928 to 1943.

- Phil Dale, agricultural superintendent at Eaton and Greeley when he retired in 1947, died on Jan. 31. Phil worked 23 years at Eaton and Greeley. He began his career in 1907.
New assignments for five members of the Great Western agricultural management staff were announced this summer by Lamar C. Henry, director of agricultural operations.

Frank Zumbrink, agricultural manager at Eaton, was also assigned to the Greeley district in an action combining the Eaton and Greeley management.

Alvin C. Robertson, who was agricultural manager at Greeley, was moved in the same post to Brighton to replace John Stewart, who retired. (See opposite page.)

Don P. Lindshield, assistant agricultural manager of the Kemp factory district at Goodland, was promoted to agricultural manager at Lovell. He replaced Stanley Walter, who resigned to the farm.

Orville (Bud) Oldemeyer, agriculturist at Johnstown, was promoted to agricultural manager of the Longmont factory district. He replaced Ralph W. Hettinger, who held the post temporarily in addition to his duties as area agricultural director.

Gordon Friede, agriculturist at Holyoke, Colo., was advanced to assistant agricultural manager of the Kemp district.

Zumbrink came to Eaton last October from Longmont, where he was agricultural manager for ten years. Earlier, he was staff assistant at the Denver office and assistant manager at Fort Morgan. Zumbrink began his GW career in Nebraska in 1953. He majored in agriculture at Michigan State University, his native state.

Before moving to Brighton, Robertson was agricultural manager at Greeley for three years. Earlier in his 22 years with Great Western, he was an agriculturist at various stations in the Eaton and Greeley districts and staff assistant at the Denver office. A native of Fort Collins, Robertson majored in engineering at Colorado State University.

Lindshield, in the Kemp district for the past ten years, was promoted to assistant agricultural manager there last fall. He was among the early GW agriculturists who worked on the expansion of beet acreage in eastern Colorado and western Kansas. Lindshield was born in Lindsborg, Kan., where he attended Bethany College for one year. He went on to the University of Illinois to earn his degree in agriculture.

In moving up to manager at Longmont, Oldemeyer brings 32 years of experience in both the Longmont and Loveland districts. In recent years, his field was around Johnstown. A graduate of Brush High School, Oldemeyer earned an agricultural degree at Colorado State University.

Before he moved to the Kemp district, Friede was an agriculturist for three years at Holyoke and for 11 years in the Ovid district. He began his GW career in 1959 shortly after his graduation from North Dakota State University. Friede was born and raised in Chinook, Mont.

### Great Western Agricultural Management Staff for the 1974 Harvest

<table>
<thead>
<tr>
<th>Area</th>
<th>Agricultural Director</th>
<th>District</th>
<th>Agricultural Manager</th>
</tr>
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<tbody>
<tr>
<td>NORTH</td>
<td>Ralph W. Hettinger (at Longmont)</td>
<td>EATON</td>
<td>Frank Zumbrink</td>
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<td>CENTRAL COLORADO</td>
<td></td>
<td>GREELEY</td>
<td>Frank Zumbrink</td>
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<tr>
<td>LOVELAND</td>
<td>Lowell E. Giauque</td>
<td>FORT MORGAN</td>
<td>Robert L. Abrams</td>
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<td>LONGMONT</td>
<td>Orville L. Oldemeyer</td>
<td>BRIGHTON</td>
<td>Alvin C. Robertson</td>
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<td>NORTHEAST COLORADO AND KEMP</td>
<td>James F. Gonyou (at Fort Morgan)</td>
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<td>STERLING</td>
<td>Lester B. Garner</td>
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<td>NEBRASKA</td>
<td>Leonard H. Henderson (at Scottsbluff)</td>
<td>FORT MORGAN</td>
<td>Norman C. Davis</td>
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<td>KEMP</td>
<td>Donald G. Redman</td>
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<td>WYOMING/MONTANA</td>
<td>Lee E. Butler (at Billings)</td>
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<td>Gordon Hobert</td>
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<td>Don P. Lindshield</td>
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Biggest beet field in the Ovid district — 415 acres — stretches to the trees and ranges wider than the camera can see near Brule, just northeast of where Nebraska corners with Colorado. It's the crop of Leo Schilz and his son, Dennis, in front, farming in partnership with the McGinty family. Agriculturist Jerry Young stands at left. The Schilz field was seeded with Mono Hy A-1, all No. 3, on March 27. With good germination from rain and good stands all the way across the field, the beets closed the rows by June 15. The crop was planted and cultivated by Nestor Garcia, year-round beetman for the Schilz operation. Leo and Dennis farm 191 more acres of beets in other fields near Brule.
Three Beet Crops --

They All Look Good!

- Late each year growers and company agricultural personnel in the GW area look at three different sugarbeet crops at the same time — and this year they all look good: the crop just harvested, the crop recently paid for in full, and the crop ahead.

When describing the first two crops, one needs words like unusual, unprecedented, and unbelievable. When thinking of the next crop, one has to observe that things never looked better price-wise for beets four months before planting.

Final payment last month for the 1973 crop brought average total gross returns to growers in GW territory to $38.29 a ton of beets. That set an American record and topped 1973 returns for nearby non-GW growers by as much as two dollars a ton of beets of the same sugar content. Furthermore, that $38.29 total was almost twice that of the prior year, the previous GW record.

The 1973-crop returns began with an initial payment of $17.15 a ton and a Sugar Act payment of $2.18. Then came four more GW payments in April, July, September, and October, one more than ever before and two more than normally.

With present prospects bright for more to come, if sugar prices average relatively good, this marketing year 1974-75 has begun with GW initial payments averaging $26.29 a ton of beets, which exceeds the November, 1973, initial payments by $9.14, or more than half again as much.

Only time will tell what subsequent 1974-crop payments will total. There are still 11 months to go before the final payment is due, and much GW sugar remains to be sold. But the Company, as it did last crop-year, will make interim payments when warranted and has promised to consider the first as early as January.

GW has also mentioned the possibility of even more frequent payments than in 1974. Meanwhile, initial acreage dollar returns have never reached such high levels before, with growers having delivered beets containing on the average more than 3.1 tons of sugar per acre, another GW record.

Many citizens and governmental committees are seeking the causes for current sugar prices. Some reasons are apparent.

Opponents of continuing the Sugar Act last spring gave no credence to Congressman Bob Poage’s forecast that, without the legislation, sugar prices next year would reach “six bits a pound.” As it turned out, the prophetic chairman of the House Agriculture Committee knew far more than his antagonists about sugar supplies and sugar prices around the world.

When this Upbeet article was written, retail sugar prices on the East Coast were close to the Poage prediction.

If governments across the globe, including this country’s, had believed their own statistics and had been more realistic toward sugar production during the last several years, the price pendulum now would not have swung so far upward. If beginning in 1968 the now non-operative International Sugar Agreement had been continued along production-encouraging lines, world supplies would now be greater and prices lower than they are.

If the U.S. Cost of Living Council had heeded beet sugar industry pleas and removed in early 1973 the effective ceiling on beets, which was arbitrary and discriminatory, as it had on other agricultural crops, more beet sugar would have been produced. If last winter CLC had taken other alternatives available to it, the price for household sugar now would have been somewhat lower.

If, if, if!

Now all that is history. The barn door has been open too long and it will take some time to get the “animals” back in. Now sugar is in short supply and sugar prices are high. But what about next year? Well, some market experts say that sugar supplies will continue to be tight and prices will remain relatively high for months. Therefore, every pound of sugar that GW growers can produce in 1975 will help to meet the food requirements and to satisfy the sweet tooth of mid-America, and time alone will tell what the price will be.
Blessings Large and Not So Small . . .

We are thankful, O Lord, for a bountiful harvest of sugar beets. Those of us on the land are especially mindful of Thy influence on those things that contribute to the quality of our crop—for which we strive; for the good planting season, for the good stands in the fields, free for the most part from devastation and infestation.

We are grateful for an adequate supply of moisture to fill our irrigation canals, to water all of our crops, to produce the foodstuffs so necessary for our way of life.

We are also thankful for the good harvest season, for the success in delivering and storing almost all of our sugarbeet crop without undue delay or untimely weather, in most areas.

We are thankful for the rewards from this bountiful crop, not only for ourselves, but also for the communities in which we live and work, in which we support our families and free institutions.

We are hopeful for Thy continued blessing of our land with heavy snow in the high country in the months to come and full streams in the spring to nourish our new crop.

But most especially, O Lord, we are hopeful of Thy guidance in these difficult times, hopeful that Thy teaching will help us to make final judgments in the light of what is right—not who is right.

Amen.

—LaMar C. Henry
Director-Agricultural Operations
Fathers and Sons in the Fields

- Family farming flourishes in a big way for the operation of Ray Cramer, Sr., who has four sons to help work his fields near Silesia, southwest of Billings.

  The four boys—Ray, Jr., Bill, Doug and Don—represent the third generation of Cramers in sugarbeets. Their heritage dates back 60 years to their late grandfather, Jacob Cramer, who got his start by working in Montana beet fields in about 1915.

  Like his own four sons, Ray, Sr. started out by helping his father. They went through the time-honored steps of working the land, renting the land, buying the land.

  The Cramer family farm enterprise included 260 acres of sugarbeets this last season with yields of about 20 tons per acre and sugar content ranging from 17 to 18 percent.

  “Pretty good,” remarks Ray, Sr., not given to overstatement, but obviously proud in explaining his operation. “We just farm, rent land, and all work together. Each of us works on all the crops. At harvest time, we help each other.”

  Ray, Jr., the eldest son, says he’s been farming for as long as he can remember—35 years, his present age; while Don, the youngest at 23, likes the country life and likes farming better than working eight hours a day for wages.

- The Cramers of Montana: Ray, Sr., at left, with two of his four sons, Ray Jr., and Don, who farm together near Silesia.
The Mellons of Colorado: Jack, in the cab, with his son, Marvin, harvesting their beet crop north of Johnstown.

Three generations in sugarbeets mark the seasoning of Gilbert Kurtz, who farms in the Mitchell Valley west of Scottsbluff.

Gilbert learned about the crop from his father, Arthur, who recently retired from farming, and from his grandfather, Henry Kurtz, who started raising beets in the Valley in 1914. Henry traced his interest in beets back to 1910, when he worked at the GW sugar factory at Sterling, Colo.

Now in his 12th year of farming, Gilbert harvested 86 acres of beets last fall with yields of 24 tons per acre and sugar content near 16 percent. His crop was unusual because the rows curved around a new bend in the highway.

"I had to go off my mark to plant, so it wasn't easy," Gilbert says, "But it was no problem to harvest."

How does Gilbert rate with his neighbors? One of his landowners, Dave Schuldies, retired a year early just to be able to get Gilbert to farm his land. Dave explains:

"Gilbert grew up here with my children. I knew him and I asked him to farm for me — he didn't ask me. He's a pretty good farmer!"

Homesteading in the post-war days paved the way for the sugarbeet operations of I. J. Frank and his son, Norman, who farm near Heart Mountain, west of Lovell, Wyo.

With irrigation opening up new farmlands in the West, I. J. was one of those who drew a homestead on the Heart Mountain Reclamation Project in 1946. He was in Denver then, but had farmed earlier in eastern Colorado.

Moving on to the project, I. J. improved his land and proved himself as a producer. And like the settler in earlier times, on other irrigated lands, he turned to sugarbeets in his crop rotation.

In recent years, I. J. was joined by his son, Norm. They work together on their farms, but contract separately in sugarbeets. Nevertheless, father and son view the beet crop with the same eye for acreage.

Last fall, I. J. harvested 112 acres with yields of nearly 20 tons per acre, while Norm delivered 115 acres with yields of 21.5 tons per acre. In sugar content, both averaged about 18.5 percent.

With beet quality like that on the Frank farms, Heart Mountain becomes the heart of sugarland.

Farming on the home place goes back nearly 90 years in the family of W. R. (Jack) Mellon and his son, Marvin, who raise sugarbeets near Johnstown, Colo.

And beet contracts there date back at least 65 years.

As a result, Marvin represents the fourth generation of beet growers in his family. His great-grandfather, Thomas Wailes, broke the sod on the home place in the 1880's; while his grandfather, J. W. Mellon, continued to farm beets there.

His father, Jack, signed his first beet contract in 1946, after four years in the Marine Corps, and Marvin himself started farming in 1961. Last fall, they harvested 113 acres with yields of 20 tons per acre and sugar content of 17.5 percent.

The Mellons — father and son — work together. And together with their forefathers, they can claim well over 100 years of experience in the business of beets, in one place, in one family.

The Kurtzes of Nebraska: Arthur and his son, Gilbert, who now operate the family beet acreages in Mitchell Valley near Scottsbluff. Their rows were curved to fit the contour of a new highway.

The Franks of Wyoming: I. J., at right, with his son, Norm, center, and their agriculturist, Stan Yung, at Heart Mountain.
The 1974 beet harvest was short and sweet. Ninety-six percent of the crop in this area was delivered by October 26, and contained one and one-half percent higher sugar than the previous five-year average. Moisture hampered harvest in a small portion of the area, however, delaying harvest into November. All things considered, this area received an excellent season for harvest of all crops and we are thankful.

The continuing fair, dry weather has enabled the growers to get much more than normal the amount of fall work done. Our soil samplers have been busy and the results from the first 200 fields sampled indicate an average of 172 pounds of nitrate nitrogen per acre which is really good news, in view of possible shortages of farm fertilizers in 1975.

An added bonus to us, resulting from the beautiful weather in November, is the number of fields being fall plowed with the addition of fumigant through a plow sole kit. This practice is becoming much more widespread as it eliminates a trip over the field.

We are looking forward to more interest than ever before in soil sampling and sampling for nematode cyst counts as soon as the weather breaks. So we'd like to ask all growers to contact their company agronomist early enough that a timely analysis can be made.

Along with the regular practice of covering storage piles with a layer of straw when the beets are to be sliced after Dec. 10, a project at the Kemp factory included covering about 30,000 tons with a plastic canopy. This canopy contains ventilation fans for better control of the air movement through the beets. It is a cooperative effort by all departments of the company to determine the possibility of extra long-term storage. If this method works for large tonnages, the factories will be able to end their slicing campaigns utilizing much better quality beets. There is still a great deal to be learned about long-term storage of sugar beets.

The new two-way radio system scheduled for Fort Morgan, Sterling, and Waverly factory districts will be in operation full scale by Jan. 1, 1975. The Goodland district has had a radio communication system in operation since 1968 and it has been shown to be of great value in improving their efficiency, availability, and service, so we are confident that we will be able to serve our growers even better with this new communications tool in the three remaining factory districts along the South Platte River in Northeastern Colorado and Western Nebraska.

North Central Colorado Area Report by Ralph Hettinger

Each year agriculture is influenced by Mother Nature and by the farmers' abilities. The combination of these two strengths has produced some interesting results during the last three years in the North Central Colorado area.

In 1972 sugarbeet growers in NCC harvested a record-breaking crop with 19.3 tons per acre and 17.2 percent sugar content.

In 1973, NCC growers received the highest price per ton ever received in this area.

And in 1974 all indications at this writing are that growers are setting a new tonnage record of 19.9 tons per acre and 17.5 percent sugar content.

During the 1974 harvest, many new trucks appeared at all of our receiving stations. New trucks and other bigger and better equipment show the effects of a profitable sugarbeet crop and generally better prices for all agricultural crops on the grower and the entire community.

We can attribute the record crop, at least in part, to:

About 180 frost free growing days plus good farming practices such as fall plowing, fall fumigation where needed, proper fertilization, good seed beds, early planting, and timely irrigation.

Virtually the entire NCC crop was planted with Great Western's Mono-Hy sugarbeet seed. The varieties indicate again a superior beet seed producing high sugar and high yields.

Generally, our control of insects and diseases was very good. Through research and "on-the-farm" testing, several good compounds are available and give dependable results when applied correctly with the proper rates to control nematodes, maggots, flea beetle larvae, web worm and others.

Services for taking soil samples are available in our area to help growers identify their fertilizer needs. This service can be obtained by the growers by contacting their agriculturalists. Nematode samples are also being taken and analyzed at our Grower Service Center in Platteville. Progress in nematode control, where needed, and in proper fertilizer usage on the 1974 crop indicates that we can assist growers in producing a better beet crop with higher sugar content and higher tonnage.

Good weed control and mechanization were again demonstrated to make sugarbeet growing easier and more productive. Machine thinning, labor and weed control go hand in hand. Good seed beds, good drills planting four to six seeds per foot after the timely application of pre-plant herbicides at proper rates, are giving us good results.

For post weed control, Betan and Betanil 475 continue to look promising on sugarbeets for control of escape weeds followed by lay-by control after a stand has been established. One of our most effective and economical weed control methods is an early, shallow, close cultivation followed by a machine to set the desired type of stand. Using this method, many growers today require only one weeding.

Growers are encouraged to seriously consider the purchase of a selectronic thinner as early as possible for the 1975 crop. It is "built-in" insurance toward proper stand adjustment for next spring.

In NCC, about 143 selectronic machines were used on 222 farms in 1974. Stand counts made behind these machines were 109.3 beets per 100 row feet. We have no difficulty finding workers to hoe out a few weeds behind chemical weed control and machines. Act now. Assure yourself another profitable crop in 1975.

On-the-Spot Reports by the Area Agricultural Directors
Wyoming/Montana Area Report by Lee Butler . . .

- At the completion of an extremely successful crop year we look backward to reflect on all of the cultural practices and weather conditions that have contributed to the outstanding results.

Sugar beets are on top of everyone's mind. Record results have been realized in both yield and sugar content. Good returns for the crop are anticipated. The Billings crop averaged 19.7 tons per acre with a 17.9 percent sugar average and Lovell had a crop yielding 17.8 tons per acre with a whopping 18.3 percent sugar average.

The growing season in Wyoming and Montana turned out to be an excellent one. Following a relatively mild winter and timely spring rains the month of June set records for hot temperatures. July and August were cooler than normal causing some concern as to anticipated yield.

The harvest season began on Oct. 1 with some misgiving about weather prospects as over an inch of rain fell in the last week of September; but once the harvest started, perfect weather was the rule. The harvest was completed on Oct. 30 at Billings in a month that gave promise of being the driest October on record. The next day two inches of rain fell over southeastern Montana which changed the weather records to show that Billings had experienced the wettest October of the past 37-year period. The normally dry Lovell country also experienced more moisture at the same time than they usually expect.

Mother nature certainly deserves full credit with growers taking every advantage of the situation to use their best skills in growing the crop. The crop was started timely on well prepared land and careful attention given to many details.

Fertilization and the wise use of nitrogen received considerable emphasis. Through soil testing and strip test methods most growers have a sound idea of the nitrogen needs of their fields.

Seed spacing of four to five seeds per foot was prevalent to accommodate the selectronic thinner and preharvest samplings showed fields that had been selectronically thinned to have better stands than those worked by hand.

Some 96 percent of the Billings acreage had a preplant herbicide and in Lovell, 97 percent was treated, while the balance of the acreage received attention when post spray time arrived.

In Lovell the program for control of the root maggot was emphasized and, while more work is necessary, growers using the control methods available were able to keep the number one problem in Wyoming reasonably controlled.

Irrigation was a real problem during the early part of the summer as the temperature put an unusually high demand on water. Growers are to be complimented in the way that they were able to keep fields wet and growing well and this certainly paid off when harvest arrived.

The continuing research effort that was conducted during the year by company research personnel, universities and ag staff members was productive with results to be given to growers during the winter months.

Planning for next year's crop is well under way with the full season allowing for fall plowing and fertilization under ideal conditions. Fall-prepared land is in good condition which should allow for an early start of the crop next spring and there is a great deal of interest being voiced about the 1975 crop.
Soil sampling tool in action — the hydraulic auger, with grooves loaded with dirt scrolled from depth of three feet in the field.

One bag of dirt, just a small bag, may help to clarify the interaction of sugar content and fertility in the beet fields of the Kemp factory district.

But, it’s not just any bag of dirt. It’s a small but reliable representation of an entire field, a composite of the length and width — and the depth, down to three feet. One bag contains a sampling of the field, a soil sample, precise and uniform, for each of the three feet — each sifted, divided and hammered into a fine powder, dried and stabilized, ready for laboratory analysis.

Soil sampling in the Kemp district — astride the Colorado-Kansas border — was expanded last fall in a plan to analyze the fertility level of every field to be planted to beets next spring . . . and to provide fertilizer recommendations for the grower in an effort to maximize his production of sugar per acre.

Samples were taken only to the three-foot level because of the uniformity of the first foot of soil throughout the district. There is some variation at lower levels, but the fine texture of the silty clay loam tends to keep nitrate nitrogen near the surface. There is no sand, so there is not much leaching of nitrogen.

The samples were analyzed by electro-chemical methods for nitrate nitrogen in each foot and for organic matter and phosphorus in the top foot. The complex testing was performed at the Great Western soils laboratory at the Sterling sugar factory under the direction of Process Control Chemist Jerry W. Steinmeyer. (For details, see the Upbeet issue of August, 1974.)

Upon return of the lab reports, often in only five days, company agriculturists visited with their growers to work out fertilizer recommendations for next year’s beet crop. The value of the soil sampling program will be more evident after beet harvest next year, when sugar yields can be compared with fertilizer recommendations, and the correlations adjusted to other conditions affecting the crop.

The sampling in the Kemp district was supervised by M. Merle Riggs, who was agricultural manager of the Ovid district before he joined the General Office staff early this year.

One Bag of Dirt: The Secret of Sugarbeet Quality and Fertility!
Two sugarbeet fertility trials that should be of interest to sugarbeet growers were conducted by University of Nebraska, Panhandle Station researchers. The objective of the experiments was to compare sugarbeet fertilizer recommendations by five soil testing laboratories servicing the area.

Soil was collected from an area 100 feet by 110 feet — the experimental area. The soil was thoroughly mixed and divided so that each sample was as near the same as possible. The soil was sampled and handled according to the recommendations of the laboratories receiving the samples. Surface plow layer samples (nine inches deep) were sent to all five laboratories. Samples to six feet depths were sent to laboratory E which is the University of Nebraska Soil Testing Service. Complete analyses were requested for all surface samples, and nitrate nitrogen determinations on the deep samples.

The experiments were arranged in a randomized complete block design with four replications. The fertilizer was broadcast on plots 22 feet by 25 feet, and worked into the soil before planting. About one-third of each plot was harvested for yield and sugar determinations.

The soil test results from all the laboratories were about the same. Fertilizer recommendations and total fertilizer cost per acre from the five laboratories were greatly different. Recommendations appear in the tables.

There were no significant differences in yield or sugar percentage among the laboratory recommendations. The addition of the micro-nutrients as well as phosphorus or potassium did not increase yields and therefore added expense with no additional return.

The study was financed in part by the Grower-GW Joint Research Committee, Inc.

(The following prices were used for computation of cost (per pound basis): Nitrogen 21c, phosphorus (P²O⁵) 14.8c, copper $1.80, boron $1.77, manganese 93c, zinc 83c, iron 40c, sulfate sulfur 7.9c and potassium 7.9c (K²O).)
• "It's been demonstrated, almost beyond question, that the amount of residual nitrate nitrogen in the soil does have a direct bearing on the sugar content of the sugarbeets."

That's the observation of Lee Girardot of Scottsbluff, a professional soil scientist. After receiving his B.S. degree in agronomy from the University of Nebraska, Lee spent 31 years with the Soil Conservation Service (SCS), first as a soil scientist in Louisiana, Oklahoma and Scottsbluff. Then as a soil conservationist, he worked in various areas in the U.S. and overseas, before returning to Scottsbluff in 1958. As part of the SCS program on erosion control, Lee did layout work for dams, terraces, and land leveling. He retired in 1970.

In the fall of 1971, Lee got his hands back in the soil by joining GW Sugar's soil sampling program in the North Platte Valley. He has been taking samples every spring and fall since.

The whole idea of the GW soil sampling program in western Nebraska is to improve the quality of the beet crop by increasing sugar content through the management of nitrate nitrogen fertilizer.

The first aim of the project is to sample all of the chronically low sugar content fields. Then, if other growers, who have average or high sugar content, desire it, samples will be taken in their fields also. Under the program last year 453 beet fields were sampled.

Lee says, "I think almost anybody who has dug into the soil, so to speak, very much here in Scottsbluff County, knows that we have a very complex soil pattern here — quite a little bit of difference in each field. The grower, then, can't really know, at least in this locality with the variations, how to fertilize unless he does have a sample taken.

"One could say that in most cases it would be nothing but a guess if a grower puts on fertilizer without a soil sample. The exception to that would be cases where the soil is very uniform, the rotation has been the same, and where the grower has learned that his fertility level is about the same every year. But on fields where the grower doesn't know that, then I would stand by that statement — that it would be nothing but a guess."

Accuracy is a vital part of Lee's work:

"It was found that when samples were taken at three feet, in many cases there was a tremendous amount of residual nitrate nitrogen. It was logical to assume that if it was at that depth, it must be deeper. Also, it is known that the sugarbeet does extract fertilizer from at least six feet. So, we have gone to six feet in all our sampling work.

"We pattern the fields so that we can get samples all over the field. Samples are taken at zero to one foot, then one to two feet, and then we combine the next two feet, and then the last two feet. On an average-size field, about 20 acres, we take from 10 to 12 boreings."

"The samples are sent to the soils lab at the University of Nebraska at Lincoln for analysis. The results come back to Louis Daigger, district extension soils specialist at the Panhandle Experiment Station near Scottsbluff. He converts the lab analysis into a fertilizer recommendation of pounds per acre and turns the recommendation over to the company agronomist, who advises the grower, taking into consideration the rotation and previous fertilizer practices."

Lee says that the program is growing in popularity every year. "I think the grower is realizing more and more that there is a correlation between low sugar and high residual nitrate nitrogen. The extremely high price of fertilizer enters into it...certainly no grower wants to apply excess fertilizer — from the money standpoint.

"I think the program will continue to grow and I don't think that any of us that are in this soil testing program could help but believe that every grower growing sugarbeets should have a soil test before he applies his fertilizer."
First beets go over pile under open steel canopy at Kemp, Kan., with sides later to be draped with plastic for controlled air circulation by attic fans. Pile later extended out in open, like those below, to store 35,000 tons.

Crane lifts wood rafters atop beet pile at Billings West in one of three projects seeking ways to control sugar losses in piles with beets to be stored longer than 100 days.

Plastic going on rafters and slopes of 10,000-ton test pile at Willwood, near Powell, Wyo. Besides forming air barrier, plastic also protects beet pile from freezing.

Rafters support plastic roof and form attic with fans to exhaust hot air and pull cool air through pile to keep temperature during piling and storage at 35 to 45 degrees.

Open vent hatches, with beets resting on fencing inside, allow cool air to be pulled through pile by attic fans. To keep freezing air out, hatches can be closed and fans stopped.
Inside the bubble at Toppenish, Wash. Under the eerie lighting and with resounding echoes, it was business as usual for the regular equipment piling beets in the "tent of air." The arcs across the roof come from skylights.

Like a puffed up quilt, the bubble stretches 550 feet in length and 110 feet in width to house 17,000 tons of beets. The structure at right provides an air lock with two doors for beet trucks moving in and out of the bubble.

On the Joint Research Committee tour, from left, Vern Palzer, grower member from Big Springs, Neb.; Dr. Tom Army, GW research vice president; Joe Alles, grower member from Billings; Dr. Bob Oldemeyer, company member from the Research Center; and Gary Orr, grower member from Powell, Wyo.

We saw the bubble!
The experimental sugarbeet storage protection bubble was viewed on Oct. 31 at Toppenish, Wash., by representatives of the Grower-GW Joint Research Committee, Inc., and company executives. They were accompanied by officials of the Utah-Idaho Sugar Company.
The plastic structure, supported only by air pressure and stabilized by plastic-coated steel cable, was raised on the Toppenish piling grounds of Utah-Idaho. It is a project of the Beet Sugar Development Foundation with financial support by at least three sugar companies, including Great Western. To oversee the project, Great Western loaned Sherm Fox, agricultural development engineer at the Longmont Research Center.

About 17,000 tons of beets were piled inside the bubble. They were dumped over a regular piler, inside the bubble, from trucks moving through an air-lock door.
The storage capabilities and costs of the beets in the bubble will be compared with another 17,000 tons on the Toppenish grounds in a steel insulated structure and canopy.

The Joint Research Committee was represented on the tour by grower members Joe Alles of Billings, Gary Orr of Powell, and Vernon Palzer of Big Springs, Neb., and company members Dr. Ken Dubrovin and D Bob Oldemeyer of the Longmont Research Center, and Bill McGuffey of the Denver office. They were accompanied by Dr. Tom Army, vice president-research and development, and LaMar Henry, director of agricultural operations, both of Denver.

—Dr. Bob Oldemeyer
Challenges for improving Mono-Hy beet seed . . .

- Seed germination — seedling emergence — plant population . . .

These growth factors offer continuing challenges in the improvement of sugarbeet varieties. And they hold the opportunity for the grower to master, with reliability, the major task of establishing productive final stands of beets.

The Mono-Hy seed concept recognized the opportunities immediately available to improve seedling emergence by raising seed quality standards. The average germination of Mono-Hy seed delivered in 1974 was 95.2 percent, compared with an average of about 85 percent prior to the introduction of Mono-Hy seed in 1971.

The variety development program has continually recognized the importance of vigorous emerging plants. GW commercial seed gives excellent emergence compared with standards in the industry.

Research and development projects indicate more can be expected. Plant growth regulators (chemical aids) have given quicker and higher rates of germination under colder (50°F) temperatures in tests conducted by Dr. E. F. Sullivan and Art Freytag, Great Western researchers at the Agricultural Research Center in Longmont, Colo. Dr. Sullivan also reports improved emergence from the use of soil surface affecting chemicals. Crusting and soil puddling problems are reduced.

Quick emergence and early canopy closure (beet tops closing the row) improve yields. Dr. Sullivan’s projects aim for a ten-day quicker canopy closure time.

Another major objective in plant emergence calls for reliable space-planting in those areas where growers feel confident about planting to final stand.

In summary, current technology presents opportunities to:
- Speed germination.
- Synchronize early emergence.
- Establish early crop canopy.
- Plant seed deeper for improved soil moisture conditions.
- Prevent crusting and other adverse soil conditions.

All these point to increased yields and simpler production practices. Research and development has been the cornerstone in the Mono-Hy seed program.

Nitrogen status may be different in Wyoming fields . . .

- Field observations of sugarbeets made during this summer indicated the vast majority of the fields in the Wyoming area were coming under a nitrogen stress much too early in the growing season. We are all aware of the need for sugarbeets to be “nitrogen starved” during the latter part of the growing season; but if this occurs too early, yields can be reduced.

Wyoming growers may need to use more nitrogen. This appears to be different from other GW areas, but it might be the situation.

As a result, a survey of the nitrogen status of soils in Wyoming is being conducted by the GW Agricultural Research Center. Very little deep soil sampling has been done in the area in the past; consequently, we don’t really know how low the residual nitrogen is in this area or if some fields are unusually high.

Our goal is to sample at least one field for every grower in the Wyoming area if he so desires. Soil samples are being collected to the depth of five feet or to the gravel layer. The samples will be sent to the GW Soil Testing Laboratory at Sterling, Colo., for analysis of nitrate-nitrogen, phosphorus and organic matter. The results will be turned over to company agriculturists for use in making fertilizer recommendations for each grower.

The comprehensive residue soil nitrogen survey is needed to determine levels of nitrogen found in the various areas, distribution of nitrogen in the soil profile, and areas of unusually high or low residual nitrogen levels.

It is well known that Wyoming produces sugarbeets with the highest sugar content of any other GW area. It is important that this relationship continue, but are growers attaining their maximum sugar production? Would additional nitrogen decrease their sugar or would the sugar content remain high and their tonnage increase? These questions cannot be answered at this time.

Next spring an indepth fertility research program will be initiated to answer the above questions. Research approaches to be taken will be the investigation of benefits of split applications of nitrogen, potential uses of starter fertilizers, investigation of control release fertilizers and of primary importance, determination of the correlation between residual soil nitrogen, fertilizer requirements and total nitrogen to produce an optimum crop of quality sugarbeets.

—Dr. Dwayne G. Westfall
Sugarbeet pile losses — the causes and corrections...

- Millions of dollars of sugar are lost each year from beets during the time they are stored in piles between harvest and processing.

A concerted effort has been made in the last five years by the GW Agricultural Research Center in cooperation with the GW Agricultural Department to determine the cause of these losses and to find methods for reducing them.

Deterioration of beets in the rim (outer two feet of the pile) by dehydration and alternate freezing and thawing causes up to 40 percent of the total pile loss for beets stored up to 100 days. Larger losses occur in February when frozen areas of the piles thaw. These losses are being reduced with straw covers on beets stored until February 1 and with plastic canopy covers for beets stored after that date.

Beets which are completely protected from the adverse effects of weather will still undergo substantial sugar losses. Beet roots are living organisms and thus carry out chemical reactions which cause sugar losses after harvest. Respiration in which sucrose is "burned" to carbon dioxide and water is responsible for about 80 percent of the sugar loss in healthy beets.

Chemical transformation of sucrose to other compounds such as invert sugars and raffinose causes the remainder of the loss. These chemical compounds formed from sucrose are impurities which will also decrease the extraction of sugar from the beets by the factories.

Evaluation of treatments which may reduce storage loss requires procedures which accurately measure sugar loss. Beets from various treatments are stored in controlled temperature rooms at the Research Center. Measurement of the respiration on these beets gives a continuous estimate of sugar loss during storage.

Equipment has been installed at the ARC to measure respiration simultaneously on as many as 180 samples. After storage for 100 to 115 days, the beets are analyzed for changes in sugar content, purity, raffinose and invert sugars. Respiration plus changes in raffinose and invert sugars gives a precise measurement of sugar loss.

Treatments which show potential for storage loss reduction are evaluated under pile conditions. In these studies, 30-pound samples of treated beets in nylon net bags are placed in commercial piles during piling and recovered intact when the piles are reloaded. Chemical analyses determine the sugar loss which occurs in each sample during the storage period.

Many factors have been found to influence storage loss. Temperature is perhaps the most important factor since an 18-degree difference in temperature will result in a two-fold difference in sugar loss. Any factor such as excessive pile size, a trash accumulation, or rapid piling which slows down the rate which the pile cools off will increase storage loss. We depend upon natural cooling of the piles, since artificial cooling with refrigeration is not economically feasible.

The majority of the storage work involves evaluation of storage characteristics of sugarbeet varieties. We have found that the respiration rates of some varieties may be as much as 50 percent greater than that which occurs in other varieties. Several-fold differences between varieties occur in invert sugar and raffinose accumulation during storage.

All chemicals such as herbicides and pesticides used in production of sugar beets are evaluated for their effect on storage losses. None of the chemicals now used have an adverse effect on storage when applied according to the label. An experimental growth regulator which shows promise in increasing sugar production per acre has been shown to reduce sugar loss in beets during storage.

The storage program outlined above is carried out not only to reduce the large loss which presently occurs, but also to avoid introduction of a variety or agricultural practice which could substantially increase storage losses.

—Dr. Walter R. Akeson

Gary Jardine, research specialist, at Kemp factory canopy.
At the First National Bank of Morrill . . .

- The belief that the world is the best possible world and the anticipation of the best possible outcome are two fundamental characteristics of the optimist.

And in the world of Charles Karpf, like the western Nebraska wind, optimism seems to rush forth and make its presence felt as surely as if it were something you could touch.

Chuck, who is president of the First National Bank of Morrill, Nebraska, and who certainly knows what’s tangible and what isn’t, talks about his world around Morrill with delightful enthusiasm: “To me, we’ve got it made in this old country . . . it’s a good country . . . the best in the world . . . it’s just been wonderful.”

Born and reared in Morrill, Chuck was one of those boys who came back home after several years . . . 12, in fact . . . of seeing how the rest of the world lives.

When Chuck’s father was named president of the Livestock National Bank of Omaha in 1936, Chuck finished high school in Omaha. After a couple of years at the University of Omaha and then the University of Colorado, the war came along and he joined the service, ending up in Europe.

Five years with the military and then two years in Europe as a civilian saw an end to his separation from the good life at Morrill. After one year back in the States, Chuck returned to Morrill with a wife in 1948.

And he proceeded to put down firm and long-lasting roots, for he’s been with First National Bank ever since.

At First National, founded in 1906 and the only bank in town, Chuck now has been president for about five years, “But we never went much for title around here. It really wasn’t that important. We’ve been here a long, long time, and I hope we’re here a long, long time in the future.

“My family has been involved in this country for 60 or 70 years. My father was brought up in this country and ran the bank here in Morrill and the bank in Mitchell until he moved in 1936. We’ve been associated with agriculture all these years.”

Chuck says, “We are 99 percent agriculture. We’ve always encouraged good rotation programs, and we’ve always fought for the sugarbeets. To me you can’t exist without them in our Valley. If they’d eliminate the sugarbeets, we’d be dead.

“I’ve also felt that you’ve got to have a well-rounded program. It can’t be all one crop; it’s got to be varied. We also think that livestock fit right in with the program to feed beet byproducts.”

In addition to the bank’s intense interest in agriculture, Chuck has been involved in agriculture in a more personal way as an investor. Like his father before him, he owns farm land and is involved in the livestock feeding business.

Asked what impresses him most about sugarbeet operations in the area, Chuck replies, “What really amazes me is the tremendous amount of equipment and ability the farmer has. I go out in a man’s field one morning and he’s working on a fifty-acre field of beets, and go back three or four days later, and, wham! It’s all over! It’s amazing what he can do from sunup to sundown.

“Fifteen years ago, there were all sorts of small operators who weren’t very efficient. Most of them are gone today, and the farmer who is still going, in my book, is very successful. He does an outstanding job. The percentage of increase on yields has just been tremendous! You don’t talk to a guy any more unless he has 20-ton beets.”

Chuck says this is due to management, fertilizers, herbicides, and good land management. “It’s just stupefying the amount of production one man can take care of. It’s magic! I just become awed at the progress sometimes. And it’s going to get better.”

Chuck would like to see more young people getting back to farming. “They’re starting to come back. As farming becomes more profitable, there will be more and more young people getting back or getting started in it. I hope they will . . . it’s a lot of work to be a farmer. And it’s something you can’t just get from a book. You’ve got to get out there and do it. If a guy wants to buckle down and work . . . a lot of ambition seems to be what makes it.”

Here’s what Chuck, a confirmed optimist, says about optimists:

“Farmers are optimists, and every year we learn from every other year as we go, and next year’s going to be better than the year before. Farmers will say, ‘We may have been kicked in the ear this year, but next year we’re going to have a better year.’ And they do; this is the thing that amazes me! They do! It’s just great to be around people who are optimistic . . . they’re great.”

And Chuck Karpf should know.
At the Security Bank of Billings...

When the Security Bank of Billings was organized and opened its doors for business in October, 1916, it was the smallest of six banks in the city. Today, it is the largest commercial bank in the tri-state area it serves — Montana, North Dakota and Wyoming.

The officers of Security Bank state without hesitation that the bank was built on the agricultural industry, with the sugarbeet industry a significant part.

Warren Vaughan, president of Security, says his interest in agriculture is a result of his long association with the bank and his apprenticeship as protege of “officers in this bank who felt strongly that we support the agricultural interests.”

Warren adds: “The incorporators of our bank saw quickly the potential and recognized the real bread basket of this area. They realized that row crops were a vital part of this economy and specifically sugar beets.

“The strength of this community and this institution is due in large measure to agriculture and an excellent, stable crop of sugar beets. We knew the sugarbeet checks would be coming out and they always meant significant contributions to profits and to the overall economy of this area.”

Warren was born and grew up in Billings. He received his undergraduate degree in business administration and doctorate from the University of Montana Law School at Missoula. He returned to Billings and started with Security Bank in 1948.

On his own acreage he raises a couple hundred acres of winter wheat and some sugar beets.

Heading the agri-business division of Security as senior vice president is Gene Coombs, a country boy, reared on a sugarbeet farm. Born in Billings, Gene grew up on a farm west of Laurel, where sugar beets have been grown every year but one since 1906, when the Billings sugar factory was built.

A third-generation Montanan, Gene was graduated with a B.S. degree in agricultural economics from Montana State University at Bozeman. After working as county agent in Richland and Yellowstone Counties for four years, Gene joined the Security Bank in 1954.

What Gene likes about the beet grower is “he’s the fellow who is going to be in every year with a more average income — he’s going to make some profit. The sugar beet crop allows for a more steady program and a more steady cash flow.”

In Gene’s division, Jim Smith and Dave Jorgensen do the field work. Jim was with GW Sugar for some years and really understands the beet business. Dave grew up on a farm near Billings and has followed the sugarbeet crop all his life.

Burt Maynard, executive vice president, who grew up in the sugarbeet business, is the son of the late Jack Maynard, who, as GW’s general livestock consultant, was world-renowned and made significant contributions to the livestock feeding industry in GW territory.

“We don’t know all the answers,” Gene says, “but we hope we can find the answers to questions our borrowers ask. We talk to John Sherman and other GW people often as questions come up.”

As further evidence of his loyalty for sugar beets, Gene adds, “I own the farm that I grew up on. It’s leased out, but part of my lease, of course, requires that there must be a certain number of acres of sugar beets grown on this farm. This, because I believe in sugar beets.”

At the Citizens State Bank of Keenesburg...

Farmers around the area used to get one, two, or maybe three visits a year each from a certain Keenesburg friend. He doesn’t get to the farms as often now, but his affection and high regard for area farmers is still obvious.

In fact, if Charles H. Starks, president of the Citizen’s State Bank of Keenesburg, hadn’t been a banker, he would have made a good farmer. “The only real difference between a farmer and a banker is his work clothes,” says Charlie.

Born in Illinois and reared on a farm near Sioux Falls, S.D., Charlie headed for Nebraska in 1935. He attended business college in Grand Island, and spent ten years working in the implement business in Sidney before making Keenesburg and Citizen’s State Bank his home in 1948. Founded in 1946, the bank just recently celebrated its 28th anniversary.

In the 20 years of his presidency, Charlie has visited a lot of farmers. Eighty percent of the bank’s customers are involved in some kind of farm operation.

Without hesitation, Charlie says, “I like to do business with farmers. We trust them, and they trust us.” If farmers come into the bank for advice, Charlie adds, “We don’t tell them what they have to do, but if they ask for suggestions on financial matters, we tell them what we think is right.”

And Citizen’s State likes its farmers to grow sugar beets. Charlie explains: “Sugar beets have always been a real strong part of...
Mel Adams, president; Bob Abrams, agricultural manager of the crop they can have, and if we ever lost sugarbeets, we wouldn’t get anything to take their place.

Our economy in this area. For the community, it’s the best cash crop they can have, and if we ever lost sugarbeets, we wouldn’t get anything to take their place. Our sugarbeet acreage is holding up well, and we hope it will continue to hold up."

Seeing many changes in sugarbeet agriculture over the last two decades, Charlie reflects: “Farmers can handle a lot more acres now. Although they still work hard, it’s a different type of work than they used to do.”

Mechanization is the main reason, including mechanical beet thinners. Charlie plays an important part in progress in this area by financing some of these crop insurance machines. The bank considers them a good risk and Charlie says they'll pay for themselves in reduced labor costs. "We’ve never gotten hurt on one of them. I think we have the most modern farmers in this area that one can find anywhere."

"I believe in farmers feeding their own feed, too," adds Charlie. "We’ll loan them the full purchase price of the cattle, if they furnish the feed, and over the years feeding has been good. Farmers have to keep putting something back into the soil; they can’t just keep taking it out. They should keep the ground built up."

Charlie also believes there is a trend these days toward more young people getting into agriculture. "We sure are glad to see them. A lot of our young farmers here have started out with their dads, but every year, we have two or three new ones that start on their own, and I think there’s going to be a greater trend. If they get in there and pitch, they can make it."

Especially if they’re on an irrigated farm, Charlie would want these growers to have part of their acreage in sugarbeets. "Otherwise, if they get a crop of beans or corn hailed out the first year, they almost don’t have a chance. But with sugarbeets, they’ll make enough to pay their expenses even in a bad year."

Yes, Charlie has a lot of confidence in sugarbeets, and he has a lot of admiration for the growers. "We haven’t sold a farmer out in fifteen years. . . . they’re good farmers, they do a good job, and they stay out there and work."

"We get along real well with our farmers," says Charlie. "We don’t have a fancy building, but they can come out of the field with their boots on and feel at home, and that’s the way we like it."

At the Bank of Brule . . .

- In Nebraska Corner Country, part of the Ovid factory district, three W’s spell out important factors in raising sugarbeets for Melvin H. Adams, president of the Bank of Brule.

Mel explains: "There are three W’s that you’ve got to watch out for in raising sugarbeets. First is wind — when your beets are first out of the ground. Next is weeds — if you get too many weeds, you’re not going to have the yield. And last, but not least, is water — you need a lot of water."

Mel’s 28 years and multi-million dollar backing of the sugarbeet business make him something of an expert.

George Adams, Mel’s father, was station agent at Big Springs before moving to Lemoyne in 1916 to organize the Lemoyne State Bank. The bank at Lemoyne moved to and became the Bank of Brule in 1934.

A native Nebraskan born at Big Springs, Mel is a 1933 graduate of the University of Nebraska. After college and a brief career at the bank, he joined the Army, returning to Brule for a year in 1940, before being called up for active duty during World War II.

When his father died in 1944, Mel was elected president of the Bank of Brule while he served as a lieutenant colonel in the Infantry. When Mel came home in 1946, he assumed the presidency of the bank, where he has remained the last 28 years.

"I encourage people to raise sugarbeets because it is the one crop that can take the normal summer hailstorms in this area. Corn has a tendency to go soft if you happen to get an early frost. Therefore, I feel that sugarbeets is a safer crop."

When irrigation was developed in the area in the early 1950’s, the Bank of Brule provided financing to help growers expand beet acreage. Mel says that the switch from dryland farming to irrigated farming has made a big difference because growers no longer have to have "all their eggs in one basket."

"In recent years we’ve had the sprinkler system come into the picture. When sprinklers first came in, we were sort of reluctant to consider them as valuable as flood irrigation, but now I think it’s a toss-up. Sometimes we think flood irrigation is better; but on the other hand, if it’s a dry year, you may have to sprinkle your crops up."

Mel has observed a lot of changes in equipment and the sugarbeet industry. "I watched them grow back in the ’20’s and everything was hand labor. I don’t claim to be a mechanical engineer or a chemist or have other scientific knowledge that a grower has to have now. Nowadays there’s a lot of emphasis on herbicides, fertilizer, chemicals and machinery, which are more important than they were when we first started."

Mel says that young persons coming back to the farm is a normal trend. "The fellows who grew up in this area like to come back to this area."

For the young farmer trying to get started, Mel says, "Well, being a banker, I guess I’d say save your money and get it invested in land and machinery. Get a good crop the first year, and from there you’re on your feet."

Mel has two sons in the banking business: Mel, Jr., president of the Keith County Bank and Trust Company at Ogallala; and John, executive vice president and manager of the Chase County Bank and Trust Company at Imperial. Both are officers and directors of the Bank of Brule.

The sugarbeet grower in Nebraska’s Corner Country has his three W’s: wind, weeds and water. That’s one part of Mel’s formula. There’s also the three-N formula in Mel Adams’ banking business: natural, notable and neighborly!
With 100 acres of beets harvested and delivered in good shape and in good time, Mervin and Margaret Reichert appear to be relaxing a bit on their farm north of Bridgeport, Neb., with Lyle Shaughnessy, right, their GW agriculturist. Margaret’s attire was not nearly so chic during harvest, since she drove a beet truck for the third year. And enjoyed it, she says. The Reicherts’ beet crop yielded from 18 to 22 tons with sugar content from 17.5 to 18 percent.

The best weather in eight years favored the beet harvest of Elmer and Elsie Kembel of Worden, Mont., here with their GW agriculturist, Bobby Pierce, at right. The Kembels harvested 200 acres of beets compared with 140 in 1973, in less time, too, with their new Lockwood six-row lifter-loader, at rear. Like other farm wives near Worden, Elsie drives a beet truck during harvest and also works in the fields year-around, driving a tractor, planting, cultivating, thinning and ditching. Elmer and Elsie used to run a dairy operation before they expanded their beet acreage.

Sugar beets pouring into a truck was Niagara Falls for Cindy Warren, left, with Alan Martens, GW agriculturist, and Judy McPhail, tare catcher at Meyers Station near Hysham, Mont. Married during harvest, Cindy honeymooned driving a beet truck for her dad. She has always helped with the farm work. Taretaking and bowling don’t mix for Judy, who hefts 25-lb. samples. She can’t keep the 13-lb. ball on the alley. “I threw it two-thirds down the alley before it landed,” says Judy.
Sideboard Closers - Distaff Delight!

Ask the grower who owns one—or better yet, ask the woman who drives his beet truck! She’ll tell you, without much prompting, that automatic sideboard closers sure take the strain out of trucking beets. Here’s one model pointed out by Connie Reiter, who drives for her brother-in-law, Ray Robertus, who farms 300 acres of beets near Schreiner station west of Billings. The unit resembles the one shown last August in Upbeet. Says Connie: “It really saves a lot of work.”

Another version of sideboard closers draws a grateful smile from Donna Beth Baker, left, at the Starr station near Lovell. It was fabricated by her husband, Lowell, who equipped three trucks to haul his 270 acres of beets. Did Donna insist on the closers? No, she says, but her husband enjoys making things so they can get their beets across the dump more quickly. Donna adds: “I never have to get out of the truck!”

Frieda Gams – Lovell’s Scalelady

Sugar beet growers in the Lovell factory district have, for almost 40 years, driven their trucks across the scales under the close scrutiny of a lady most of them know by her first name. She might have been with them in Lovell schools, chummed with them on the playgrounds, or later she might even have taught some of them in a little country school nearby.

But if they didn’t know her before, they’ve surely come to know Frieda Gams as scale lady sometime in the last thirty-nine years she’s held that position. The only campaigns she’s missed at the scale house in all that time were when her two children were born, and a couple years when she worked in the central tarehouse.

Frieda was born in Denver, but reared and schooled in Lovell, and taught at a country school out on Crooked Creek before she was married in 1935. Her father, Henry Schneider, helped build the GW factory at Scottsbluff, before moving his family to Lovell.

Taking up her post in the scale house the first year of her marriage, Frieda was hired by the late Ted Stevens, Lovell fieldman. She had worked at Ted’s home while attending high school.

After marriage Frieda and her husband, Henry, who is now caretaker at the Lovell factory, lived on a farm near Lovell for 31 years until construction of Yellow Tail Dam forced them to Lovell. Extending the family affair with Great Western even farther is Mollie, their daughter, and Mollie’s husband, Charles (Swede) Olson. Mollie works in the office as beet clerk during campaign, while Swede works with the agricultural maintenance crew.

When Frieda first started weighing, some sugar beets were still being hauled by horse and wagon. Beets were still shoveled on and off the wagons or trucks. There were no women truck drivers. Only manual scales were used. And there were more growers with smaller contracts and smaller trucks, more loads to be weighed in and out. The work was more difficult and hours longer.

Back then, there was no central tarehouse. Tare was taken right at the receiving station. "And when the beets were frozen, they’d bring them in the scale house. They’d saw them off a little and clean them right there," Frieda says.

Today's central tarehouse is a great improvement, Frieda believes. Among other improvements are replacement of the old storage flumes with beet pilers and front-end loaders, and addition of bigger trucks and electronic scales.

In the early days, Frieda recalls, "I weighed them in and another girl weighed them out. But we had so many, many little trucks that it took two of us. But we did a
Sugar Country Women

Ladies Liberate Beet Stations!

• High fashion at the Schreiner beet receiving station calls for a hard hat and hooded sweatshirt for Elva Loyning, working her third harvest as a piler operator. One of the few lady operators, Elva likes the work. She adds: “We have fun out here!”

• Bertha Visser, in her third harvest as a tare-catcher at Schreiner station, says she likes the job even though she’d never done anything like it before. Bertha explains: “It’s a change.”

• Nelda Adams, working her first harvest as a tare-catcher on the other piler at Schreiner, finds she likes the active outdoor work, but admits a busy day cuts into her social life at night.

Friend to All for Nearly 40 Years.

Frieda Gams is at home in her work, and the scale house is her home away from home.

load a minute, so I don’t think that was too bad, do you?”

At that time, weights had to be pushed on the scales by hand. “We couldn’t let our arms down at night, they would be so tired,” Frieda says. “But this is easier now. We can handle a lot more trucks . . . you just push the button and you know it’s going to be accurate.”

Now Frieda weighs an average of 250 loads a day during the peak of harvest, sometimes weighing as many as 360 loads a day.

As to the 50 percent of the truck drivers at Lovell today who are women, Frieda observes, “They began driving about three or four years ago. I think they are more patient and understanding than men. Women are better drivers and more conscientious about what they’re doing, too. I think women take better care of the trucks than men will . . . and they don’t have nearly the breakdowns.”

In addition to the regular campaign, Frieda works about three months more weighing beet re-hauls. “I weighed them by myself the first three years, then for two years there were two of us, then last year we weighed ‘round the clock — four of us.”

Frieda Gams likes her work, and she gets along well with growers. She is acquainted with almost everybody around the factory and she calls almost all growers by name.

Hundreds of thousands of loads of beets have crossed the scales under her watchful eye. And, in no small way, she has been a vital link in the chain from the sugarbeet in the fields to the spoonful of sugar on the kitchen table.

Frieda Gams is at home in her work, and the scale house is her home away from home.
For the best hail insurance, ask a dozen beet growers around Johnstown, Colo. In hail storms on July 27 and Aug. 28, they lost their late barley, about 30 percent of their dry beans, and 20 to 30 percent of their corn. But the sugarbeets of those 12 growers recovered to go on and produce yields averaging 23.2 tons per acre with 17.14 percent sugar content!

—Cornell Weltin
Agriculturist
Longmont

Jack B. Powell Appointed Executive Vice President

Jack B. Powell, a veteran Great Westerener with management experience in almost every locality of the company, was appointed executive vice president and chief operating officer of GW Sugar in November.

Powell brings to the post 27 years of background in general management, factory management and engineering supervision. Before he became director of manufacturing in September, 1973, and then vice president of manufacturing last March, he served four years as a district general manager at Fort Morgan and Fremont, Ohio. Before that, he was a district superintendent of factory operations and on the operations staff at the Denver office.

In his earlier career, Powell was factory manager at Gering and Mitchell, Neb., and Brighton, Colo. He also was a supervisory engineer at Colorado factories. He began his Great Western career with the engineering staff at the Denver office in 1947 upon graduation from the University of Illinois with a degree in mechanical engineering. A native of Virginia, he served in the U.S. Army during World War II.

Powell was succeeded as manufacturing director by Jack W. Eastman, a Great Westerener for nearly 30 years, who was formerly area manufacturing director for factories in North Central Colorado and at Billings and Lovell.

Agronomist Don Baldridge has been promoted to superintendent of Montana’s Southern Agricultural Research Center at Huntley. Baldridge will continue his 19 years of work at Huntley in sugarbeet research on fertility, varieties and weed control—some of them financed in recent years by the Grower-GW Joint Research Committee, Inc. A native of Great Falls, he earned his agronomy degree at Montana State University at Bozeman. He replaces James Krall, who was transferred to Bozeman.

Dr. Gary Peterson, professor of agronomy at the University of Nebraska at Lincoln, has won the CIBA-Geigy award for outstanding teaching performance at the annual session of the American Society of Agronomy. His award includes a research tour of Europe. A specialist in soil management, including sugarbeet fertility, Dr. Peterson works closely with the Scottsbluff Experiment Station. In 1973, he won the distinguished teaching award in science at the University of Nebraska, where he earned his early degrees. He took his doctorate at Iowa State University.

It was “Harry Kraus Night” last August in Scottsbluff. Members of the company’s agricultural staff in the Valley gathered at a banquet to recognize Harry, at right, for his personal contribution to beet receiving efficiency. A Bayard district maintenance man, Harry is presented an engraved plaque here by LaMar Henry, left, director of agricultural operations at the Denver office. Harry was honored for designing a hydraulic lifter with push-button action on the piler to close the sideboards of beet trucks.

Montana’s Don Baldridge

Nebraska’s Gary Peterson
How You Gonna Keep 'em Down on the Farm - and Out of Harm?

Commentary and Cartoon
By JEAN HURST
Asst. Editor of Upbeet

"Eat your heart out, Weeble K-neeble!"

The last few years have seen a renewed interest in the prevention of farm accidents. There are pamphlets galore to attest to this. The National Safety Council (NSC) publishes information and recommendations, while the Occupational Safety and Health Administration (OSHA) sets standards.

The grower has at his fingertips all kinds of information and rules that apply to nearly all activities on the farm.

But something is missing. There are no rules to assist the farm mother in preventing frequent and painful accidents-at-play of her farm child. This is the child whose mother wishes that OSHA would come out and follow her kid around for a day or two . . . and then write some safety standards for her disaster-seeking, barnyard adventurer.

While the NSC tells the father to "Watch your step at all times when working with farm equipment," his wife has too often watched her child take a flying leap at the fuel barrel, a Wild Bill Hickock gleam in his eye — either to hit it head-on, or end up head down on the other side.

Where does it say, "Don't try to be a trick rider."? Farm mothers aren't alone, though, when they wonder if their kids have some kind of latent suicidal tendencies. All mothers ask at one time or another, "Don't you want to grow up and go to college?"

And college is the last thing on their minds.

Take the kids, for example, generations of them, who have been destined to be "hay-loft conquerors." Many chubby, five-year-olds on farms could be credited with inventing daredevilry — they were doing their thing long before Evel Knievel.

Mostly they follow the leader, waddling up the loft ladder and trotting along over the edge with a blood-curdling scream all the way to the bottom. Perhaps the jump is exciting, but the real kick must be in surviving. Many's the time when mother must be called after an emergency landing . . . to test all moving parts, to hope the tongue heals in time for supper, but mostly to administer loving caresses when she would rather be spanking.

Wouldn't it be helpful if there were something there in those safety rules to tell farm kids, "You must stay in the house and play with toys or dolls."? There are many farm mothers of little girls who are as silver-haired at 30 as mothers of boys. If anything, little girls seem to work even harder at their innocent attempts toward self-destruction.

The game of "house" ought to bring to mind the pipe and slippers routine, but kids can turn a simple game into a nightmare for mothers.

Ordinarily, mothers are only invited to play "house" when it's time to sit down to the ill-fashioned, kitchen table for a sip of mud coffee, or tea that's a little less muddy. Prior to teatime, anything can happen.

And it usually does. As in the case of the two little sisters who clean out the cob shed for the never-ending game of "house." One girl takes up a spade to do the job of a scoop shovel. The other girl, consequently, suffers an inch-long cut above her brow from the spade. Then the incident is forgotten — except by the injured party.

Several years later, vengeance is the game. No matter how innocent, the spade-struck girl manages to slug her sister smack on the forehead with a croquet mallet, and raises a knot an inch high.

Now, the mother will never be convinced it was an accident. After administering cold packs to one and comforting both, she hears the girl tell her knot-headed sister with a giggle, "I knew someday I'd get you for that."

Perhaps OSHA could study up on a "safe" revenge.

The farm mother needs some safety rules also to tell Sonny not to ride his new bicycle downhill toward the big combine machine until he knows where the brakes are.

She needs a way to prevent the kids from crawling under the corn crib where there's barely room for ants, not to mention children. And the calves are raised for meat or money, not as means for kids to copy their favorite rodeo riders.

Mother needs rules that tell her children the tool shed roof is made like that so that water will run off — it's not a scale-model of a ski slope. And, you know that big 100-year-old tree down by the lane? Well, somehow kids have to be told that it's for shade and not to be used to satisfy their astronautic ambitions.

And, please! Somebody write a rule in such a way that it will explain clearly that Tarzan did not use baling twine to swing from limb to limb.

Yes, something is missing in the government regulation of safety for the farm child. But most likely there aren't enough words in the English language to control the antics of the impish, robust youngster. Even if his behavior could be anticipated.
The Great Western Sugar Company
P. O. Box 5308 T.A.
Denver, Colorado 80217
Exclusive Interview!

Meet the Hunts!

with in-depth details about their families and their ideas about Great Western Sugar

Beginning on Page 2
Meet the Hunts!

Meet the Hunts, the two brothers who now direct Great Western Sugar, in this recorded interview with Herbert, who speaks for himself and his brother, Bunker. Here, exclusively for Upbeet readers, Herbert Hunt ranges far and wide talking about their youth, their families, their outlook for the sugarbeet business. It's an introduction, informative yet informal, Southwestern to Great Western. Plain howdy!

Herbert Hunt at the Sugar Building in Denver.

Upbeet: Herbert, may we first say, welcome to Great Western Country! It's a big country, as you know, with our sugarbeet operations spread over half a dozen states in a score of communities. Since it takes some time to get around our countryside for personal visits, we want to take this opportunity now to introduce you and your brother, Bunker. The fact is, as you might suspect, we want to know more about both of you and your plans for Great Western. Now, tell us a little bit about your backgrounds. Where were you and Bunker born and where did you go to school? Things like that.

Herbert: Bunker and I were both born in El Dorado, Ark. Bunker is three years older than I am. Our family moved when I was about a year old and I was raised as a kid in Tyler, Texas, during the East-Texas oil boom. Left there in 1938, moved to Dallas, and have made my home there in Dallas since that time. I went to Washington and Lee University in Lexington, Va., graduated with a bachelor's degree in geology. Bunker went to the University of Texas and into the service. After returning from the Navy, he attended Southern Methodist University a semester and decided that there were other things better than going to school.

"As a kid, I lived on the outskirts of town . . .
I got most of my spending money raising fryers.
I also had layers, so I was in the egg business . . .
Turkeys almost broke me — I lost 50 at one time!"

Upbeet: Did you and Bunker work at summer jobs while in high school and college?

Herbert: As a kid I lived on the outskirts of town and my family had about ten acres, so I got most of my spending money raising fryers. I also had layers at the time, so I was in the egg business. Experimented with all kinds of livestock and crops, including pigs, which had to be given up because of the odor in the neighborhood. I had a milk cow and calf, looked after the sheep, and raised turkeys, geese, ducks, guinea hens and exotics like pheasants. The turkeys almost broke me — I lost 50 at one time! I also had a batch of peacocks, until they scratched up the car fenders and we had to get rid of them. And we always had a pen of deer and still do to this day at my dad’s house. We had a peach orchard and a vegetable garden. As far as outside work, I worked summers in the oil fields as a roughneck and my brother, Bunker, also worked as a roustabout and roughneck in the oil fields.

Upbeet: Tell us about your families, your children. Both you and Bunker have quite a house-full. Are they still in school or what?

Herbert: At the present time, I have three kids in college, one graduating this year who was 22 last January; then I have a junior, a daughter, 19; and another daughter who is a sophomore, 18; and a 17-year-old boy who is a football nut; and a 12-year-old boy. Both boys go to public school. Bunker has four children. One daughter has been married about two years; the other two are in college at this time; and a boy who is 17.

"I coached Little League ball for five years . . .
I have my third boy in Scouts at this time, and while the first two boys were in Scouts, I was an assistant Scoutmaster."

Meet the Hunts!
Upbeet: You've gotten yourself quite a little bit of experience with Little League, Scouting and helping with homework, is that right, Herbert?

Herbert: I coached Little League teams for five years — six-man football, basketball and baseball — in the Y program in Dallas.

Upbeet: Tell us a little bit about your Scouting work, Herbert. You were involved pretty much?

Herbert: Yes, I have my third boy in Scouts at this time, and while the first two boys were in Scouts, I was an assistant scoutmaster. With all the travel, I haven’t been able to be that with the younger one. However, I do have to return home by Sunday, because I’m due to pick ‘em up from a camp-out.

“We both met our wives in college. . . they’re involved in the normal community projects. In fact, I have a hard time getting mine to stay home and take care of the family!”

Upbeet: How about your wife and Bunker’s? What community projects do they take part in?

Herbert: My wife is out of the El Paso, Texas, area and Bunker’s wife is out of Ruston, La. We both met our wives while we were in college, and they’re involved in all of the normal community projects. In fact, I have a hard time getting mine to stay home and take care of the family! Nancy has done volunteer work for the Junior League service program and she’s president of her garden club this year. They just had their show at our house. Let’s see, Nancy served on the board of the Day Care Association for 12 years, she’s now on the board of Suicide Prevention, she teaches Bible study for the women at our church, and works on the Crystal Charity Ball committee, along with other numerous activities.

Continue on next page . . .

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At the Sugar Building in Denver, Herbert Hunt appears at right in a conversation with Jack Powell, left, executive vice president of Great Western Sugar, and LaMar Henry, center, new vice president of agriculture.

Upbeet: Can you tell us about Mrs. Bunker Hunt?
Herbert: I think you'll find our wives pretty much side by side in many activities, because when you see one you see the other, I'm afraid. They have been friends since college days. Caroline did volunteer work for the Junior League as a dental assistant at Children's Medical Center. She also teaches Bible study and belongs to several garden clubs and the Dallas Woman's Club.

"... all through our school years, why, everybody knew Lamar as my younger brother. Now that he's involved in the sports world, everytime I meet somebody, they say, 'Oh, you're Lamar's brother!'"

Upbeet: Now, Herbert, you have your own community projects with the Presbyterian Church, the Presbyterian Hospital, and the Wadley Institute for Molecular Medicine. Tell us a little bit about your work with these organizations.
Herbert: I'm an elder at the Highland Park Presbyterian Church, one of the larger in the U.S., with a membership of about 6,300. As concerns Presbyterian Hospital, I serve on the board. The Wadley Blood Bank and Molecular Center is not only a hospital, it operates a blood bank, which manufactures all kinds of special blood products for the Dallas area, handling more than 50,000 units a year. They also do an awful lot of research in the cancer field, in particular with leukemia.

Upbeet: There's another member of your family we hear a lot about, the sports fans among us anyhow — that's Lamar Hunt. Do you think his Kansas City Chiefs will be a big threat to our Denver Broncos this fall?
Herbert: Well, having just changed coaches, I really would hate to comment on that. I will say that all through our school years, why, everybody knew Lamar as my younger brother.

Now that he's involved in the sports world, every time I meet somebody, they say, "Oh, you're Lamar's brother!"

Upbeet: To get back to our business, Herbert, can you tell us just exactly why you and Bunker decided to acquire your interest in Great Western?
Herbert: Very frankly, we became interested in Great Western and the sugar industry because it runs a very similar parallel to that of the oil business; and that is, basically, the prices have been so low that it has made it impossible to make the new investment that it takes to keep up with demand. And we could see the same thing happening with the sugar business, where prices have been historically so low, while costs were rising, and we could see that expansion was not taking place, and therefore felt that sooner or later there had to be a correction, and price would have to increase in order to generate the needed capital to put in additional facilities to meet the demand. For this reason, we felt the sugar business and Great Western, in particular, was a desirable investment.

Upbeet: There's something else we're curious about. With all your other business interests, why did you and Bunker decide to take management jobs with Great Western?
Herbert: Well, very frankly, this is the first time that we've ever been involved in a business with substantial outside ownership. And while we were advised by our attorneys that we would be better off not to take active management positions, Bunker and I discussed it at length. We felt that really our reputation was on the line with the public, and that therefore we would have to disregard the legal counsel and go ahead and take an active part. This is what we have actually done.

Upbeet: Both of you have a lot riding on the new Great Western. Can you give us an idea of how much?
Herbert: Well, basically, the how much is not the important thing. I think it's a reputation for being prudent businessmen and...
“We would have been in favor of a larger sum for modernization and expansion, but... the manpower really was just not available to accomplish it.”

Herbert: Well, as I mentioned earlier, the industry has not been expanding, mainly due to the low prices, and if the industry is going to keep up with demand, it’s going to have to involve modernization and expansion, and for this reason, we feel that this is something that has to take place on an orderly basis. Very frankly, we would have been in favor of a larger sum being spent this year for modernization and expansion, but from a practical standpoint, the manpower really was just not available to accomplish it on such a short time-frame and therefore, we feel that there will be further expansion on down the way.

Upbeet: When you talk of expansion, Herbert, just what do you mean?

Herbert: Since the sugar company markets in the central part of the nation, it is obvious that expanded growth on a national basis is desirable. As a result, we are exploring the best avenues to expand our producing and marketing area so that we can utilize the expertise of Great Western people. We are also exploring other possible areas of expansion into related fields but outside of the sugar industry.

“...certainly you can’t afford to let your plant facilities wear out... Great Western Sugar, for the benefit of the growers and the company, must continue to expand...”

Upbeet: Do you regard this approach as a conservative one?

Herbert: I don’t know whether you’d call it conservative, but certainly, I think, it’s an approach that you must take if you’re going to stay in business, because certainly you can’t afford to let your plant facilities wear out and they must be continually renewed. For this reason, I think it’s a must. Also, I’ve always felt that if our organization is not growing and expanding, it’s dying. And I’ve seen this happen with many companies, and therefore, I feel that Great Western Sugar, for the benefit of the growers and the company, must continue to expand and grow.

Upbeet: This, then, would be what you might call a turn-around for Great Western Sugar?

Herbert: Very definitely.

Upbeet: Since you’re in close touch with world trade, Herbert, what sort of future do you see for sugar and other foods, especially in view of the shortages?

Herbert: Well, I think that there’s no question that with the growing population around the world and the increasing affluence, particularly in such areas as the Middle East, the increased demand for food products is very real and acute. And so I think the fact that sugar market in the U.S. has been opened to the world, we’re going to be a part of that market. We can no longer think of ourselves as the U.S. sugar market, but must think in terms of the international market, because this is really going to be what sets the prices in the future and determines the demand.

Upbeet: You would say, then, there is not only an opportunity, but a responsibility in the area of food production?

Herbert: Definitely. There’s no question that our country is always going to be an importer of raw materials, and the one thing that we have the capability of exporting is food products. I think we’re going to have to develop this in order to try and offset the balance of payments that is being required by the importation of raw materials and energy, in particular.

Upbeet: When you first got acquainted with Great Westerners, Herbert, what did you think of them... these people who call themselves Sugar Tramps?

Herbert: Very frankly, we’ve been very impressed, both my brother Bunker and I, with the caliber of the people that we have found in Great Western Sugar. We think that the Company probably has been handicapped by financial shortages — in particular, the funds to expand and modernize in the past. But the talent is there to do it. We plan to build on this talent and utilize it in expanding the company and creating growth.

“...we’ve been very impressed, both my brother Bunker and I, with the caliber of the people that we have found in Great Western Sugar. We plan to build on this talent.”

Upbeet: The term, “Sugar Tramps,” did that kind of strike you as odd or different or do you think it fits in with the names in the oil industry, like wildcatters?

Herbert: Well, the oil business is one of travel. We must go where the oil is, so we’re kind of vagabonds ourselves in the oil business. We have such terms as roustabout, roughneck, toolpusher, and this sort of thing. And so Sugar Tramps, I think could very well be translated into Oil Tramps.

Upbeet: One last question, Herbert. What one thing do you think Great Western Sugar needs most of all?

Herbert: Well, I think it’s very obvious that Great Western Sugar has suffered from a lack of direction and dedication and this is something that we hope to bring with the new management. It also must be realized, by all, certainly, that the growers and Great Western Sugar need to cooperate, because they are true partners sharing in the fruits of both the growers’ efforts in farming beets and the sugar company’s efforts in processing and selling the end product. And we can only be successful if we work together for the good of all, and we certainly hope that this is going to come about in the future.

“...the growers and Great Western Sugar need to cooperate, because they are true partners... we can only be successful if we work together for the good of all...”

Upbeet: Herbert, thanks for your time, thanks for your comments. We hope that you and Bunker, your wives and members of your families, will find Great Western hospitality as cordial in every way as your own Southern hospitality!

Herbert: Thank you, very much. We certainly look forward to working with the Great Westerners and with the growers. And as we get to know each other, I’m sure we’ll go hand in hand down the same road to success. Time has not permitted us to get out and meet many growers and Great Westerners yet, but we certainly hope that when some of our problems are thrashed out, we’ll be able to get around and see and meet a lot of you, both growers and Great Westerners.
Dr. Sullivan Says...

What Dr. Edward F. Sullivan says about sugarbeet weed control always attracts attention among growers and scientists alike because of his international reputation.

Here, in a recorded interview, Dr. Ed recounts the progress of his favorite topic.

Upbeet: Ed, when you came to the Agricultural Research Center in 1961, what was your job?
Sullivan: I was employed to formulate an intensive program of weed control for the beet crop.

Upbeet: Had much been done before that time?
Sullivan: Yes, there was a program on beets that commenced in 1946. However, at that time, the production of chemical companies was rather low, so it was very difficult to obtain good compounds. But it so happened that in 1960-61 we had a flush of newer candidates, and we immediately tried them on beets. Some of these proved to be very effective.

Upbeet: Looking back, Ed, what would you say were the main differences between now and then, generally?
Sullivan: I think that in the late 50's and 60's there was the realization that new technology should be adopted as quickly as possible. This was built around the idea of early spring mechanization of beets. That can be accomplished now, because we have weed control with newer, more effective compounds. Is that right?

Sullivan: That's right. Now, some of those would be Ro-Neet and its predecessors, Eptam, Tillam and Avadex. We found that we could mix these in combinations at various ratios and increase broad-spectrum kill of weeds in sugarbeets. We did the pioneer work on these chemicals in cooperation with our colleagues at the state stations and USDA. I do believe in all honesty that Great Western Sugar led the fight against weeds. There's no doubt about it.

Upbeet: Ed, you indicated that 1961 was the turning point in weed control with newer, more effective compounds. Is that right?
Sullivan: Yes, I do. Now, the grower, in my mind, is an integral part of the whole thing. So, I like to converse with growers personally to get their feelings about many things on weed control. I have a big feedback from the field. The GW agriculturist really does my work for me, in that line, however. I don't want to lose contact because of the personal feeling I have for the grower and for the agriculturist. We just couldn't function correctly without that whole line of communication. I also spend quite a bit of time with the chemical companies, these cooperators, to keep the whole ball of wax in shape for the people who do the job.

Upbeet: Do you also discuss with the grower what conditions or problems he had with his crop at that time?
Sullivan: Yes, I do. Now, the grower, in my mind, is an integral part of the whole thing. So, I like to converse with growers personally to get their feelings about many things on weed control. I have a big feedback from the field. The GW agriculturist really does my work for me, in that line, however. I don't want to lose contact because of the personal feeling I have for the grower and for the agriculturist. We just couldn't function correctly without that whole line of communication. I also spend quite a bit of time with the chemical companies, these cooperators, to keep the whole ball of wax in shape for the people who do the job.

Upbeet: Can you describe the strip trials then?
Sullivan: That's one of the original things that the research and field staffs learned together. Without taking the chemicals from the laboratory to small plots into the field, under the company agriculturist's control, we wouldn't have the progress we have to date. It was a major advance in herbicides within the company. It is almost indispensable, I would say, to have that link between the grower and research and agriculturist.

Upbeet: Has computerization helped to advance your program, Ed?
Sullivan: The computer now makes analysis and data presentation much more easy. However, I'm a little old-fashioned, and I like to see the data myself and go over it. I really like to use the computer, but I don't want to lean on it like a drunk on a lamp post. I think you've got to get out and take a look at fields yourself. Sometimes you see things in the field that figures don't tell you. A guy that looks at the figures all the time, he's going to miss something very important. It's what you see and what you relate historically, because of your recall. If a researcher in weed science has good recall, he remembers many things that are not shown on the sheets.

Upbeet: A great number of growers know Ed Sullivan as one of the leading authorities on weed control. How many growers, Ed, would you say you know or how many fields have you gone over?

"I really like to use the computer, but I don't want to lean on it like a drunk on a lamp post. . . . Sometimes you see things in the field that figures don't tell you."
Sullivan: I think I’ve been in about every single production area in the company, and I’ve been on many, many growers’ fields, all over the territory. And without that foot on the ground, the same thing as a politician with his ear to the ground, you’re not going to do the job right. I think young men, going into weed science, can’t do the job in the laboratory. It’s impossible. You have to get out in the field.

Upbeet: Ed, could you summarize briefly the present needs of the beet grower to produce a weed-free crop?

Sullivan: We need, I think, in the second phase, to obtain chemicals with beneficial persistence. Before this time, Ro-Neet and those other workhorses that we had, were very good chemicals. But they didn’t last long enough — only about four weeks. With herbicides of longer persistence, the farmer wouldn’t have to go back through the field to put on his second or third chemical application. We want to minimize wheel traffic, so we can maximize production. And we want, really, now in the second phase, to eliminate that clean-up bill. And we can do that, because we will have these newer chemicals to replace the older ones. They beneficially persist until mid-July or even August 1.

Weed: Well, at that time the beets are competing in the row with the weeds. However, there’s a certain population of weeds in a field that the grower can live with economically. We don’t have to clean out every single weed in the field. This is too costly.

Sullivan: Just how do herbicides fit into the broad plan of spring mechanization of the beet crop?

Upbeet: Herbicides have always been and will be the core of spring mechanization, because without a clean band, without a relatively weed-free row, you just can’t produce beets with maximum returns. And you can’t use thinning devices and plant for final stand. You have to have a clean row. And to expand that a little bit: Weeds are pests, so we’d like to go ahead and perfect systems of crop protection related to systems of crop production. So, that starts even before the clean row. It starts with the seed. I like to think of crop emergence as part of the weed control. We need to enhance early vigor by selecting herbicides that don’t retard the plants. We want to get the beets up fast. We need to have weed control as near complete as possible until the beets close the row and start competing against the weeds. All the new chemicals show us the growth-regulating effect that we can put on weeds. That goes back to the idea of tolerating a few weeds in the field. We can do that and still live pretty well. However, if we tolerate those weeds, we ought to treat those weeds chemically so they never appear above the canopy — never compete. We have some growth regulator compounds that stunt, so the weed will be present but not competing. That’s a new concept, but I think we can work those things out in the next five to ten years, and our program will be much, much better.

Upbeet: Ed, you might explain what you mean by a growth regulator in comparison with an herbicide itself.

Sullivan: Well, certain herbicides are growth regulators. They keep the weed stunted, in a very non-competitive state, without producing seed. We have some chemicals we call herbistats that severely restrict growth and kill some weeds, but no weeds go to seed. Now, you see how that works into a program.

Upbeet: Now, let’s look at the spring ahead, Ed. What do we have on the shelf that will do the job, generally, with the help of decent weather?

Sullivan: We have some very, very good chemicals that do an excellent job. Of course, in general, Ro-Neet is used in our area, much more than any other compound. This does a very good job. We can obtain about 80 percentage points total weed control from this chemical. We also have Pre Beta chemicals for the north country. We have Pyramin plus Herbicide 283 and also Ro-Neet for the Nebraska and Kansas areas. Now, I think our big job is the sequence application of these chemicals. For example, you put on preplant Ro-Neet, and you have some weed escapes. Kochia may be one, and you apply Betanal tank mix for that and for the other weed escapes. At layby time, if it’s needed, you apply Eptam or Treflan, depending on the area you’re in. So, I think you would have weed control that is very acceptable. Some growers use field workers to pull out some very troublesome weeds, but, our program is very adaptable.

Upbeet: Ed, it’s obvious that conditions vary from one area to another, and even sometimes from one field to another. Where can a grower get reliable advice in planning his weed control program?

Sullivan: Right back to his company agriculturist. That’s the best place to start, and he’ll obtain the best information.

Upbeet: What about post-emergence and layby weed control, Ed? Do you think there is a tendency to overlook or misunderstand the benefits of these applications?

Sullivan: There is some tendency to do that. I don’t think it’s serious, but I think this year we should set a goal of sequence applications with Dalapon, Pyramin-and-Dalapon, and Betanal tank mix. Also Eptam, and in certain areas, in the heavy soil types, Treflan. Because this has been overlooked, it’s very encouraging, the last year or two, to see the interest shown in this phase. I think we’ll be amazed by the increase in yields and the clean fields.

Upbeet: What about the time and expense for post-emerge and layby? Do you believe they pay out in higher yields?

Sullivan: Yes, they do. I know they do. They also eliminate the cost of hand work. It really pays off to use these chemicals. There’s no doubt about it.

Upbeet: What about the variables of the weather, Ed? Can you give any advice?

Sullivan: Temperature is the main variable, while water is somewhat controlled. Any time that you have irrigation water at your disposal after you put on a preplant herbicide, you should run the water in. We have chemicals now, like Betanal tank mix, Pyramin plus Dalapon, that will work under wetter or dryer conditions. So, I think we can, to a great extent — not completely, but to a practical extent — overcome these weather variables. We won’t completely do it, because herbicides are triggered by weather and moisture. And this always will be the case. So, we have to manage our technology to take this into consideration.

Upbeet: Ed, is there some indication that the usual application of Telone will help control weeds?

Sullivan: There’s no doubt about it. Telone fumigation has a side effect on weeds. It’s measurable. Mainly on perennial weeds with fleshy or creeping roots. Telone will definitely suppress these weeds with earlier closing of the beet rows. Now, annual weeds are more questionable, because Telone doesn’t affect seeds.

Upbeet: Let’s look at the herbicide label, Ed. What does it mean, and what does it take to get a label on an herbicide? And what’s the difference between an experimental label and one for commercial beet production?
Dr. Sullivan Says...

Sullivan: The label certifies that the chemical meets EPA standards for safe use on certain crops, if applied according to instructions. An experimental label is issued on the basis of usually five years of comprehensive research in the laboratory and in the field. To obtain full labeling, the experimental compound must be tested for another two years under limited commercial conditions to get a better picture of its total effect. During this experimental period, the crop can be harvested and processed.

Upbeet: Now, Ed, who do you work with in this process?
Sullivan: We work with our good colleagues at the state experiment stations and with the USDA, and, of course, we work with the technical staffs of the chemical companies. Without these people, I don’t think we could really construct a program as meaningful as we have now.

Upbeet: Ed, in labeling, what are the main precautions?
Sullivan: The first thing, of course, is protection of the food supply and the second is to give instructions on the safe and proper use of the chemical.

Upbeet: Now, we’re getting down to future herbicides, Ed. What’s coming out of the lab now... any miracles?
Sullivan: No, there are no miracles. I don’t think we’ll ever have a miracle in chemical weed control, but we’re going to have improvements continually. One of the new chemicals, of course, is Nortron.

Upbeet: How long have you been working with Nortron?
Sullivan: Well, we first investigated Nortron in 1970, so we’ve been working with it five years now.

Upbeet: Did Nortron come from Europe?
Sullivan: We picked it up from the English in 1970. I think Great Western was the first to test Nortron in America. I remember Phil Smith and I were looking the plots over here at Longmont and we came across Nortron. It looked good. And it’s looked good in every test we’ve had between 1970 and 1974. I’ve never seen it fail in the fields. So, we’re highly enthusiastic.

Upbeet: What are the great advantages of Nortron in comparison with the herbicides now available?
Sullivan: Its beneficial persistence! Nortron works until the beets cover the row from a single application. That’s the biggest advantage. The other advantage is Nortron’s effectiveness on red-root pigweed and on grasses. You don’t have one pigweed in the field. If that’s all it would do, I think that would be enough, but it does other things too. It takes out other weeds without hurting the beets.

Upbeet: Ed, won’t that higher cost be offset a great deal by the cost?
Sullivan: Nortron is not as moisture-sensitive as Ro-Neet, so you get better results under dry conditions with Nortron than with the present chemicals. Any time you have that little bit of overhead moisture, it makes things a lot better.

Upbeet: Now, what’s the plan for working with Nortron this spring? Will supplies be limited?
Sullivan: It will be limited. From the information I have at hand now, we will have enough Nortron to field-treat 500 or 1000 fields up to 20 acres in size. I think that’s a sufficient amount for an experimental label.

Upbeet: The growers will work with it themselves?
Sullivan: Yes, they will. I think that’s the only way.

Upbeet: You will be running your own strip trials that you’ve run for years?
Sullivan: Yes, we will, we’ll run the strip trials as a concurrent check on what the grower does.

Upbeet: You will have help of the university researchers and scientists, like Dr. Ed Schweizer? What will they be doing?
Sullivan: They will be doing two or three important things. One is to find out how long persistence lasts with Nortron. The second thing they’ll be doing is to find out the effect that weed escapes might have on yield in the presence of Nortron. Of course, they’ll run radio-active tests on Nortron uptake in beet and on weeds.

Upbeet: Ed, will the environmental authorities be checking on all these experimental plots?
Sullivan: Yes, the EPA inspectors have access to all our plots.

Upbeet: Ed, every grower is going to be asking sooner or later, so we might as well get it to now. What’s Nortron going to cost?
Sullivan: Nortron applied pre-plant in a band at an average rate for our soils will cost about one-third more than the standard system of pre-plant Ro-Neet followed by Emptam layby.

Upbeet: Ed, won’t that higher cost be offset a great deal by eliminating other chemicals and other trips over the field, with the fuel and time and all, not to mention hand work?
Sullivan: That’s correct.

Upbeet: One more question, Ed, what’s further down the road, and what’s the future hold, say, in mixes and combinations?
Sullivan: Well, I think we’ll be using more mixes and combinations, in particular sequence applications, or split applications, because these seem to give us a broader spectrum and more reliable weed kill throughout the growing season. With various combinations and sequences, chemical weed control will be more weather-proof. Fail-proof, really. There’ll be many more tools in our tool box to go to work with in the spring-time.

“With various combinations and sequences, chemical weed control will be more weather-proof. Fail-proof, really.”

Upbeet: Will you still get pretty good results with a drought situation?
Sullivan: Nortron is not as moisture-sensitive as Ro-Neet, so you get better results under dry conditions with Nortron than with the present chemicals. Any time you have that little bit of overhead moisture, it makes things a lot better.

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Sullivan: Well, we first investigated Nortron in 1970, so we’ve been working with it five years now.

Upbeet: Did Nortron come from Europe?
Sullivan: We picked it up from the English in 1970. I think Great Western was the first to test Nortron in America. I remember Phil Smith and I were looking the plots over here at Longmont and we came across Nortron. It looked good. And it’s looked good in every test we’ve had between 1970 and 1974. I’ve never seen it fail in the fields. So, we’re highly enthusiastic.

Upbeet: What are the great advantages of Nortron in comparison with the herbicides now available?
Sullivan: Its beneficial persistence! Nortron works until the beets cover the row from a single application. That’s the biggest advantage. The other advantage is Nortron’s effectiveness on red-root pigweed and on grasses. You don’t have one pigweed in the field. If that’s all it would do, I think that would be enough, but it does other things too. It takes out other weeds without hurting the beets.

Upbeet: Ed, will the environmental authorities be checking on all these experimental plots?
Sullivan: Yes, the EPA inspectors have access to all our plots.

Upbeet: Ed, every grower is going to be asking sooner or later, so we might as well get it to now. What’s Nortron going to cost?
Sullivan: Nortron applied pre-plant in a band at an average rate for our soils will cost about one-third more than the standard system of pre-plant Ro-Neet followed by Emptam layby.

Upbeet: Ed, won’t that higher cost be offset a great deal by eliminating other chemicals and other trips over the field, with the fuel and time and all, not to mention hand work?
Sullivan: That’s correct.

Upbeet: One more question, Ed, what’s further down the road, and what’s the future hold, say, in mixes and combinations?
Sullivan: Well, I think we’ll be using more mixes and combinations, in particular sequence applications, or split applications, because these seem to give us a broader spectrum and more reliable weed kill throughout the growing season. With various combinations and sequences, chemical weed control will be more weather-proof. Fail-proof, really. There’ll be many more tools in our tool box to go to work with in the spring-time.
Weed control planning in consultation with scientists from six state universities and agencies at the GW Agricultural Research Center at Longmont, Colo. In front, representing growers, Kish Otsuka, co-chairman of the Grower-GW Joint Research Committee, Inc., with the session leader, Dr. Ed Sullivan, senior agronomist, GWIARC. Seated at left, from front to back, Dr. Ed Schweizer, USDA Crops Research, Colorado State University; Dr. Gary Lee, University of Wyoming; Don Baldridge, Montana State University; Dr. Jake Eshel and Dr. Bob Zimdahl, CSU; standing from left, Dr. Ken Dubrovin, director, GWIARC, and Art Freytag, GWIARC. Seated at right, from front to back, Gail Wicks, University of Nebraska; Dr. Alan Dexter, North Dakota State; Jerry Cordray, Kansas State; Frank Anderson, Nebraska Panhandle Station; standing, front to back, Bill McGaffey, agricultural development director, GW Sugar; Dr. Walt Akeson and Otis Brit, GWIARC.

Science Session on Weeds

Scientists from six state universities were invited to join Great Western research personnel in January for two days of weed control planning at the GW Agricultural Research Center at Longmont, Colo. The meeting was the first of its kind ever held. The first day was devoted to herbicides, while the second was given over to chemical growth regulators.

The researchers were joined by Kish Otsuka of Sedgwick, Colo., co-chairman of the Grower-GW Joint Research Committee, Inc. As a grower representative, he presented interesting insights on the practical goals for herbicide research. Kish reaffirmed that growers look forward to using more reliable and effective herbicides and combinations, in particular, those that have a longer residual effect on troublesome weeds. He also noted that Jimson weed was becoming a local problem. Kish stressed the need for quicker implementation of research findings favorable to complete mechanization of the crop and full production. The use of preplant/postplant herbicide sequences to improve chemical weed control was emphasized by Kish.

On herbicide testing, the participants agreed that Nortron applied preplant showed special promise for residual control of several weeds infesting sugarbeets. Antor was cited for excellent control of redroot pigweed and small seeded grass. It was reviled again that Betanal tank mix applied postemergence had excellent broad-spectrum results in most cooperative tests. Uniform testing among researchers was acknowledged to be of great importance in determining the most effective herbicide treatments. Therefore, additional cooperative effort on postemergence mixtures, such as Nortron + Betanal, and Betanal + HOE-23408, was planned for 1975. HOE-23408 alone has given excellent grass control. In particular, uniform testing of Nortron sequences at several sites to determine their effectiveness for season-long weed control was considered a must.

Chemical growth regulators were shown to be of practical value for future use in sugarbeet production. Participants in the meeting gave reports on favorable responses when growth regulators were applied on seed and to the growing crop. Cooperative plans were made to extend uniform testing in 1975. Specific plans were to apply chemicals on seed to improve early emergence and crop vigor, and to enhance crop quality and yield by later applications.

On-the-farm observations at the weed control planning sessions were provided by Kish Otsuka of Sedgwick, Colo., co-chairman of the Grower-GW Joint Research Committee, Inc. Kish offered these comments on the meeting:

"This is a great idea. It's the first time we've had such a conference, so I'm real honored that I could sit in here with these university scientists. They fall in line with the thinking of our Joint Research sub-committees in their recommendations on weed control last summer. From what I heard today, there's going to be quite a bit come out of this meeting. Some of the things they talked about we can do on the farm on a large scale — not just in test-plot type of work. "They're not all agreeing with each other which is good — but they're bringing out ideas. By getting all the ideas together, I think we can come up with answers, a lot quicker."
The interview with Dr. Ed Sullivan in this issue is most timely since weeds are a most serious problem in growing a good crop of beets in the Wyoming/Montana Area. There has been a continuing success with weed control methods, but until control is economically complete, neither the grower nor the agriculturist feel that they have succeeded.

Growers have been convinced for a good while that weed control will be accomplished and through their willingness to use chemicals and test rates on their own farms. Almost 100 percent of the beet acreage receives treatment. The grower has been quick to discover the value of the Pre-Beta compounds, Ro-Neet and Herbicide 283.

These materials form the backbone of the weed control program; 54 percent of all district acres were treated with Pre-Beta I and II, while 44 percent of the acres were treated with Ro-Neet. The remaining 2 percent was treated with Avadex alone, Pyramin on some combinations.

Herbicide 283 has been found valuable in kochia control, and while not completely satisfactory, it is effective enough to be used in combination with other chemicals on 13 percent of the acres.

Other chemicals certainly deserve additional attention. Betanal 503 has received praise from other areas. The use of Eptam and Treflan has proven very beneficial as a layby application, but due to press of time does not get the usage that it deserves.

In all only 7 percent of the acres received a post-emergence treatment. This low amount is due in part to the generally good results from preplant treatments, but certainly here is an area that warrants much more effort in the future.

Prospects for the coming season are very optimistic. An open fall and winter has permitted fall seed bed preparation to progress and soil moisture is excellent. Given favorable spring weather, planting should be done early on good seed beds.

It is essential to control the sugar beet root maggot in the Lovell district. Actually, weed control is secondary to the control of maggot. Since the climatic conditions at Lovell differ from other areas, chemical placement is most critical.

Control methods at planting should be 15 pounds of Dyfonate 10G or 12 pounds of Temik 15G side-banded or power-incorporated. Material placement is very important when the side band method is used; material should be placed two inches below the seed and two inches to the side of the seed row on the water furrow side. Power incorporation should be two inches deep in a seven-inch band.

Heavily infected maggot areas should certainly receive a post application at first cultivation. Post applications should be 10 pounds of Temik or 13 pounds of Dazinon 14G in a three- to four-inch band over the row.

Frank Jimenez of Big Springs had excellent results, picking up weeds remaining in his beet stand just before thinning with Betanex. And Brendon Barger, of Imperial, Nebraska in the Sterling district, uses Ro-Neet power-incorporated, then decided in 1974 to apply Eptam as a layby on about two-thirds of his beet crop. At harvest time it was still plain to see the excellent results produced by using Eptam to reduce weeds and allow the beets to utilize the available fertility and moisture.

The Sugarbeet Production Guide, published last year by Great Western, lists the basic steps of herbicide usage, and will apply anywhere. Our growers have discovered some other rules that are vitally important to success on their farms:

1. Know what weed you're trying to eliminate. If you are a little hazy about the identification, the fieldman can help.
2. Select the herbicide(s) suited to the problem.
3. Apply at the recommended growth stage — of both beets and weeds.
4. Pay particular attention to sprayer calibration.
5. Follow label instructions exactly.
6. Clean equipment thoroughly afterward.

Remember, weeds on cropland cost about $4 billion annually. It is well worth it to control them, not only for the present, but also the future.

We have really been in a transitional stage of selective herbicide use for about ten years now. We have come to expect a certain standard of control from Ro-Neet. Now we know that the previous standard can be raised significantly with the use of Betanex.

As the research people come up with better and better compounds and they gain approval for use, we will continue to move toward the 100 percent mark, and one of these days — we'll be there!
North Central Colorado Area Report by Ralph Hettinger . . .

Number One for weed control in North Central Colorado is still Ro-Neet.
With good to excellent control of broadleaf weeds and grasses, Ro-Neet improves overall crop returns and enables you to farm for the machine. It’s extremely important, of course, to use the proper rates and method of application in relation to your soil conditions. For best results, Ro-Neet should be mixed in the top one and one-half inches of the soil. If in doubt about your requirements, check with your company agriculturist.

For weed escapes, Betanal + 475 (Betanex) worked effectively on hundreds of acres last year in North Central Colorado. But when using this post-plant herbicide, watch carefully for stress conditions. Proper use of Betanal + 475 sets the stage for effective machine thinning. And the advantages of machine work can be measured by the fact that 40 new selectronic thinners will be out in the fields this spring in North Central Colorado.

For late weed control, Eptam-Treflan provided beneficial results last year. Again, application must be timely at proper rates.

For root maggots, five registered compounds will be available. Their usefulness proved out last year with the high-yielding crops in North Central Colorado.

Likewise, nematode control paid off handsomely in fields with evidence of infestation. There is increasing interest in nematode control, too, with more than 400 soil samples taken in North Central Colorado for analysis at the Platteville Grower Service Center. Again, check with your company agriculturist.

The Area moves into the new season with a record that will be hard to beat — or repeat. As noted elsewhere in this issue, North Central Colorado came up last year with 12 out of the 16 growers in the Great Western territory who averaged more than 10,000 pounds of sugar per acre. In yields, the ten highest ranged from 30.25 to 34.68 tons per acre!

The leader was Art Adler of Longmont with 11,474 pounds — second highest on record for the company! Here is Art’s secret of success:

110 beets per 100 feet of row, planted March 19, three to four seed per foot, hoe-trimmed, weeded, cultivated, ditched three times, irrigated six times; Thimet applied at 15 pounds for insect control; soil samples taken, applied 20 tons barnyard manure. 38 pounds of N, 37 pounds of P2O5, 1¼ pounds of Zn, and 25 pounds of sulfur in the spring; 220 frost-free days of growing.

Can a good crop of beets be grown in North Central Colorado?

With those figures, with the help of a good growing season and a good harvest, the answer has got to be yes.

So now, on to the new season!

Nebraska Area Report by Leonard Henderson . . .

Weather conditions prevailing during the spring months always exert a great influence on the action of selective herbicides. Last year the Nebraska district experienced one of the driest years on record.

Ninety-five per cent of the acreage was treated with preplant herbicide. Only 12 per cent of the acreage was planted early enough to receive germinating moisture and on those fields excellent weed control was obtained. The balance of the acreage had to be irrigated for germination and the delay in irrigating reduced the effectiveness of the herbicide and less than full weed control was realized.

I hasten to add weed control was effective and we believe the weed population would have been intolerable had not herbicides been used. Nevertheless, results were not as good as we had experienced in the past.

Some weed escapes were treated with a post-emergence spray, but the drouth again reduced the effectiveness of those herbicides.

A large acreage was treated with a layby application of Eptam, but, because of the weed escapes from preplant treatments, the results were not as good as they had been in previous seasons. In spite of this the weed control was acceptable and an excellent crop of beets resulted.

Our experience under these conditions leads us to believe that our herbicide program is a good one that can be depended upon even under the most trying circumstances. We expect that again 95 per cent of the acreage will be treated with Roneet preplant.

We now have a full label on the compound Betanex which is an excellent post-emergence herbicide to be mixed half and half with Betanal and has done an excellent job of controlling a wide range of weeds when properly used. We expect that an increased acreage will be treated with Eptam layby to eliminate one or two hoeings.

We have been somewhat careless in our methods of incorporating the Roneet, relying instead on the beneficial rains that usually come to do the incorporating for us. With an improved understanding of the capabilities of the several herbicide systems available to us, and the added clout we will realize through increased use of post-emergence spraying with the new labelled Betanex, we look forward to 1975 confident that weeds will be controlled economically chemically.
Proper nitrogen fertilization is of great importance to both sugarbeet growers and Great Western. When excessive amounts of nitrogen fertilizer are applied, the sugar percentage decreases resulting in a loss to the grower due to the decreased sugar content and also for purchase of the unnecessary fertilizer that is continually becoming most costly.

The deep soil sampling program recently initiated is an essential step in developing a meaningful, economical nitrogen fertilization program. A complementary program is a new innovation called "Brei Nitrate Analysis" in which the nitrate content is determined on the same sample as the sugar content.

The amount of nitrate in sugarbeets at harvest is a reflection of the amount of nitrogen available to the crop during the growing season. If there was an excess of nitrogen during the growing season, there will be a lot of nitrate in the brei. But if the crop was starved for nitrogen during the last few weeks before harvest, as it should under desirable growing conditions, the brei nitrate content will be low (and the sugar content will be high).

The brei nitrate analysis program was first initiated on a very limited scale in 1972. During the 1973 campaign, the program was expanded to five factories; and during the 1974 campaign, all Great Western factories participated. In 1974 all samples analyzed for sugar content were also analyzed for nitrate.

The information obtained has been collected at the GW Agricultural Research Center at Longmont and has been analyzed to determine the relationship between brei nitrate concentration and sugar content at each factory.

Figure 1 shows the relationship between the various factory average sugar contents and the factory average nitrate ratings.

A very good relationship between brei nitrate rating and percent sugar exists (r² = .608). That is, as sugar content goes down, 60 percent of the reduction can be accounted for by increases in the brei nitrate rating. Geographic location and environmental conditions will affect nitrate ratings. Therefore, factories with the same rating might have different sugar contents. Nevertheless, the trend shown in Figure 1 is real and very significantly effects the economical production of sugarbeets.

What benefit can brei nitrate analysis be to growers?

It is another tool to use in improving sugarbeet quality through proper use of nitrogen fertilizer. For example, if a grower’s brei nitrate rating was high and his sugar content was lower than the factory average, he apparently used too much nitrogen fertilizer.

Specific relationship between brei nitrate ratings and changes in sugar content have been developed for each factory. Four pieces of information must be known to make this tool work: 1) grower’s average brei nitrate rating, 2) grower’s average harvest date (that day by which 50 percent of his tonnage had been delivered), 3) factory average brei nitrate rating on that date, and 4) the relationship between harvest date and factory average nitrate rating is presented in Figure 2 while the relationship between deviation from factory average nitrate rating and sugar content change is given in Figure 3.

What can this information do for a grower?

Assume a hypothetical grower had an average harvest date of October 20 (10/20) and a brei nitrate rating of 5.8; Figure 2 shows the factory average nitrate rating on 10/20 was 3.8. Subtract the factory average rating from the hypothetical grower’s average rating (5.8 - 3.8 = +2). Locate this deviation from factory average (+) on the vertical axis in Figure 3 and determine the change in percent sugar which is 1.1 percent.

This means this hypothetical grower lost 1.1 percent sugar content because his brei nitrate rating was two units higher than the factory average.

A more straightforward interpretation is — if this hypothetical grower would have controlled his nitrogen fertility better, his harvested sugarbeets would have had a nitrate rating two units lower, and his sugar content would have been 1.1 percent higher.

This hypothetical situation is for purposes of explanation and will not apply to all growers’ situations, but, it does point out the importance of an efficient nitrogen control program.

The Importance of Efficient Nitrogen Control

By DR. DWAYNE G. WESTFALL and MADALINE BARNES

Dr. Westfall is senior plant nutritionist at the Agricultural Research Center, while Miss Barnes is a data analyst there.
Quality vs. Quantity -- What's What?

By WILLIAM C. McGUFFEY
Director-Agricultural Development

• How does quality stack up with quantity in the sugarbeet crop?

Some beets have class — that's quality, or to be exact, high sugar content and high purity. Quantity describes tonnage of the crop. In these days of higher production costs, what's the best combination of quality and quantity? First look at the terms of the beet purchase agreement:

The price paid per ton of beets delivered by the grower is determined by a payment schedule based upon the extraction experience of the company — sugar actually put into the bag. This fluctuates with the average net return per hundredweight of sugar received by the company and the grower's sugar content.

As a result, quality (sugar content and purity) is of vital interest to the grower.

In the past, growers have undoubtedly had a greater management influence on tonnage than on sugar content; however, with higher production costs, it becomes more prudent to emphasize quality by better understanding the factors influencing sugar content.

Dr. Dwayne Westfall, senior agronomist at the GW Agricultural Research Center, and others, have gathered data that verifies that the amount of nitrogen available to the beet for growth is the largest single factor that determines sugar content (see article on opposite page). Factors such as environment and other grower management practices as planting date, irrigation program, variety, speed and quality of harvest, etc., are influential to a lesser degree.

Today there are new tools and techniques that assist the grower in determining the best level of nitrogen to be added as fertilizer for the growth of the crop. Deep soil testing, plus brei nitrate rating, stand, climatic factors, increased nitrogen cost, etc., all provide a background from which better decisions can be made for the wise use of nitrogen.

What does this actually mean to the grower?

His sugar production per acre (the basis of his actual income for the crop) is a compromise in the judicial use of nitrogen as fertilizer.

If sugar content increases from an average of 16.5 percent to 17 percent, the additional value of the crop would be in the following range:

$1.38 per ton at $20 net per hundredweight of sugar
$2.07 per ton at $30 net per hundredweight
$2.76 per ton at $40 net per hundredweight

It is apparent that as sugar increases in value, greater returns can be made by producing higher quality beets.

This increased value is ideal if he can maintain maximum tonnage also. Many growers do. However, in some cases he won't have both. But a slight decrease in tonnage (to a point that offsets the value of the increased sugar content — remember, we're talking about sugar per acre) has some other cost-saving advantages. Controlled fertilizer charges, less harvest time, minimal wear and tear on harvesting machinery, reduced hauling cost to the grower, fewer campaign and pile storage days — all save money and produce better extraction.

Looking at it in another way, where slicing capacity of factories limits the acreage to be planted, improved quality can allow more total beets to be sliced in a given number of days.

For the quality crop, with maximum sugar per acre, the grower should use the services available in deep soil testing, brei nitrate rating, and fertilize for early growth. And he should extend the growing season by any means possible, such as early planting, irrigation for germination when needed, and capitalize on a prudent rate of harvest.

Don't ever forget the crop of 1974, one of the highest quality crops in our history with enough nitrogen available to provide near record tons of beets and sugar per acre.

That's always the goal!
Drill Test Stands
Show and Tell!

What Little Dab Will Do Ya?

By MERLE RIGGS

• There used to be a jingle heard on the radio a few years ago for a men's hair preparation which said "a little dab will do ya." But what the jingle did not say was just how much "a little dab" was.

We in the sugar business must be able to make a better recommendation to our growers as to the amount of nitrogen (N), phosphorous (P) and potassium (K) needed for top sugar production than to just add a "dab" of this or 100 pounds of N and 100 pounds of P.

There are many things we know about growing beets. We know about how much N, P and K it takes to grow a ton of beets. We know that an excess of N depresses sugar accumulation in the beet root. And we know that a beet has the ability to draw nitrogen from a depth of six feet.

But what we have not known is how much residual nitrogen was present deep down. So, before we could make a good, reliable fertilizer recommendation, we had to determine the amount of N in the individual fields.

Most of the soil samples in years past have been taken by means of a shovel or hand soil probe. But due to the fact that the beet can utilize soil nutrients from a much greater depth than the top 12 to 18 inches, the use of the hand probe or shovel just does not give us all the facts we need. It was, therefore, decided to start an extensive deep soil testing program in the Kemp factory district. The goal was set to take a sample from each field to be planted to beets in 1975.

• One of the five drill test stands "on location" for beet growers at the new Sekich Equipment showrooms near Longmont. Instruments at left simulate speed of planter so that drill plate performance can be checked by spacing of seed dropped on grease belt in foreground. Agricultural Manager Bud Oldemeyer and Agriculturist Smoke Weltin appear at left with Longmont growers Floyd Adler, Jim Adler, Theodore Webber, Herman Wagner, John Webber and Dennis Adler.

By taking the pounds of N, P and K required to produce a 20-ton crop, subtracting from this amount of N, P and K in each acre as shown by the soil sample, the results give us the basis for our fertilizer recommendations for the 1975 crop.

The day of guessing that 100 pounds of N and 100 pounds of P should be enough fertilizer is now a thing of the past. Deep soil tests show some farm land has enough residual nitrogen and phosphorous to grow a 15 to 18-ton crop without adding anything but a starter. Other fields may need 150 pounds of N.

Costs of fertilizer, freight and production of all crops have taken a dramatic increase the past 12 months. The need to increase sugar yields is quite obvious. Everything points to greater production and the quicker the better.

Soil samples taken with the latest equipment and analyzed carefully will help us build a reservoir of information from which we can make better recommendations for future crops. Savings in freight and fertilizer costs will be an immediate benefit to the grower. The information obtained from these samples will also help our seed breeders decide which hybrid varieties will perform most satisfactorily. The more use we make of the tools we now have, the easier it will be to make a profit for all concerned.

So, keep in mind that "a little dab will do ya" is not good enough in today's farming practices. 'Tis best to soil test — the only way to fly!
Prototypes

- Bumpy ground and windy weather during post-emergence weed control operations can be overcome with two new prototype spray rigs at the GW Grower Service Centers.

In these models, each spray nozzle, protected by a windshield, rides independently on floating suspension. The result is a more even band of spray, since each nozzle tends to be self-adjusting in relation to ground conditions, while the windshield keeps a more constant height to minimize wind drift.

The prototype in the pictures at top rides on double rod sleds for each spray nozzle with adjustments to position both the nozzle and windshield. The cultivator bar, a box beam, also serves as a manifold for the herbicide solution. The close up at right shows the adjustment features — up, down, or at various angles.

The unit in the photo at left rides on wheels with chain lifts for each spray and spring tension on the bottom. It can be attached to any cultivator bar.

Both models help to accomplish the three important objectives in post-emergence spraying — constant tractor speed, stable spray pressure, and even band widths.

- The “equalizer” in plow sole fumigation appears at left in a rig designed and fabricated at the Platteville Grower Service Center. It’s a front-mounted drum, supported by extended channel beams, and bolstered by weights underneath. The weights equalize front and back loads, especially when the drum nears empty, to keep the nose of the tractor from taking off. Special tubing and fittings transport the fumigant from drum to plow.
Beet Fields of the Future:

The Potential of Regulators

By ARTHUR H. FREYTAG
Senior Agronomist

A plant growth regulator is any organic compound which in dilute amount will stimulate, inhibit or modify plant growth processes. These compounds have been studied for many years, but up to now their major uses have been mostly in the production of table grapes, in fruit ripening, for plant dwarfting and for greenhouse floral crops.

Researchers at the GW Agricultural Research Center have also studied plant growth regulators and have recently found several that show promise in sugarbeet production. These potentially useful chemicals affect every aspect of producing sugar from beets, starting with seed emergence and going through tonnage, sugar content, pile storage characteristics and on to the sugar in the bag.

There has been some success in improving seed emergence with various chemicals. Since early planting can lead to adverse temperature conditions, ARC researchers have conducted tests with several chemicals at 40°F and 50°F. Several growth regulators have shown good results and one, ethylene, increased both total emergence and the rate of emergence in lab tests.

Ethylene and other chemicals have also shown good results in the field when applied on early-planted seeds, when a growth regulator can help the most. Treatments are applied to the seed or in the seed pellet; or in the case of ethylene, by soil injection. Treated seeds have shown 10 to 20 percent higher emergence and two to three days earlier emergence in some of these field tests.

Out of the many compounds tested for increasing tonnage, four or five, including ethylene, have shown consistently good results. Yield increases with these chemicals are on the order of 10 to 30 percent. Most of the chemicals are foliar applied about six weeks before harvest, but ethylene is injected in the soil when the beet canopy is about 12 to 14 inches across. The mechanism by which growth regulators increase yield is generally unknown, but there is some evidence that ethylene works by increasing the plant's rate of uptake of nitrate and other soil nutrients.

Increasing the sugar content of the beets without dropping the tonnage a corresponding amount has posed many problems. Consistent results have not yet been obtained from any growth regulator, but several showed in 1974 for the first time increases of .5 to .8 in sugar percent, giving increases of 200 to 1,000 pounds of recoverable sugar per acre.

The most surprising result so far of GW's growth regulator research has been in the area of storage losses. One of the yield increasing chemicals, ethylene, has lowered sugar losses in storage.

In the future, the ARC researchers will test new growth regulators, and will also seek new uses for existing chemicals. Among potential uses are stimulation of bolting for seed production, inhibition of photorespiration to help increase sugar content, and inhibition of sugarbeet pathogens such as Rhizoctonia.

Another aspect that will be investigated concerns new and better methods of applying these growth regulators. Some methods which have been considered are adding the chemical to irrigation water, new ways of putting chemicals in the coating of pelleted seed, and encapsulation of the chemical so that it can be released slowly in the soil.

None of these chemicals is yet available for growers to use on their fields. This is partly due to the fact that several years of research are required to confirm that a growth regulator causes enough improvement to be useful, and then to find the best method of application, time of application and the optimum amount to apply. Also, meeting government standards for residues and labeling takes a great deal of research and careful testing.
Nortron Approved for Experiments

*Nortron*, a new herbicide from Fisons Chemical Company, an English firm, has shown outstanding results in tests conducted over the past several years. The performance of this chemical was discussed in this column in an earlier issue.

Word has recently been received from Fisons that the Environmental Protection Agency (EPA) has approved an experimental label for Nortron in 1975. This means Nortron can be applied by growers with their own equipment on their own fields and the beets can be processed along with other beets.

The amount of material Fisons has made available is limited and it will be very important that all of it be used properly in order to obtain the maximum benefit. Great Western, working in cooperation with Fisons, is developing a program for distribution of this chemical to growers. Included in that program will be the need for keeping careful records of the application and effects of this chemical. Growers should look to their agriculturists for further information on this program.

Samples Show Some Nematodes in Montana, but Few in Wyoming

Sugarbeet cyst nematodes were found in almost half the Montana sugarbeet fields sampled but only in very few Wyoming fields. Soil samples taken for soil fertility analysis were also analyzed for nematodes. The analyses showed:

<table>
<thead>
<tr>
<th>District</th>
<th>Total Number Samples</th>
<th>Samples with some Viable Cysts</th>
<th>Samples with more than 10 Viable Cysts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billings</td>
<td>46</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>Lovell</td>
<td>189</td>
<td>36</td>
<td>24</td>
</tr>
</tbody>
</table>

In the Montana samples, 65 percent had some viable cysts and 46 percent of the samples analyzed had more than 10 viable cysts, a level which justifies fumigation.

In the Wyoming samples, only three of the 189 analyzed had more than 10 viable cysts and all of these came from the older beet growing area around Lovell.

This survey shows almost all sugarbeet fields in Wyoming are free of nematodes at the present time. In Montana, however, chemical treatment for nematode control would be beneficial on half the fields sampled. The number of fields analyzed in Montana should be increased to obtain a clearer picture of the extent of the nematode infestation.

—Y. Mok Yun

Survey Traces the Trail of Powderly Mildew Last Year

*Powdery mildew was observed on sugarbeets throughout the Great Western producing areas in 1974. Never before had this disease occurred in so widespread an area or as severely as last summer.*

Powdery mildew has been seen before in sugarbeet fields; but until 1974, it occurred on a few of the lower leaves on just a few plants in some fields. When the disease was first observed last August, there was not much concern about it because always before it was of no consequence. But as the weeks passed and the severity of the infection became more intense and more widespread, questions began to arise.

Dr. Earl G. Ruppel, research plant pathologist for the USDA at Colorado State University, was engaged by the Beet Sugar Development Foundation to obtain all possible information on the extent of the disease — and more importantly, on what to do about it.

Dr. Ruppel circulated a form to agricuturists of all sugarbeet companies in the western United States to find out when the disease first appeared and where it occurred. When these forms were returned, he found the disease was first observed in the Imperial Valley in extreme southern California in March.

From there, it spread in a northeasterly and easterly direction and to the Arkansas River Valley of southern Colorado in mid-July and to eastern Wyoming and Nebraska in late August.

Throughout most of the Great Western producing area, the severity of the disease was mild. However, in California, the attack was moderate to severe. There the estimated losses ranged up to three tons per acre in root yield and a reduction of 1.5 percent in sucrose concentration.

At the present time, no chemical has federal registration for control of powdery mildew on sugarbeets. Two chemicals, Benlate and sulphur, are effective for controlling this disease and steps have been taken through the Beet Sugar Development Foundation to obtain registration in time for application in 1975. Under a State Registration in California, sulphur applications in 1974 have good control.

It is difficult to explain the rapid spread of the disease throughout western U.S.A. It could be that temperature, rainfall and humidity were "just right" for the disease to spread in 1974. On the other hand, some experts believe that a new highly virulent strain has occurred in this country.

A careful watch on sugarbeets growing in the Imperial Valley will be made in the spring of 1975 to find out if the disease will again occur. If it does, all possible action will be taken to make sugarbeet growers aware of the potential occurrence of the disease again and to provide suitable methods of control.
Dean Hand at the Sterling PCA . . .

- The Pawnee Valley west of Sterling cradles the ranch that was the birthplace of Dean Hand, president of the Sterling Production Credit Association (PCA).
- Dean and his family raised cattle on their land, alternating with sheep, alfalfa, corn, barley and other grain crops. And Dean stayed in the valley, except for being graduated from Sterling High School, until he joined the army during World War II. When he returned to Colorado in 1946, he joined the staff of the Sterling PCA.
- The Sterling association hired Dean as its first full-time fieldman in the ninth farm credit district in 1947. For the succeeding ten years, Dean traveled the district visiting farm people. In 1957 he was named assistant secretary-manager and in 1962, president.
- The Sterling PCA celebrated its 40th anniversary at its annual meeting on February 20 last year — the same date the original charter was issued in 1934. Its organization followed passage of the Farm Credit Act of 1933. Dean adds: "The association had the pleasant experience of having a very fine board; the majority of its members served terms of 25 to 33 years. Their contributions to this association have been a great item in the success it has enjoyed over the years."
- Presently the Sterling PCA operates in the six northeastern counties of Colorado from one central office at Sterling. Along with loans to its grower members, the association participates with four commercial banks in the area, to the tune of $3 million in 1974, in agricultural loans. About one third of the member-borrowers produce sugarbeets.
- Reflecting on his long association with agriculture in general, Dean says, "We have seen a trend from small individual operations to larger enterprises, usually family corporations. For example, our average loan size at the time I started here was around $1,500. Today, the average loan is in the area of $54,500."
- "We used to have a saying years ago that we would count the pieces of machinery and multiply by $10 to put the value on a man's equipment. Today he may spend up to $30,000 for one tractor. But that's what makes the agricultural industry one of the most efficient as far as getting the job done."
Roland is familiar with the farm operation. There, his family raised beets, potatoes, beans, corn, barley, and also kept a small dairy herd. Roland recalls that in his youth one of the first things he learned to do was to milk the cows by hand.

And, in the 1930's and early '40's, school began in August, allowing a break in October and early November for sugarbeet harvest. Everybody, including the elementary school children like Roland, worked in the fields. And he became pretty good at topping sugar beets.

The late Otto Johnson, Roland's father, emigrated from Sweden and settled at Windsor in 1914. Otto's bride had been born to Swedish immigrant parents in the "Oklahoma district" southwest of Windsor.

Upon graduation from Windsor High School, Roland served in the Navy during and after World War II, and then worked with his father in farming and feeding cattle.

Returning to school under the GI Bill, Roland was graduated from Colorado State College at Greeley in 1953 with a degree in business administration. That same month, he became vice president of the Fort Collins PCA.

The Fort Collins association dates back to 1933, when with passage of the Farm Credit Act, 20 farmers bought shares of PCA stock at $5 each. Government funds totalling $325,000 were borrowed initially and repaid with interest by 1950.

Presently the Fort Collins PCA operates in ten counties in north central Colorado, with a staff of eight in Collins and four in Greeley. It participates in farm financing with commercial banks in the area.

During his years with PCA, Roland has learned more about sugar beets: "Twenty-two years ago, an average grower farmed about 30 to 40 acres of beets. Now, the largest would be over 500 acres. "This is due to a greater capability by the grower, who has to be a professional to get the job done in this day and age -- not only crop-wise, but also money-wise. He has to be a good manager, as if he were running a large business," Roland adds.

"Advancement in sugarbeet technology," Roland says, "gives more stability to farm operations and affects the whole economy within the area. If people have income, then they spend money. From that, then, everyone within the area benefits."

The PCA attempts to allocate a certain percentage of its loan funds to younger farmers. "More often than not, these young operators have been born and reared on the farm. They are experienced. We try to help them as much as we can. As a matter of fact, 25 percent of our member-borrowers in 1974 were 30 or younger.

For the future, Roland sees the outlook for agriculture as "bright, when you view the world situation and the demand for foodstuffs. I think we can produce enough to fulfill the demand."

In December, 1972, Roland was elected president of the Fort Collins PCA. Looking back, he recalls that he has worked in every phase of the operation. He admits, "That makes it a little tough at times on my staff."

Dick Miller of the Scottsbluff PCA . . .

- Wednesday is more meaningful than just the middle day of the week for agriculture in western Nebraska. For that's the day that Dick E. Miller, president of the Production Credit Association (PCA) in Scottsbluff, has set aside for drives out to the farms and visits with association members.

- It doesn't have to be on a Wednesday, though, because Dick likes any opportunity to get out in the country and talk to members all over the territory: "This keeps me in touch with what's going on as far as crops and attitudes are concerned and also of any future developments being planned by the borrowers.

- "It gives me a good overview of things -- rather than getting tunnel vision here in the office," says Dick.

- Born and reared on a 400-acre irrigated farm near Utica, Nebr., west of Lincoln, Dick is no stranger to agriculture, since his family raised corn, milo and soybeans there, along with their livestock operation. After earning a degree in business administration at Nebraska Wesleyan at Lincoln, Dick joined the Production Credit system. He began his 12 years in Iowa, then worked in eastern Nebraska and four years ago moved west to Scottsbluff. He was named president of the association in November, 1973.

- The Scottsbluff PCA was organized in March, 1934, with some government capitalization, which was paid back in full in 1954. In its 41-year history, the association has had only four managing officers, Dick being the fourth.

Concluded on next page . . .
in the new Midland Production Credit office at Billings. Manager Pete Peterson stands at right with John Sherman, agricultural manager of the Billings district.

In regard to the financing business, Dick says, "On a district level, a recent study indicates that the general pattern is that the average loan doubles in a five-year period. The average-sized loan currently is about $50,000 for short term credit. The association currently has $12,500,000 outstanding in loans."

The Scottsbluff PCA serves 320 members, with about 40 percent farming some sugar beets.

Of agriculture in general Dick says, "We encourage a balance of crops on a rotation basis, which gives quite a lot of stability in this country. In agricultural credit, we look for adequate cash flow in developing a program for an operation."

He adds, "The beet crop has supplied a good balance in a good rotation program. With the hail factor in this area, we encourage our borrowers, if they have the right management and machinery to grow beets, to give them a balance in case hail ruins their beans and corn. We generally encourage them to stick to their normal rotation pattern."

"Our experience with beet growers over the last 41 years in the Valley has proven to be real successful. With the price of sugar today, some landowners in the area are encouraging their tenants to grow more beets. They are renting out ground that they haven't previously rented to raise beets to give them a more stable income."

The Scottsbluff PCA is making a special effort to work with young people in getting them started in agriculture. "On a district-wide basis we have a new program that we're working on to set up some additional guide-lines on what we call our 'young farmer loans'."

"We have seen in the last three years a marked increase in the number of young fellows returning to the farm. This is terrific, and when they have the guidance, some machinery and land from their fathers, it's a good way to get started. It's a good way to pass it from one generation to another, something we're vitally needing in agriculture. It just makes good sense."

And when the young fellow gets himself set up out there on the farm, Dick will probably be calling on him. "In most offices of Production Credit, one of our claims to fame is that we do get out on the farms as often as we can. We think that we can learn more in one day out in the country visiting with some of our people than we can in two weeks' time here in the office," he says.

And that one day might be any day of the week, or it might be Dick's Wednesday.

- "We kind of like the beet crop and the sugar beet growers. They have a better chance for consistent profit over the long haul, averaging year-in and year-out returns."

Those are the words of Kermit B. "Pete" Peterson, manager and secretary-treasurer of the Midland Production Credit Association (PCA) of Billings and Hardin, Mont. As an example, he cites a grower at Hysham, who proved his ability as a good beet producer by raising the kind of crops in a couple years that could pay off all of his obligations that had resulted from flooding and bad weather.

"I believed that he was a good producer, and he proved it," says Pete. "This grower is now current on his financial situation with PCA."

Born and reared in Tappen, North Dakota, Pete worked on the area farms in the summertime as a boy. He attended North Dakota State College, then took his degree in animal husbandry at Oregon State University in Corvallis. After a background in forest service and range research work in the Pacific Northwest and five years with the ASC office in Oregon, Pete joined the PCA in The Dalles, Oregon, in 1947.

Thirteen years with the PCA in The Dalles, four years with Klamath Falls PCA, and nine years with the Federal Intermediate Credit Bank in Spokane, Wash., led Pete to the management of the Midland PCA in 1970. (Although he is not president, Pete is the chief operating officer.)

Chartered with 29 members in January, 1934, the Midland PCA has been completely member-owned since 1949, when all government obligations were paid in full.

Midland reported 768 members in 1974, with about 25 percent engaged in sugar beet production.

In its 41-year history, the organization has loaned a total of over $314,000,000 with about 12 percent of that money going to beet growers. "This money, in an agricultural community," says Pete, "turns over approximately seven times in the economy. I regard that as the dollar contribution to the economies of the counties in which we operate."

Midland PCA operates in Big Horn, Carbon, Stillwater, Sweet Grass, Treasure and Yellowstone Counties in Montana. At Hardin is a branch office of Midland, managed by William M. Gunn since 1966 on a semi-independent basis with the officers and board of directors at Billings. Gunn is a native of Big Horn County and operates a small ranch near Custer.

The Hardin branch helped to finance several beet growers there in 1974, the first year that the sugar beet crop has been raised since the closing of the factory about four years ago.

Pete adds, "Hardin area growers produce good beets. And it's a more stable crop for that area."

Jack Halverson of Grey Cliff, a cattle and sheep rancher and member of the PCA since 1949 and of its board of directors since 1967, recently began a two-year term as president of the Midland PCA. He replaces Elmer Quanbeck, who just completed his term.

According to Pete, over a third of the Midland PCA membership is under 40 years of age, including all types of farmers. "Midland makes special efforts to help young farmers get started, especially if they have some backing from their parents or a friend. One beet grower came from a minus-$4500 position to a $9,000 net worth in two years."

"That's an example of how young fellows can progress with the help of the PCA — and a lot of hard work."
The Joint Research Committee lost the services of one of its most dedicated and long-term members last December with the resignation of Charlie Reisig, above, a beet grower who farms west of Scottsbluff. Charlie decided to relinquish his post as a director of the committee because of the press of other outside commitments. A member of the committee since its organization in 1967, he was also assistant secretary-treasurer. Charlie's resignation was accepted with sincere appreciation for his counsel and contributions to the committee. His place as a grower director was filled with the election of Henry Schneider, who farms near Gering. (See photo at top right).

Joint Research Committee Directors of 1975

- Directors of the Grower-GW Joint Research Committee at their annual meeting in Denver last January. Front row, from left, Dr. Bob Oldemeyer, secretary-treasurer, from the GW Agricultural Research Center; Kish Otsuka, grower co-chairman from Sedgwick, Colo.; Waldo Peterson, company co-chairman from the General Office in Denver; and Joe Alles, grower co-vice chairman from Billings. Back row, from left, Bill Davis, grower director from Goodland, Kan.; Dr. Ken Dubrovin, company director from GW Research Center; Bill McGuffey, company co-vice chairman from General Office in Denver; Denny Smith, grower director from Powell, Wyo., and Henry Schneider, newly-elected grower director from Gering, Neb.

- Inside the beet storage bubble at Toppenish, Wash., three members of the Grower-GW Joint Research Committee view the removal of 17,000 tons of beets from the experimental plastic structure. They are, from left, Max Harper of Yuma, Colo., Melvin Heimbouch of Gering, Neb., and Leo Bratsky of Bridger, Mont. Their trip was authorized by the Joint Committee to observe the condition and removal of the beets stored for more than three months under the gigantic plastic bubble operated as a pilot project by Great Western and other sugar companies. They were accompanied by two company members of the Joint Research Committee, Co-Chairman Waldo Peterson of Denver and Dr. Ken Dubrovin of the Longmont Research Center – along with Dr. Tom Army, vice president-research and development, and Vic Ostermiller, vice president, GW Export Company.
Eaton
High Ten
Front row, from left, with figure for pounds of sugar per acre: Edwin Tateyama, 9,149; John Leffler, 8,878; Melvin D. Winter, 9,344; LeRoy Weitzel, 8,865; Harold Tateyama, 9,149; Daryl Tateyama, 9,149. Back row: Larry Dean Miller, 9,118; Vic Leffler, 8,878; Roger Winter, 9,105; Charles Scheid, 8,956; Eugene Nelson, 8,999; Charles Leffler, 8,878; Robert Akahoshi, 8,736; H. L. Brooks, 8,726.

Greeley
High Ten
Front row, from left, with figure for pounds of sugar per acre: Raymond F. Hergert, 9,364; Leslie E. Peterson, 9,224; Jack D. Boegel, 10,898; Larry Leafgren, 9,548; Bob D. Stricker, 10,040. Back row: Melvin T. Bickling, 9,344; W. Lee Detterer, 9,417; Edward Wolfe, 9,765; Vernon Wolfe, 9,150; Robert Joe Wagner, 8,933; Norman M. Hickling, 9,344; William G. Leafgren, 8,970.

Loveland
High Ten
Front row, from left, with figure for pounds of sugar per acre: William Webber, 9,346; Eugene Hettinger, 10,167; Frank Smylie, 9,898. Middle row: William G. Markham, 10,185; Rodney Johnson, 9,342; Rick D. Johnson, 9,342; Richard Seaworth, 10,995; Bruce K. Markham, 10,185; Alex H. Schwindt, 9,311. Back row: C. R. Schooley, 9,533; Willard G. Markham, 10,185; Vern Johnson, 9,342; Neil F. Brunner, 10,248; Harlan Seaworth, 10,995; Kenneth W. Markham, 10,185; Henry Schwindt, Jr., 9,311; Richard D. Schild, 9,397.
Longmont High Ten

Front row, from left, with figure for pounds of sugar per acre: Bob Tanaka, 9,910; Jacob P. Schlagel, 9,782; Walter E. Nygren, 11,087; Mark Nygren, 11,087; James W. Stroh, 10,169; Back row: Ricky Tanaka, 9,910; Robert Seader, 10,566; Floyd Adler, 10,939; Adam Seader, 10,566; Howard Rasmussen, 10,337; Arthur V. Adler, 11,474; Dick Tanaka, 9,910. Not pictured: Sam Tanaka, 9,910; Lyle Heil, 9,780; Abraham L. Dreith, 9,937.

Brighton High Ten

Front row, from left, with figure for pounds of sugar per acre: Mark A. Kauffman, 8,725; Lee E. Kauffman, 8,725; Lloyd Land, 7,567; Jack Berger, Jr., 7,708; Angelo Palombo, 8,158. Back row: Gordon M. Rupple, 7,569; Albert Becker, 8,910; Conrad Bauer, Jr., 8,080; Herman Huwa, 7,890; Harold Huwa, 7,623; Dale A. Johnson, 7,992.

Ovid High Ten

Front row, from left, with figure for pounds of sugar per acre: Richard Van Velson, 10,007; Norman Frates, 9,380; Michael Kimberly, 10,057; Harold Bieber, 9,419. Middle row: Amos Mehl, 9,612; Albert Neubauer, 9,634; James Jimenez, 9,487; George Jenik, 9,500. Back row: Ernst Mehl, 9,612; Edward Brill, 9,570; Evan Mehl, 9,612; Calvin McClung, 10,214.

Sterling High Ten

Front row, from left, with figure for pounds of sugar per acre: John Vasa, 8,318; Harvey Misegadis, 8,252; Jay Dean Krueger, 8,250; Bill Larabee, 8,768. Middle row: Chris Bieber, 8,660; Paul Misegadis, 8,252; Robert Mollendor, 9,230; Mike Raffaeli, Jr., 8,966. Back row: Clifford Bennett, 9,033; John Mollendor, 9,230; Victor Helmut, 8,389; Henry F. Schaffer, 8,332.
Fort Morgan High Ten

Front row, from left, with figure for pounds of sugar per acre: Richard Mari, 8,505; Duane Bruntz, 9,265; Edward Stark, 8,824; Louis J. Lorenzini, 9,061. Back row: H. E. Forrest, 8,520; Ralph H. Goeglein, 8,473; William Wunsch, 8,511; Clarence Goeglein, 8,473; Harold Ruhl, 9,108; Tom Deganhart, 9,175; Melvin H. Schauermann, 9,479.

Kemp High Ten

Front row, from left, with figure for pounds of sugar per acre: Robert L. Irvin, 9,407; Jim Foos, 8,374; W. H. Woodmancy, 8,931; Orville Pratt, 8,268; John Baalman, 8,163; Murray Baalman, 8,163. Back row: Glenn O. Burk, 9,290; E. E. Morrell, 8,357; Bill Hinkhouse, 8,515; John Foos, 8,374; Jim Adolf, 8,173; Raymond Struckhoff, 8,143; Edward Vavra, 8,163.

Scottsbluff High Ten

Front row, from left, with figure for pounds of sugar per acre: Alex Schildt, Jr., 8,310; Dave H. Stricker, 9,388; Ray A. Carrier, 8,192. Middle row: Calvin E. Keller, 9,853; Donald E. Ullrich, 8,381; Russell Dougherty, 8,296; Stanley W. Reisig, 9,489. Back row: W. O. Barbour, 8,393; Henry Welsch, 8,375; Carl X. Schmidt, 8,292.

Gering High Ten

Front row, from left, with figure for pounds of sugar per acre: Leland K. Buehler, 9,455; Robert Gingrich, 9,467; Howard Allison, 9,710; Wilford Kaufman, 8,975. Middle row: Gilbert Kurtz, 9,029; John Abe, Jr., 9,084; Kent Buehler, 9,455; Clarence Maupin, 9,117; Grant Gingrich, 9,467. Back row: Harold Ruppel, 9,550; Harry A. Maier, 8,921; Wilbert Ruppel, 9,905.
Bayard High Ten

Front row, from left, with figure for pounds of sugar per acre: Gary Franklin, 8,667; Pete Weisgerber, 8,405; Ronald Meter, 8,709. Middle row: Henry Jerger, Jr., 8,583; Dale Hall, 9,277; Lewis H. Henkel, 8,972; Chris Anest, 9,638. Back row: Wallace Mays, 9,054; Herman Schmall, 8,350; Robert Vogel, 8,567.

Mitchell High Ten

Front row, from left, with figure for pounds of sugar per acre: Rolland W. Stoll, 8,905; John Schoeneman, 8,983; Morris E. Hessler, 9,538; Leonard D. Geringer, 9,131; Alvin L. Lebruska, 8,845. Middle row: Rynold Becker, 9,594; Robert C. Thomas, 9,779; Marion L. Hessler, 9,538; Harry D. Schmer, 9,066; Robert L. Hessler, 9,538. Back row: Ronald G. Stuckert, 8,994; Leonard Sakurada, 8,896; Neil Sakurada, 8,896; Fred Sakurada, 8,896.

Billings High Ten

Front row, from left, with figure for pounds of sugar per acre: Walter Schroeder, 9,541; William Michael, Jr.; 9,541; Dick Hardt, 9,510; Ray Robertus, 9.351; Eugene H. Keil, 9,360; Bob Sticka, 10,340. Back row: Raymond Robertus, 9,642; David Robertus, 9,642; Alex Wetsch, 9,376; Donald W. Miller, 9,343; Herman Fox, 9,833; Robert Michael, 9,657; Wm. Michael, 9,657.

Lovell High Ten

Front row, from left, with figure for pounds of sugar per acre: Burchell E. Hopkin, 8,361; William A. Gimmeson, 8,584; Roger Rodriguez, 9,243; I. J. Frank, 8,020; Raymond Karst, 8,567; Charles Shumway, 8,149. Back row: Daniel Shumway, 8,149; LaVern Johnson, 8,999; Norm Frank, 7,972; James W. Cox, 8,027; William E. Fisher, 8,027; L. J. Decker, 8,605.
1. L. E. Smith, second from left, with his sons Gene, Stan and Les, who produced 7,359,179 pounds of sugar in the Sterling district to rank first among the High Sugar Producers.


4. The Hojio brothers – Bill, Paul and Merle – who produced 5,017,971 pounds of sugar in the Loveland district.

5. Sharon and Vernon Parker, who produced 4,540,200 pounds of sugar in the Ovid district.

6. Paul Rodriguez, Jr., who produced 4,476,540 pounds of sugar in the Loveland district.

7. From left, David Kraus, Dale Ott and Sam Kraus, who produced 3,089,959 pounds of sugar in the Mitchell district.
Rex and Kenneth Hitchcock produced 7,207,309 pounds of sugar in the Kemp district to rank second in High Sugar Production.

3. Robert Poitz, who produced 6,475,975 pounds of sugar in the Fort Morgan district to rank third.

7. The Lambrecht brothers - Dave, Leo, John and Harold - who produced 4,070,916 pounds of sugar in the Billings factory district for 1974.

13. W. E. McKay and W. M. McKay, who produced 1,908,894 pounds of sugar in the Greeley district.

14. Alex H. Reifschneider, who produced 1,797,097 pounds of sugar in the Scottsbluff district.

15. Gary and Melvin Grasmick, who produced 1,382,645 pounds of sugar in the Gering district.


Nebraska Area winners were Norman Strong of Mitchell, left, who took FFA honors with a beet crop of 21.6 tons per acre and 17.6 percent sugar, and Todd Franklin of Bridgeport, who won 4-H honors with a crop of 25.4 tons and 17.2 percent sugar.

In Northeast Colorado & Kemp Area, Duane Hirsch of Holyoke won FFA honors with 6,520 pounds of sugar per acre. Duane accepts award from Bill McGuffey, GW agricultural development director, with his agriculturist, Charlie Cross, at right.

Randy Huwa of Keenesburg, far left, won FFA honors in North Central Colorado Area with a beet crop of 20.7 tons per acre and 17.6 percent sugar. Randy appears with S. E. Koon, FFA executive secretary, left, and Lauren Herget, his GW agriculturist.

Mike Laber of Longmont took 4-H honors for the second straight year in North Central Colorado with a crop of 26.9 tons and 17.6 sugar. Mike appears with Fred Kaehler, left, extension 4-H specialist, and Bob Bever, his agriculturist in Longmont district.
Where the Roosters Still Crow!

Home is where the heart longs to be, in all seasons, but especially in the spring time, with the land awakening, with the morning resounding to the rooster's call to action.

But sadly, it's not for everyone. Here is a little drama with a plot revolving around a plot - a plot of ground.

CAST OF CHARACTERS:
Sherry - farm wife and mother
Hildegarde - big city career girl

SCENE:
It is springtime, on the farmhouse front porch, where two chums of high school days are catching up on the details of their lives after a long separation.

Sherry: (dreamily) My life and my world revolve around Dick and the kids and the crops and livestock out here. Our lives are sort of governed by the seasons as they come and go.

Hildegarde: Speaking of crops, I tried to get six tomato plants to grow in the backyard last year. First, I couldn't find a spot in the yard that gets enough sun. And I'm on a water meter, and you know how much water they need. The plants were already struggling to survive when the slugs just drank the beer I put out, as if it were an appetizer, and then they ate my tomatoes one by one. Fortunately, there was one, a small one, they didn't get. I had to do some pretty tall talking to persuade my taxidermist to stuff it for me.

Sherry: We had a terrific crop last year. Between plowing, harrowing, leveling, planting, fertilizing, cultivating, thinning, weeding, irrigating and harvesting seasons, Dick and the kids and I even got out together and went fishing and swimming. Or we just sat out in the yard or walked down by our lake for some fresh country air.

Hildegarde: I just stayed home on my vacation last year. Wouldn't you know it, I hardly saw the sun that whole time. And I even got out together and went fishing and swimming. Or we had a terrific crop last year. Between plowing, harrowing, leveling, planting, fertilizing, cultivating, thinning, weeding, irrigating and harvesting seasons, Dick and the kids and I even got out together and went fishing and swimming. Or we just sat out in the yard or walked down by our lake for some fresh country air.

Hildegarde: I just stayed home on my vacation last year. Wouldn't you know it, I hardly saw the sun that whole time. And the cars were buzzing, bumper to bumper, past my house all the time. When I tried to get a tan, I had to go in and wash off the soot every 15 minutes so the sun could get to my skin. But there really wasn't any sunshine coming through that smog anyway. And I found that as long as I wasn't breathing, I was having a fairly good time.

Sherry: (obviously talking more to herself than her guest) What were you saying?

Hildegarde: My closest neighbor about three miles down the road was driving up a hill on a gravel road the other day. The sun was so bright she couldn't see, and her car skidded and ended up in the barrow pit — she was a little embarrassed about it, having lived out here for so long.

Hildegarde: There were ten cars piled up on the freeway as I sat out in the yard or walked down by our lake for some fresh country air.

Hildegarde: It's like when I look through the new seed catalogue and think about planting those petunias and hollyhocks and roses around the house here. It's like we've been born again ... like we get another chance.

Sherry: (ignoring) We start all over again in the spring with even more faith than before and hope for as good a year as last and maybe even a little better. We like our life out here, as if you couldn't tell.

Hildegarde: We like spring in the city, too, but I've never heard it described quite the way you do. And that look on your face ... Oh, please, won't you wait ...

Sherry: (with a faraway look) There's nothing like living out here on and with the land. It's real — and good — and honest. The feel and smell of the soil in your hand, or the seedling popping up it's head. They're beautiful! Oh, we work hard at farming, but it's our way of life, not just a place to live. And God must like it out here too, for He's awfully good to us. (returning attention to her guest) What were you saying?

Hildegarde: I wanted you to stop a minute, so ... May I use your phone? I'm going to call my boss right now and ask to stay on a few days out here. (leaning forward in anticipation) Tell me, Sherry, do you think there might be a chance that a little of this "rebirth" you're talking about might rub off on me? Maybe I could take some of it home with me when I go? (smiling) If I go ...
Appointments & Advancements

• Appointment of four new vice presidents and a new treasurer of Great Western Sugar was announced in February by Jack B. Powell, executive vice president and chief operating officer.

LaMar C. Henry was advanced to vice president of agriculture to replace the late Robert J. Fisher, who died in December (See page 31).

Jack W. Eastman was promoted to vice president of manufacturing. He replaces Jack Powell, now executive vice president.

Robert A. Wherry was named vice president of administration.

David E. Crandall was named vice president of finance.

M. Edward Rebhan was appointed treasurer.

All of the new officers are long term employees of Great Western Sugar, with the exception of Crandall.

Henry, who was director of agricultural operations, moves to the top post in agriculture with nearly 29 years in sugarbeet crop management. Before he came to the Denver office in September, 1973, his career included assignments as district general manager for North Central Colorado and agricultural manager for factory districts at Goodland, Brighton and Ovid.

Earlier, Henry was agricultural staff assistant at the Denver office and assistant agriculture manager in Scottsbluff and Gering. He joined Great Western Sugar in 1946 upon completion of five years duty in the Army Air Forces. He is a 1941 graduate of Colorado State University. A native of Kansas, Henry grew up on ranches in western Colorado.

Eastman, who heads up manufacturing, has served nearly 31 years in sugar factory operations at various locations. Before he became director of manufacturing last fall, he was area manufac-
turing manager for factories in North East Colorado and Kemp and then in North Central Colorado.

Earlier, he was on the operation staff in the Denver office and was also a factory manager at Fort Morgan and Sterling.

Eastman began his Great Western career in Fort Collins in 1944 upon graduation from the University of Colorado with a degree in business. A native of Huron, South Dakota, he grew up in Loveland.

Crandall, a native of Denver, becomes vice president of finance with background in New York City with First National City Bank and the Electrical Data Systems Corporation. Earlier he was a member of the faculty and administration at the U.S. Military Academy at West Point. A graduate of the University of Kansas, Crandall earned a master's degree in business administration at the University of Missouri.

Rebhan becomes treasurer with nearly 35 years of service in various financial departments of Great Western Sugar. Before becoming assistant treasurer in 1968, his assignments included the Denver office and the factories at Billings, Mitchell, Fort Morgan and Ovid, where he began his career as timekeeper in 1941. Earlier, he worked for seven years in the Denver office of the former American Crystal Sugar Company. A native of New York, Rebhan completed his schooling in Denver after his family moved here in 1950.

• DAVID E. CRANDALL
  Vice President-Finance

• M. EDWARD REBHAN
  Treasurer
Bob Fisher -- from Sandlot to Sugar Building

It was the best of all things for a young fellow when Bob Fisher landed a job as a reporter, the perfect combination for his keen interest in athletics and literature. To arrive at this combination, Bob emerged from the bottom of the depression on the sandlots of Buffalo N.Y. where he played pick-up games with youngsters of all sizes and different languages. There was no Little League then — it was, choose sides! The sandlot was the melting pot, a test of character. Winning counted. But with all of his wanting to win Bob also acquired along the way a love of language and history, not just from high school, but from his own study, his own curiosity. Words counted, too, with their appeal to humanism. They unlocked the testaments of the Bible, the drama of Shakespeare, the lessons of the historians. In spite of his first love, for sports, there was a more lasting challenge for Bob in business activity; and, more important, there was a young woman by the name of Alice. Home and family counted now, above all. Another romance in his life, also a permanent one, began with his work in the U.S. Department of Agriculture in Washington, D.C. It was sugar. And it was intensified in 1945 with his move to The Great Western Sugar Company in Denver. Here was the abundant life. Here was a job in his new-found field of sugar economics, a personal concern for those who engage in the sugarbeet business, a personal commitment to his church and his church's hospital; here, in a modest home, pleasant surroundings for a growing family. With successive promotions over the years to senior vice president, Bob liked nothing better than to be called a Great Westerner, a Sugar Tramp. It was his life work. But it was evident, beyond doubt, that there was more to his life than just work with his death at the age of 59 on Dec. 28, 1974.

No one who attended the church memorial service for Bob will ever forget the fond recollections of each of the five Fisher children for their father. Their spoken words, mounting grief, were an affectionate farewell for a man only they and Alice knew best, for the things in life that really count.

— Jim Lyon

* Back home in Brush for retirement, Eldon Graham rounded out a Great Western career spanning 38 years last February. In his last assignment as an agriculturist, Eldon worked with beet growers along the North Platte near Gothenburg, Neb. He moved there in 1971 after 22 years of service with growers in the Brush area. Eldon joined the field staff at Ovid in 1945, but had worked earlier on beet seed projects from 1938 to 1942 at the old GW Experiment Station at Longmont. From 1942 to 1945, he also engaged in seed work for the U.S. Department of Agriculture at Fort Collins. A graduate of Fort Collins High School, Eldon attended Colorado A & M College and belonged to the football and track teams.

* Premier Grower -- that's the title of the plaque held by Art Adler of Longmont, who was honored by the Rocky Mountain Plant Food Association at the Denver Ag Club's annual dinner meeting for his sugar production averaging 11,474 pounds per acre. Art topped a record number of new members of the 10,000 Pound Club whose names appear on the back cover.
The 10,000 Pound Club

One of the most exclusive farm clubs in the nation presents the roster of new members with sugar production averaging 10,000 pounds or more per acre for the beet crop of 1974.

Welcome to the club!

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<tr>
<th>Pounds</th>
<th>Grower</th>
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Sugarbeet Beach-head

Fall gets to be the busy time of the year with the harvest of sugarbeets around the Great Western countryside. But just how busy?

Perhaps it can be visualized this way:
There will be 204 receiving stations in operation. At these stations, there will be 215 beet pilers, 38 direct-loading units, plus all the scales, along with 54 pieces of reloading equipment, and the repair and maintenance trucks. Plus personnel.

And to these stations will be coming the thousands of farm trucks with five and one-half million tons of beets. And back on the farm, hundreds of harvesters to lift the crop. Plus personnel, on the farm, to dig and deliver the beets.

If all this equipment were landed at one time on a beach-head, it would begin to resemble the invasion of Normandy. And like a beach-head, the sugarbeet harvest calls for orderliness and timeliness in deliveries, dispersions, diversions, in receiving, reloading, repairing, in storing and maintaining.

The millions of tons of sugarbeets must be landed and piled with efficiency, accuracy and safety.

To mount the sugarbeet beach-head this fall, with these aims in mind, there were numerous improvements carried out this spring and summer at the receiving stations. In all, they totaled $3.3 million — the largest amount ever allocated for agricultural equipment.

The big items in the budget were the purchase of eight new super pilers, extensive modification of existing pilers, installation of 22 new 50-ton scales, improvements in pile grounds, and completion of the two-way radio network for company agricultural vehicles.

In addition, new electronic tarehouse scales were installed.
The eight new super pilers went to the Starr station in the Lovell district, Gering factory station, Nida station in the Bayard district, Kemp factory station, Big Springs in the Ovid district, Iliff station in the Sterling district, the new Riverside station in the Fort Morgan district, and Krause station in Prospect Valley of the Brighton district.

The arrival of the eight new pilers permitted relocation of some other existing units to provide additional service. The “musical chairs” movement resulted in three new piler stations — one at South Brule, Neb., in the Ovid district; another at Deaver in the Lovell district, replacing the old rail stations at Deaver and Cowley; and the third at a new site for Custer in the Billings district, replacing the old Custer and Fee rail stations. The new Custer station’s piler was equipped with both side and rear dump facilities.

Although every effort is made to insure that individual item supports the aims of business-like management of harvest deliveries — new and improved pilers for efficiency and safety, new scales for accuracy, and the radio network for service as well as efficiency.

The same movement added one more piler at Greeley factory, Windsor station, Scottsbluff factory, Roach station in the Mitchell district, and at Hysham in the Billings district, with both side and rear dump facilities.

The 22 new scales were installed at Ault in the Eaton district, Kuner in the Greeley district, Gowanda and Harney in the Longmont district, Sloan in the Brighton district, South Brule and Lexington in the Ovid district, Atwood in the Sterling district, Riverside in the Fort Morgan district, Peconic and Kemp factory in the Kemp district, Costin in the Gering district, Tony in the Bayard district, Roach, Janise, Stegall, Morrill, Hartman and Lyman in the Mitchell district, Custer, Knox and Townsend in the Billings district, while an existing 50-ton scale was moved to Deaver in the Lovell district.

In striving for efficiency, accuracy and safety during the harvest, there are several ways growers can help to prevent delays at the receiving stations:

1. Post the proper number on the truck for the contract being delivered.
2. Deliver clean beets — check for proper adjustment of toppers, make use of cleaning devices.
3. Maintain trucks in good working order — check hoists, sideboards, endgates, hooks — avoid flimsy beet boxes.
4. Instruct drivers to proceed with caution on the piling ground and to yield the right-of-way to loaded trucks.

Now then, on with the show, with good luck and good beets!
The smiling voice of Radio Scottsbluff Secretary Rose Ann Tritten doubles as traffic controller for agricultural vehicles operating in the Scottsbluff factory district. Here in her "tower," Rose Ann relays instructions from Agricultural Manager Gordon Hobert. On the air for the past four years, Scottsbluff and other Valley districts proved the value of radio for timely and orderly service to growers.

For sugarbeet service, on the farm itself, just as in business, there's also a trend toward radio communications to save time and trouble, especially for larger or scattered operations. Dale Johnson, above, who farms on several locations near Hemingford, Neb., responds to a message over the radio in his tractor cab to demonstrate how easily he coordinates operations in his sugarbeets and other crops in various places.

Amazement was the reaction of one sugarbeet grower with the first use of radio communications to improve field service. He needed to check with his company agriculturist, so he phoned the factory agricultural office.

"Ask him to stop by when he can."

Hardly had the grower hung up the phone than the white pickup truck pulled into his farm yard. The grower scratched his head in astonishment and murmured something about space-age service.

"Not quite," explained the agriculturist. "Just happened to be in the neighborhood when I got the message about your call. Over the new radio."

That's the best example of the radio improving field service, but of course not many farm calls can be answered as quickly as that. Nevertheless, the radio does help the agriculturist to provide same-day service for many calls. It helps him to map out his day's travels and to coordinate his work with other members of the field staff.

The radio builds teamwork, while saving time and trouble, and wear and tear on trucks and tempers. Not to mention gasoline.

This past summer saw the completion of the radio Billings factory district goes on the air for the first time in August with Secretary Kathy Fredericks at the controls. In the farflung Billings district, the new radio network promises quicker coordination of field service work and receiving station repairs during harvest, along with regular farm calls in the other seasons.
tune in on your telephone

On the Johnson farm, the radio station works right out of the kitchen in the hands of Dale's wife, Jeanne, who monitors operations. Their station, like other private stations, cannot contact the Great Western network because of different broadcast frequencies. But like all other growers now, they can relay a message to their agriculturist by telephoning the agricultural office at the sugar factory.

network in all factory districts, with units installed in North Central Colorado and the Wyoming/Montana Areas. Last year, Northeast Colorado went on the air, while the Kemp district and Nebraska Area began broadcasts in earlier years. The system also serves the Grower Service Centers at Scottsbluff and Platteville as well as the receiving station repair trucks.

The harvest season offers another good example for full use of the radio, since receiving station operations and repairs can be more easily coordinated among the station personnel, the maintenance crews and the agriculturists. If replacement parts are needed, for instance, the repair truck can be located by radio.

In the other seasons, the network helps to speed distribution of seed and chemicals and the assignment of field workers, along with the rush calls and the more routine checks on problems with the beet crop.

Whatever the season, the radio keeps every member of the field staff in touch with each other and on top of all the operations in their district. Together, they're in the picture, almost like television, and as near as the telephone.

now broadcasting in all factory districts

On the go, on the air, in the Alliance area with Agriculturist Jim Davidson (now assistant manager at Sterling). Jim found in six years of working with two-way radio that one big advantage was teamwork. If he was at one end of his territory, he knew that an urgent call at the other end could be picked up and handled by another agriculturist. The radio also provides a running account of current field activities.

The radio network was also hooked up with the agricultural equipment maintenance trucks in each factory district. Here at Scottsbluff, Maintenance Supervisor Jim Graham answers a call in his truck. With two-way radio, maintenance crews can keep in constant contact with the field staff during harvest to service the receiving stations.
• The beet crop is making excellent growth in North Central Colorado. By employing good agronomy practices and using good judgement as to weather and field conditions, growers expect an above-average crop this year.

It appears in 1975 the four to five seeds per foot plantings in NCC were the most popular seeding rate on good seed beds. These plantings gave us a desirable stand for the long-handle hoe and outstanding results from the 173 electronic machines used in the area.

Herbicide for pre-plant weed control was used on 83% of the acreage, and 14% of the acreage was treated with a post application. 1975 demonstrated to us again, when using chemicals on any crop a grower must know his soil conditions, type of soil, and how best to apply today's herbicides for maximum weed control to eliminate the escapes and mistakes.

Taking care of your beet crop pays big dividends. GW agriculturists want to help. We have to offer you the following:

1. Mobile Radio Communication! To give growers better and more timely service throughout the year two-way radios in all our agricultural vehicles now provide quick contact with field personnel in each factory district and also at the Grower Service Center in Platteville.

2. Soil Testing. Know what your soil needs. A soil sampler is available in NCC for depths up to 5 feet. This fall is a good time to check your available nitrogen, phosphate, and organic matter.

3. Fall Fumigation. Do you need to fumigate? Nematode cyst counts are determined at our Platteville Grower Service Center. Plow-down kits can be purchased to apply your nematicide and tote rigs are available for chisel-in application.

4. Drill Test Stand. We will check your seed plates, size and thickness, seed plate tension, springs, star kicker, filler ring, hopper bottom and determine the seed spacing you desire at the speed you normally plant. Again, this fall is an excellent time to take advantage of this service. We tested 104 drills this past season. Your drill is the foundation of a good crop.

Clean Beets + Good Equipment = A Good Harvest! Grab rolls on your harvester will clean out any trash and clogs and you will haul clean beets you can be proud of and assist us in our pile storage. Remember all top defoliators must be equipped with scalpers or the beets will not be accepted at your receiving station.

North Central Colorado receiving stations were improved this summer to provide better service to growers. New 50-ton capacity scales were installed at Ault, Kuner, Gowanda, Harney and Sloan; and a new CF&K super piler for Krause. Greeley factory station will have two pilers, as will the Windsor station; Berthoud station was electrified and several new hydraulic truck hoists and tare catchers were installed.

North Central Colorado Area Report by Ralph Hettinger...

On-the-Spot Reports by the Area Agricultural Directors

Northwest Colorado & Kemp Area Report by Jim Gonyou...

• Looking back to our experiences in the spring of 1975, we see that the Kemp factory district had more hail than normal, but with good herbicide results, the crop was worked in good time and an average crop is expected. Ovid, Sterling, and Fort Morgan have a better than average crop in prospect.

A new selective herbicide, Nortron, was introduced this year with an experimental label. This year it was used on 1,522 acres in this area, and shows a great deal of promise. As with all new tools, some time will have to be spent in learning how to use it, so we can gain the most benefits. We learned much this spring and gained some information that will help us to use it better next season.

Again this year, many growers cooperated with Great Western in experimental tests designed to help solve some of our field problems. At Ovid, Morris Devine, Leonard Hilton, and Philip, Ron, and Paul Steib participated in seed variety tests which should give a good indication of yield potential of some of our new sugar beet varieties in the Gothenburg and Lexington, Nebraska area in the next few years. Dr. Gail Wicks and Dr. Paul Nordquist showed promising herbicide and seed variety work respectively at their annual tour at the North Platte Experiment Station on July 16.

Studies under way at the Fort Morgan factory district include Elmer Kembel with an investigation into Fusarium resistant seed varieties; Edwin D. Schauermann, Gene Beauprez, and Dale Brueggeman in fertility studies; Marion Chapman and Ernest Snyder in irrigation management; and Leonard Dutton, seed variety test.

Our harvest preparations have really been under way since last year's harvest was complete, but now things are really getting wound up. We like to provide ever-better service to growers in marketing their sugar beet crop, and you will find some of our improvements described in another part of this issue. The larger harvest equipment now in use demands that we continue to alter our receiving equipment to fit it better. Our desire is to give the best possible means of receiving the beet crop, but Great Western cannot do the most efficient job without grower cooperation. More time is lost at receiving stations by faulty grower equipment than mechanical breakdowns. Here is a list of items that should be given attention before harvest starts.

1. Adjust topping devices. Trash in the beets causes delays when we have to stop and clean the screens.

2. Make use of cleaning devices in the digging operation. Mud and dirt mixed with beets prevent fast, smooth unloading of the truck.

3. Truck hoist. Make sure it is in good repair and the driver knows how to operate it. Average unloading time for a load of beets is three minutes. Faulty hoists causing a 5- or 6-minute delay will cost the unloading of two more trucks.

4. Tight trucks with workable sideboards and/or endgates. Make it easier for the receiving station crews to let the beets out of the truck. It is hard work to open and close 250 to 400 trucks each day.

These items can be looked after easily, and your cooperation will help us get our work done more smoothly, while at the same time, the beet trucks will come back to the field quicker for the next load.

We're looking forward to an excellent harvest of the 1975 crop, and working together, we have confidence that the entire operation will proceed with a minimum of delays for grower and company alike.
This year the demand for beet acreage was very strong. Acreage was allotted to prevent the production of more tonnage than our factories could process without undue losses from an extended storage period.

Our acreage ceiling was 75,000. Three hundred acres less than that were actually contracted. Weather conditions were so favorable that losses were kept to a minimum and we have thinned and expect to harvest a modern-day record-breaking crop. This crop sets the following records for the last five years:

1. Most acres contracted.
2. Most acres planted.
3. Fewest acres replanted.
4. Fewest acres lost.
5. Most acres treated with preplant herbicide.
6. Most acres treated for nematodes.
7. Most acres post-emergence herbicide.
8. Most acres lay-by herbicide.

Germinating moisture was received soon after the crop was planted. In general, uniform emergence occurred and herbicides worked well. In fact, conditions were so favorable for the herbicides that more than normal stunting was observed on the beets and greater weed control was obtained. At this date some widely scattered damage to the crop from wind and hail has occurred and, although losses in the paths of these storms are regrettable and the damage to those growers is real and should in no way be minimized, the crop on the whole is ahead of normal. If average weather conditions occur the balance of the season, we will have one of the best beet crops on record.

To better handle this expected large crop into a piler station which will remove the growers’ dependence, in that area, on rail cars and allow for a smoother harvest. Rear dump facilities are provided at this new station as well as at the Hysham and Knox stations to meet growers’ needs. The program of installing large modern scales continues with the addition of three more scales.

Lovell, likewise, is making good progress. A new super piler has been placed at the Starr station. The Deaver and Cowley rail stations have been consolidated into a piler station near Deaver which will prove to be a great help to growers in delivering their crop. Scale installations are also made at Lovell.

Service to growers will be greatly enhanced by the installation of radio service with agriculturists, offices and repair trucks being brought into close contact by this two-way system installed in August. Again the use of herbicides was almost 100% at both Billings and Lovell and growers are quite enthusiastic about Nortron which was used for the first time this year. It showed much promise as becoming one of our most effective weed control materials for the future. In spite of the excess amount of rainfall, the chemicals worked well and, rather than the leaching out of the chemical by too much rain, the results were better than normal.

As a result of good control, the fields were exceptionally clean and remain so. Labor had a relatively easy job. The use of chemicals singly or in combinations continues to be a way of life for Wyoming and Montana growers. PreBeta I, PreBeta II, RoNeet, 273, 283, Avadex and the new Nortron remain our reliable and efficient means of controlling weeds.

Insects have been of no consequence this year and even the maggot situation at Lovell has been insignificant this year which is probably due to good control measures and the influence of unusual weather.

With harvest time just around the corner and the crop now progressing rapidly after a very trying spring season, thoughts are turning to getting harvest equipment repaired and ready.
Richard and Betsy Wilhelm on their farm near Pierce, Colo. Richard is the fourth generation of his family to grow beets.

The Wilhelm Heritage

National recognition enriches the Wilhelm farm escutcheon, dating back four generations, drawing on time-honored teaching of how to do things right.

By Jean Hurst

• Growing up with sugar beets is by no means a rarity in the Wilhelm family, but what is unique is that Richard and Betsy Wilhelm are fourth generation sugar beet growers east of Pierce in North Central Colorado. And while there can be no doubt about his legacy of Wilhelm knowledge about the beet business, Richard and Betsy have made history for themselves by being selected as one of nine farm couples across the nation to participate in the International Harvester's Farm Forum in Chicago in July.

The Wilhelms grew up in Northern Colorado — Richard graduated from high school at Pierce and Betsy at Wiggins, Colo. Richard and Betsy, who have been farming here since 1967, were selected by International Harvester to represent a five-state area. The eight other farm couples also represented large areas.

Betsy says, “That was really a surprise. We had to meet these qualifications — we had to farm no more than 320 acres; the husband had to be 33 years of age up to 45; I had to work in the home to keep all the books for our farming operation, to help out with the actual farming work; and a few other requirements.”

Asked if they had to own International equipment, Richard says, “No, they didn’t care about that. If a person owned something else, they wanted to find out why.”

The three-day forum consisted of panel discussions to obtain ideas from the young couples about farming and information about what they are actually doing out there on the farms. Qualifications for other participants varied with geographical and agricultural areas, in order to have a good cross-section of farming interests. “Our activities out here weren’t necessarily the same as those in New York,” Betsy adds.

The farm couples’ responses will be published in IH Farm Forum magazine, along with photos. Television and radio spots were taped in Chicago for nation-wide distribution to about 99 television and numerous radio stations.

Richard believes one of the best things about the forum was “talking with engineers and to know that there are people of that caliber really working to help you out. They know your problems, they know their jobs, and they do everything they can to help.”

Betsy enjoyed meeting all the people from different areas and finding out that they have related concerns about their operations. “We worry about freezing beets off in the spring, or about hail. It may not be hail in Louisiana, but something else — bugs or too
much rain, while we don't get enough. It was a relief to know that we weren't alone with our problems."

Richard and Betsy farm 320 acres, and the first of next year will take possession of their own recently purchased acreage near Ault. They planted 106 acres of sugar beets this year along with picking corn for feeding 1300 pigs.

Richard stresses the importance of management in farming: "It isn't just going out there and sitting on a tractor. I don't say a college education is a necessity, but there are things offered at school that a person could take to improve his efficiency . . . like management, bookkeeping, welding, or mechanics."

Of the sugar beet crop, Richard says, "I'd say sugar beets, since we've been farming, have been our principal means of support. We didn't have beets one year - we lost them in a hail or something. But sugar beets are the big thing to me. I like to be diversified so that if one crop doesn't work, something else might. But sugar beets is a more sure crop."

Richard and Betsy have two children, Donnetta, 12, and Kevin, 9, who just may turn out to be the fifth-generation Wilhelm in sugar beets. Currently, Kevin is trying to figure how he can be a professional baseball player and a farmer too!

The Wilhelm tradition in beets began in 1907 with the immigration of the Henry Wilhelm family from Russia. German-born, the Wilhelms sought a better way of life in the United States, coming straight to Greeley on a train from a Russian freighter. Henry's brother had come here the year before and borrowed the money to bring the family here. Henry's son, John, says, "He had borrowed it from a friend, I imagine, and we had to work almost a whole year to pay that bill back."

John, semi-retired and living in Greeley, remembers those days of his childhood beginning at age seven in Greeley, Eaton and Lucerne:

"We tended beets for twelve years straight. We got $13 an acre for thinning and pulling weeds. The guy said to keep the weeds out until he harvested. They held back $1 an acre if you didn't, too. The sugar company gave a gold pin or silver sugar bowl to the family that did the nicest work, and I think my dad won two or three of those."

"The Wilhelm family includes a potential fifth-generation beet grower. Betsy and Richard appear here with their children — Kevin, 9, and Donnetta, 12. Kevin can't decide yet whether he prefers a career in baseball or sugar beets!"

John recalls his own work then:

"I grew up in it and enjoyed every bit of it. I wouldn't want to relive it again on account of shoveling the beets. I worked with a partner reloading beets at 9c per ton, 52 tons per day."

"Then in 1918 the flu broke out. When our neighbor's wife died, he offered to go to the bank with my dad and find a farm and mortgage the whole outfit until the crop was in. Then my dad could release him and mortgage the crop. So we got started farming that year at Gilcrest on the Lorenz farms. We always planted 25 to 30 acres of beets so we could work them ourselves, and from there we really prospered."

John and his wife, Mary, started farming on their own in 1925 northeast of Eaton. They have always raised sugar beets, and John still owns a farm in South Pierce station.

The third generation of Wilhelms in sugar beets is John's son, Richard, father of young Richard. Richard the father is secretary-treasurer of the Eaton Local Beet Growers Association, and has been in the Eaton High Ten in 1966, 1968 and 1970. He started farming on the Hester farm in 1947. Richard and his wife, Liz, have 89 acres of beets this year.

Richard raises corn, some beans and sugar beets. "I used to feed a lot of sheep, but I'm just in the process of making that weed pasture into more beet fields for next year."

A leader in the use of chemical and mechanical weed control, Richard says, "I've been mechanical thinning four years now. As far as I'm concerned, that's the only way to go. I have a fair looking crop, and I don't have that much in it either. I've only got $13 an acre in my beets right now as far as labor is concerned."

So, to young Richard and Betsy Wilhelm passes the legacy of three generations before them in farming and in growing sugar beets here in North Central Colorado. Richard's advice to young people wanting to get started in farming would be to obtain all the knowledge they can about farming from those who know the business. "Of course, my dad and grandpa taught me how to raise sugar beets and corn and how to do things right. I don't have to learn by some of the mistakes that they made because they can say they've tried it and it doesn't work. But practical experience is the best teacher there is . . . just bail in and do it."
It's a Happy Hundredth Birthday for Dr. Asa C. Maxson.

A Centennial celebration all his very own on June 19 marked the 100th birthday of Dr. Asa C. Maxson, center, who almost invented the modern sugar beet while heading the old Experiment Station at Longmont, now the Great Western Agricultural Research Center. Among his many birthday honors, Asa was feted by research staff members and friends at a country club luncheon. In good health, looking much younger than his one century, Asa astounds his friends with his remarkable memory and lively interests. Here he regales those now in charge of sugar beet research — LaMar Henry, left, vice president of agriculture, and Dr. Ken Dubrovin, director of the Center. Asa retired 30 years ago, a short while before LaMar began his Great Western career as a young apprentice agronomist at the Experiment Station.

Powdery mildew traces unpredictable path this year ... 

This year in the Great Western sugar beet growing area, powdery mildew (PM) was first found in a field just a few miles east of Fort Collins. Several days later, the disease was reported near North Platte, Neb. Since then, PM has been spreading steadily covering a sizable area in the Colorado districts. The most heavily infested areas include North Platte, Holyoke, Yuma, Wray and Goodland, Kan.

The infestation pattern this year is somewhat different than that we observed last year. In 1974, the disease moved in from the south and quickly worked up northward in an orderly and predictable manner. Infestation was heavy and severe. This year, however, the disease showed up in a highly unpredictable way and the infestation is generally lighter and milder compared to last year. This is also the general pattern observed in California, Texas and elsewhere — spotty and with a mild infestation.

The most commonly used chemical for PM control in the Great Western area is Stoller Chemical's flowable sulfur called THAT. Fields in Colorado districts have been treated with this compound at the rate of about 2 quarts of material in 3 to 10 gallons of water per acre.

Comments made on the effectiveness of THAT sulfur treatment vary from one grower to another. However, it appears that sulfur treatment at least slows down the disease development, thus slowing down the spreading of the disease.

In areas like North Platte, where both leaf spot and PM occur together, Benlate was applied and results were satisfactory in some cases. Fungicide combinations such as Benlate-Sulfur or Mertect-Sulfur may be the most desirable form to control both diseases in such cases.

Great Western researchers are currently conducting several experiments to test the effectiveness of various fungicides on PM. We expect to obtain some meaningful data from these experiments after this season.

Sugar beet seed harvest above normal, new areas planted ...

Above-normal yields and quality marked the harvest of sugar beet seed this season in Arizona and Oregon. At the same time, in almost back-to-back operations, the planting of the new seed crop neared completion in both states early in September.

The Oregon seed crop, mostly Mono Hy D-2 and A types, was somewhat late but was excellent in yields. In Arizona, additional acreage was planted this year to supplement stocks. Two new areas of Mono Hy D-2 plantings also went into operation. The first harvest of D-2 seed was completed near Rodeo, N.M., on the Arizona line just north of the Mexican border; and the first planting of D-2 was made at Pahrump, Nev., on the California line overlooking Death Valley.

Experimental seed production at Grants Pass, Ore. ...

Great Western's plant breeding program was also advanced by the initiation of a new experimental seed production area in Grants Pass, Ore. Dave Rademacher, manager of agricultural
• Response by Dr. Asa C. Maxson to those who attended his 100th birthday party:

"I can't find words to express my feelings at this moment. Neither can I express my gratitude for all you have done. Recalling and reliving this day will brighten many of what would otherwise be dull moments. I want to thank all of you for what you have done to make this a very memorable and happy day for me. And I pray that the future may have many good things in store for each and everyone of you."

Founder of GW Agricultural Research

Sixty-five years of leadership in sugarbeet research! On his 100th birthday, Dr. Asa Maxson sits at right front with his four successors at the Research Center. At left front, Dr. Harvey Brewbaker, who retired in 1960 with world-wide acclaim for his concepts in sugarbeet breeding. In back, from left, Dr. Bob Oldemeyer, now senior in ranking among American beet geneticists; Ralph Wood, who retired last year from his specialty of improving and adapting varieties to particular areas; and Dr. Ken Dubrovin, the present director of all research at the Center. Dr. Maxson was awarded an honorary degree by the University of Colorado for his work at the Experiment Station, beginning in 1910. Asa set the foundation for the broad fields of research now carried out by the present Research Center, the largest private sugarbeet complex in the free world.

Research in Montana-Wyoming, is being transferred to head up this new development. Dave, who comes from Longmont, graduated from Colorado State University and joined Great Western in 1968 at the Research Center to specialize in plant breeding. In his new position, he will produce seed of new experimental sugar beet varieties so they can be introduced to growers more quickly.

Researchers relocated to support sugarbeet studies...

In order to continue the important research programs in Montana-Wyoming, Will Eitzman is being transferred from the Research Center to replace Dave Rademacher at Billings. Will joined Great Western at the Platteville Growers Service Center in 1971 after graduating from Kansas State University. He later moved to the Research Center in Longmont to participate in the plant breeding program.

To further strengthen Great Western's sugarbeet breeding program, Dr. Jimmy N. Widner, manager of agricultural research in Northern Ohio, is being transferred back to Longmont as senior plant breeder. Before going to Ohio three years ago, Jimmy was a plant breeder at the Research Center. A native of New Mexico, Jimmy joined Great Western in 1968 after receiving his Ph.D. in genetics at North Dakota State.

Research tare lab — source for shaping sugarbeets...

The tare lab at Great Western's Agricultural Research Center in Longmont is not an ordinary tare house. It processes experimental samples from all of the various kinds of tests conducted by the scientists who work at the Center.

An individual sample consists of beets harvested from 18 to 20 feet of row. This comes from a single plot in the many field tests conducted by the research staff. The beets are counted to get a measure of the stand. Sample weights are made, but only clean crowned weights after washing are used. Sugar contents are determined — as in other tare houses — but the equipment is highly automated. As in many tare houses, the nitrate nitrogen content is determined in order to measure field fertility.

Other analyses are made which are not part of factory tare houses. Each sample is analyzed for its apparent purity. This involves treating each sample in much the same way the factory purifies the pressed juice, and measuring the content of impurities left in the juice. This gives an indication of the amount of sugar which GW can actually extract and recover from the beet, as opposed to the amount it contains.

Samples are tested for raffinose and invert sugars which are also considered impurities in sugar processing since they limit the amount of sugar which can be extracted from the beet. All of the information produced in the lab is collected and stored, sorted, and prepared for statistical analysis by a small computer located right in the lab. The ARC tare lab analyzes approximately 60,000 samples per year and between 900 and 1,000 per day.

In short, the Agricultural Research Center Tare Lab provides the best possible information to the research staff so they can develop the best varieties and practices for all GW growers.
Soil Sampling Research in Progress

By DR. A. E. LUDWICK

Extension Associate Professor of Soils
Colorado State University at Fort Collins

During the past several years, researchers in the Department of Agronomy, Colorado State University have been studying the use of nitrate soil testing to predict nitrogen fertilizer requirements of sugarbeets. This work, led by Dr. J. O. Reuss and the author, was supported by financial assistance from the Grower-GW Joint Research Committee, Inc. and directly from Great Western Sugar.

The results of this research clearly established that nitrate soil testing is a reliable method for determining nitrogen fertilizer requirements for the coming beet crop. So important is proper management of the soil's nitrogen supply for high yielding and high quality beets that GW has established a soil sampling and testing service for its growers. This new service will certainly make a real contribution to producing bigger and better future crops.

Real progress has been made, but not all the questions on nitrate soil testing and nitrogen fertilizer recommendations have been answered. The Joint Research Committee recognizes this and is continuing to support nitrogen research at CSU.

The present most critical problem in a nitrate soil testing program is a lack of knowledge concerning the best methods of taking soil samples for evaluating soil nitrate levels on a field basis. Present recommended sampling procedures are based on a combination of experience in sampling gained from studies with less mobile nutrients such as phosphorus and potassium, tradition, and convenience.

There are two important questions concerning sampling for nitrates that need careful study. First, when is the best time to take a soil sample? Presently, farm fields are sampled in either the fall following harvest or in the spring prior to planting. Past research that developed the presently used fertilizer recommendations utilized spring sampling. However, frequently it is not convenient or possible to obtain soil samples early enough in the spring to get the necessary information before planting. Fall sampling eliminates the time problem, but over-winter changes in soil nitrate content could reduce the reliability of the test.

Second, what is the distribution and variability of soil nitrate in farm fields? Knowing this is necessary to determine the best manner of taking soil samples in a field, that is, how many individual soil cores and in what pattern across the field.

To answer these questions 26 grower fields selected by GW agriculturists are being studied (Table 1). The study began in the spring of 1974 with 12 fields (Group 1) to evaluate nitrate distribution and variability within each field. In the fall of 1974, 14 additional fields were sampled (Group 2); these fields were resampled in the spring of 1975 to determine over-winter nitrate changes in addition to nitrate distribution and variability as with Group 1. Sampling was done to a depth of five feet in most cases by one-foot increments on a grid basis. Field size or areas within large fields ranged from 13 to 27 acres and individual grid size was approximately one acre. Each depth increment of each soil core is being analyzed for nitrate. When completed over 4500 soil samples will have been analyzed.

The present timetable is to finish the nitrate soil tests in July and have all the information evaluated by October (1975) in order to provide specific suggestions as to when and how to obtain the most reliable soil sample possible for the 1976 beet crop.

Table 1. Growers cooperating in CSU soil nitrate sampling study sponsored by The Grower-GW Joint Research Committee, Inc.

<table>
<thead>
<tr>
<th>Grower</th>
<th>Location</th>
<th>Grower</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amon Farms, Inc.</td>
<td>Hillrose</td>
<td>Bennett</td>
<td>Holyoke</td>
</tr>
<tr>
<td>Betz</td>
<td>Greeley</td>
<td>Blemh</td>
<td>Loveland</td>
</tr>
<tr>
<td>Brienenman</td>
<td>Loveland</td>
<td>Dunn</td>
<td>Guezi</td>
</tr>
<tr>
<td>Brueggeman</td>
<td>Wray</td>
<td>Hartman</td>
<td>Guezi</td>
</tr>
<tr>
<td>Burkhardt</td>
<td>Longmont</td>
<td>Hartman</td>
<td>Guezi</td>
</tr>
<tr>
<td>CSU Dairy Farm (E)</td>
<td>Loveland</td>
<td>Jimenez</td>
<td>Guezi</td>
</tr>
<tr>
<td>CSU Dairy Farm (W)</td>
<td>Loveland</td>
<td>Johnson</td>
<td>Guezi</td>
</tr>
<tr>
<td>Hirsch</td>
<td>Holyoke</td>
<td>Ver Zionist</td>
<td>Guezi</td>
</tr>
<tr>
<td>Olander</td>
<td>Longmont</td>
<td>Big Springs</td>
<td>Guezi</td>
</tr>
<tr>
<td>Pfieffer</td>
<td>Greeley</td>
<td>Sigwart</td>
<td>Guezi</td>
</tr>
<tr>
<td>Riden (E)</td>
<td>Loveland</td>
<td>Soper</td>
<td>Guezi</td>
</tr>
<tr>
<td>Serl</td>
<td>Yuma</td>
<td>C. Winter</td>
<td>Guezi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F. Winters</td>
<td>Guezi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beringer</td>
<td>Guezi</td>
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</tbody>
</table>
Comparison of Nitrate Content of Soils Sampled in Spring and Fall in the Nebraska North Platte Valley:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FALL SAMPLING (November)</th>
<th>SPRING SAMPLING (March)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grower</td>
<td>1b nitrate N/a 6-foot root zone</td>
<td>1b nitrate N/a 6-foot root zone</td>
</tr>
<tr>
<td>Wm. Groskopf</td>
<td>54</td>
<td>115</td>
</tr>
<tr>
<td>Clint Morrison</td>
<td>122</td>
<td>126</td>
</tr>
<tr>
<td>George Sato</td>
<td>60</td>
<td>33</td>
</tr>
<tr>
<td>George Sato</td>
<td>216</td>
<td>256</td>
</tr>
<tr>
<td>Leland Buchler</td>
<td>46</td>
<td>97</td>
</tr>
<tr>
<td>Leland Buchler</td>
<td>66</td>
<td>89</td>
</tr>
<tr>
<td>Keith Flint</td>
<td>299</td>
<td>292</td>
</tr>
<tr>
<td>Keith Flint</td>
<td>49</td>
<td>81</td>
</tr>
<tr>
<td>George Hutchinson</td>
<td>176</td>
<td>159</td>
</tr>
<tr>
<td>Don Ulrich</td>
<td>126</td>
<td>115</td>
</tr>
<tr>
<td>Don Ulrich</td>
<td>71</td>
<td>121</td>
</tr>
<tr>
<td>Robert Busch</td>
<td>82</td>
<td>54</td>
</tr>
<tr>
<td>Melvin Schmidt</td>
<td>71</td>
<td>97</td>
</tr>
<tr>
<td>L. C. Miller</td>
<td>159</td>
<td>165</td>
</tr>
<tr>
<td>Raymond Spencer</td>
<td>146</td>
<td>165</td>
</tr>
<tr>
<td>Average</td>
<td>116</td>
<td>131</td>
</tr>
</tbody>
</table>

The spring sampling period is even shorter — between thaw and the time to apply the fertilizer before ground preparation. Two weeks is required to process and analyze the samples and then the same amount of time is required for fertilizer application. Therefore, the spring rush for sampling and fertilizer application is often short — between bean and corn harvest, freeze-up, and thaw.

The new soils testing laboratory at Sterling, with the sugar factory at rear, and Process Control Chemist Jerry Steinmeyer, who will supervise analyses of samples for fertility and nematode cysts.

Sterling Soils Lab — Facility for Fertility

By William C. McGuffey
Director-Agricultural Development

*Soil, dirt, sand, gumbo, or whatever you want to call it, not only supports but gives birth to all agricultural products. To understand its components, texture, fertility, organic content, and level of disease or nematode infestation, is only a prudent and wise practice in this day of technology.

One would not pour a concrete slab without knowing the amount of sand, gravel, water, and cement required to make a quality product. Consequently, it is good common sense to know what your soil is and what it contains, to design its productivity level for maximum production. One can then decide whether to utilize the nutritional level already in the soil or by the judicial addition of fertilizers and pesticides enhance its productivity.

Experience in growing various crops and handling soils of a different make-up is the best teacher that a grower can have in knowing and understanding the soil on his farm. The Great Western Sugar Company and others, however, provide an additional tool for good soil management by extending to the growers in Colorado, Kansas, and Nebraska, a soil sampling service. This service came into being because of some inherent problems of excessive levels of nitrogen and nematodes.

To support this soil sampling service, and to expedite the return of information to the growers timely, G.W. Sugar has constructed a new, modern soil’s lab at Sterling, Colorado. This lab determines the fertility profile by analyzing for N, P, K, and organic matter content, plus a cyst count for sugarbeet nematodes. These test results are then utilized by the agriculturists and growers to make sound decisions in the judicial use of fertilizers (especially N) and the economical level at which nematicides should be applied.

Jerry Steinmeyer, Process Control Chemist at Sterling, is in charge of the lab and is responsible for its operation. His keen interest and close association with the problems was instrumental in locating the lab at Sterling. Therefore, he has been directly involved in its design and construction.
At the First National Bank of Longmont...

"I've thinned beets, shoveled beets, swore at beets. I spent all my life in a beet field, and I've done everything there is to do to a beet. I cultivated a thousand acres with that old team of mules."

And that's just part of what he knows about sugarbeets admits Art Salberg, president of the First National Bank of Longmont, who started his working life as a boy on the beet piles and in the beet fields of the family farm.

Art was born and reared and got his experience in beets on his father's place near Cloverley, which was purchased by the Swedish immigrant in late 1890 after coming to the area in 1877. His family of ten farmed 80 acres there until moving to Greeley in 1917. Art recalls, "In the years that we were on the farm, we always raised beets and hauled them to Cloverley by horse and wagon. My job when I was a kid of six or seven was to cover the piles with beet tops at night and uncover them in the morning."

Art put his farming knowledge to work in banking when he joined the First National Bank in 1937 at Johnstown. The Johnstown bank, founded in 1904, was then and still is primarily an agricultural bank and Art believes that the community was built in large part on the success of surrounding farms. "A lot of the farms in that community were paid for with the proceeds from sugar," Art recalls, "and I can attest to that, being in the bank all these years."

In the early years at Johnstown, Art built a solid relationship with GW Sugar when his bank handled the GW plant payroll and he became well acquainted with officers and directors of the company. "Our bank was very close to the GW plant and our relationship with the factory and personnel was A-one."

Coming to the Longmont First National Bank in 1967 as a vice president, Art moved into the presidency in 1971. Over the last several years Longmont's population has more than doubled, "And certainly the wealth of the community has been increased because of the fine beet and other agricultural crops we've had the last three consecutive years," Art says.

The First National Bank of Longmont, fourth largest in north central Colorado in terms of business with sugarbeet growers, serves about 75 growers in the area bounded by Boulder, Lafayette and Broomfield to the south, east to Platteville, north to Berthoud and northeast to Johnstown, and west to the mountains.

Art attributes the growth of northern Colorado to excellent farm yields and prices which add tremendously to the economy of the area. Of the dollar growth in the banking business in Longmont and Johnstown, Art says, "We've more than doubled from $20 million to about $43 million here at Longmont in the last ten years. Johnstown has nearly tripled its business from $3 million to about $8.5 million."

With farming becoming more profitable in recent years, Art believes young people will return to the land, "You work hard, but with the machinery we have today you can get the job done, and I think more young people are going to be interested in farming."

And his bank invests heavily in farm mechanization. "We do a lot of financing of machinery and we have a lot of growers with way over $100,000 worth of equipment. When you're paying $16,000 for a tractor, $22,000 for a three-row harvester, and $20,000 for a combine, it doesn't take long to get up in that $100,000 bracket."

Art's farming background draws him to the farms often. "I spend a lot of time driving around the countryside, watching the crops, talking to the farmers, checking on the water situation and the insects. Makes it very interesting."

Away from the banking business, Art has a more personal interest in the beet crop on a family farm operated by Art Adler northeast of Longmont. "Last year we had ninety acres of beets, averaging 34 tons per acre with 17.5 percent sugar." (Editor's note: Art Adler's crop last year was second-best in the history of the company for sugar production at 11,474 pounds per acre average.) "The last two years we've cut out some other crops and went even a little stronger on beets because we thought the price was going to be good and we were right." And he adds, "As long as I can remember we've raised beets on that farm."

At the Scottsbluff National Bank...

Scottsbluff National Bank opened its doors for business in 1909 — the first bank established in the heart of the North Platte Valley. In its fifty-mile trade radius, 30 percent of Scottsbluff National's customers are directly involved in agriculture. And up to 45 or 50 percent of its customers are involved in agri-business related activities or farm real estate. Between 150 and 170 of its total customers are sugarbeet growers.

H. D. (Hank) Kosman, president of the bank, says he likes the sugarbeet crop because: "It's a very hardy crop — not susceptible to some of the difficulties in weather. Also, the beet farmer has had to be a better manager in order to control costs especially during the past five years. He has had to have maximum production. Planning and good management practices are a must today. I think beet growers compare very favorably, and above in many cases, with the abilities of small businessmen in general."

Born and reared in Omaha, Hank attended high school there...
Another look at the banks and bankers around Great Western Country, a continuing series with emphasis on financial programs for sugar beets.

At the Farmers State Bank of Brush . . .

• "The family farm will be the salvation of our whole country one day. In the future, the farm will be the place where the conversion of solar energy into fuel will take place."

That is the prophecy of Warren M. "Doc" Watrous, president of the Farmers State Bank of Brush. Doc expresses some pretty firm opinions about the energy problem, economics and agriculture in general.

"Before farmers can get involved in this energy conversion, we're going to have to stabilize prices. Farmers have been subsidizing the city people for years and that's going to have to change. People in the cities are going to have to pay a fair price for the farmer's labor investment."

Energy — economics — agriculture. Who would be more qualified to make these predictions than a chemical engineer turned country banker?

Doc Watrous was born in Boston and grew up in Silver Plume, Colo., and Denver where he attended East High and graduated as a chemical engineer from the University of Colorado at Boulder. After several years in Navy and civilian work as a chemist, Doc's father-in-law, Alanzo Petteys, approached him about coming into banking.

Mr. Petteys had started the banking business in Weldona, Colo., in 1914, and moved into the Farmers State Bank in Brush in 1920. Farmers State was chartered in 1916. Doc joined Mr. Petteys at Brush in 1947, starting in the bookkeeping department and moving on up through the officers to the presidency in 1965.

The broad field of chemical engineering made the switch from

Continued on next page . . .

• Doc Watrous, president of the Farmers State Bank of Brush, in his board room at left with Norm Davis, agricultural manager of the Fort Morgan factory district.
that to agriculture and banking less difficult, and Doc is also a 1951 graduate of the University of Wisconsin School of Banking. In his first years at Brush, Doc made it a regular practice to visit with the farmers to understand their problems and operations.

Of modern farming mechanization of the beet crop, Doc says, "I think farms must go to a more mechanized production to eliminate as much labor as possible. But the machinery must be utilized; it's so expensive that it has to be kept busy. There has to be a happy medium on the size of the operation."

Doc believes in chemicals for weed control. "They certainly play a big role in eliminating labor, cutting costs and increasing production, but sometimes some of the farmers get carried away with chemicals. They can do damage if they're not carefully controlled."

Farmers State territory extends north and south of Brush about 20 miles, on toward Akron and halfway to Fort Morgan. Citizen's National Bank of Akron and First National Bank of Wray belong to the family group, which serves about 80 beet growers in the area. Farmers State Bank is predominately agricultural with 80 percent of its business devoted to farming. Total deposits are now up to about $11 million from $3 million in 1947.

The future of sugarbeets in the area is bright, Doc says, "This is a diversified farming area and beets should be a part of our crop rotation. The sugar beet crop is the stable crop in our area. Beets are more hail resistant. The crop has paid for a lot of farms here and will continue to do so."

And new people will be coming into agriculture, "I think there is a definite trend of people, generally, wanting to get back to the country, and the young people are trying to come back and get established. Money-wise it's tough unless they have some family to back them up. But they are the aggressive ones."

Doc owns a couple of farms of his own, and has 60 acres of beets this year under the supervision of Mel Teter at Brush and Hillrose.

Recently elected president of the Colorado Bankers Association, Doc makes another prediction: "One thing I question is just how serious the depression is outside automobile centers and cities where a major plant shuts down. Actually, of the nine percent now unemployed, half of those never did work anyway. So you could say 95 percent of the people that want to work in the whole country are working at the highest pay they've ever had in history. This depression is just a mental state — everybody is frightened. When we get the confidence back, in government and economy, things will improve."

And Doc Watrous believes the family farm will be vital to the solution to the energy problem, "When you take oil and coal out of the ground they're gone, and they're not being replaced. Through the leaves of a plant, energy from the sun can be turned into usable fuel and that will be our salvation."

At the Midland National Bank of Billings...

• Bustling fairly describes business activity in Billings, biggest city in the Great Western producing territory. But with all the commercial trade, agriculture still stiffens the economic backbone of the city and the surrounding Yellowstone Valley, in the opinion of executives at the Midland National Bank of Billings. At Midland National, they ought to know, because farming and ranching have been chief concerns for something like 90 years. Those interests, in more recent decades, called for the formation of an agriculture department with the bank.

Midland National now serves an agricultural area in a radius of about 100 miles out of Billings. At the pivot in the bank, at the president's desk, sits Robert H. Waller, who mixes banking with community service.

Like many a young fellow, Bob Waller heeded the advice to go west — but he took the northern route. From his native Superior, Wis., he attended high school in Minot, N.D., and then the University of North Dakota. His studies were interrupted by Army Service, but he came back to earn his degree in business administration in 1953.

After working in data processing, Bob returned to Wisconsin to start off banking in LaCrosse. He moved west again to Billings and Midland National in 1967. He became president in 1971. His affection for Billings can be measured by his working leadership for Boy Scouts, YMCA, and United Way — he's president this year of United Way.

As time permits, Bob Waller gets out in the country to talk to farmers and look at the land. But the bank's farm and ranch activity functions out of the agriculture department headed by Vice President James A. Wempner, a Minnesotan, who earned his degree in agricultural economics at the University of Minnesota in 1948, Jim also stopped off in North Dakota to work at a bank before he came to Midland National in 1951.

Bob is assisted in agriculture by Ralph Stenehjem, agricultural loan officer, who came to know many farmers and ranchers while working for GW Sugar in the Billings district as an agriculturist and then beet by-products salesman some years back.

In nearly 25 years on the go up and down and around the Yellowstone Valley, Jim Wempner has observed significant changes in agriculture. What do they add up to?

"Management ability," replies Jim. "The farmer today is much more sophisticated, much more knowledgeable, and a much better businessman than the public gives him credit for. If he wasn't, he would no longer be farming!"

Likewise, Jim finds that the farmer has made tremendous progress in adapting technology to his operations. He cites the elimination of much of the hand work with sugar beets. In the move to mechanization, Jim adds, the beet grower became innovative. And he emphasizes:

"To be successful, the farmer must utilize technology."

With management and mechanization becoming more and more important on the farm, Jim sees encouraging prospects for the future in farming, for the family farm, for the young farmer.

"I'm bullish on agriculture," he explains. "It will be kept alive by the real good young operators. Their operations provide the leverage to obtain credit easier than their fathers could. The big danger is if they try to expand too fast. If they move a bit slower, if they use their management ability, they can build a strong foundation."

As for the family farm, Jim Wempner sums up:

"No corporate operation can compete with the initiative and innovation of the individual on the farm. He can find ways to get around obstacles, if he has the interest, if he wants independence, if he loves the land and the work."
The Real Sugar Factory

By Arthur H. Freytag
Senior Research Agronomist
Agricultural Research Center

With his own startling electron photo-micrograph, Art Freytag unveils the mysteries of botany and describes the functions of the sugarbeet cell in terms of the sugar factory process. Here's what happens in every beet field — it's fascinating!

GW's sugar factories aren't really factories, they are refineries.

The real sugar factory, where sugar is manufactured from light, carbon dioxide and water, is the sugarbeet cell. The average cell is about 20 to 30 microns in diameter (about 1/15,000 of an inch) and the typical sugarbeet is made up of 100,000 to 200,000 of these cells.

For understanding let's compare a cell with a sugar factory, and the cell parts (organelles) with the components of the factory. (Letters in parenthesis refer to the photograph).

The nucleolus (nu) contains the genetic material and controls the operation of the cell; this compares to the factory management. The nucleus (n) includes the nucleolus and assists in controlling the cell by coordinating the orders and passing them out into the cell; this corresponds to the foreman and supervisors of the sugar factory.

In the factory the boilers furnish the energy to power the factory; the mitochondria (m) furnish the energy for the cell. The golgi bodies (g) are believed to build and repair the cell walls (cw), similar to the machine shop of the factory. Factories have reserve fuel storage and so does the cell, the lipid bodies (l).

The many workmen of the cell factory are the ribosomes (r), the many black dots. The ribosomes align themselves on the endoplasmic reticulum (er) and form a template for the production of different proteins and fats which are very important to cell metabolism.

The cell pictured is a very young cell and is not yet mature enough to have begun to produce or store sugar.

Key to the Photo:

nu — nucleolus
m — mitochondria
g — golgi
cw — cell walls
l — lipid bodies
r — ribosomes
er — endoplasmic reticulum
• A KSTV television news camera rolls at the Scottsbluff School for the Deaf, at upper left, to record the presentation of speech training machines for children from Dow Chemical Company and Great Western Sugar. The machines were part of more than $20,000 in equipment awarded in several localities from sales incentives for marketing the Dow-fumigant, Telone, through GW Grower Service Centers. The aim was to plow-back the sales contest premiums in the farm communities where both firms operate.

Operation

Plow-back

• At the school presentation at top, from left, Paul Blome, manager of the Scottsbluff Service Center; his wife, Vi; Guy Haggard, regional sales manager for Dow Chemical; George M. Hayle, director of the school; and Bill McGuffey, director of agricultural development for GW Sugar. The same group appears in the middle photo, watching a teacher adjust the machines on two of the youngsters who attend the school for deaf children.

• Farm equipment made up a Dow-GW award to the University of Nebraska Panhandle Station near Scottsbluff, in the bottom photo, with delivery of a John Deere tractor and six Milton planters for use in sugarbeet research plots. Here Dr. John Weihing, at left, station director, accepts the keys to the tractor from Bill McGuffey of GW Sugar, while Station Agronomist Frank Anderson sits behind the wheel.

• Boy Scouts figured in another Dow-GW award resulting from the Telone sales premiums. The Laramie Peak Scout Camp was given 18 rifles for marksmanship training in a presentation to Kurt Weaver of Scottsbluff, field director of the Longspeak Council of Boy Scouts.
Retirements in Greeley district . . .

* Beaming best wishes go to Sven Johansen and his wife Karen, at left, upon his retirement last April as agriculturist in the Greeley district. In line, from left, Johnny Edmiston, retired district manager; Lynn Pitcher, retired assistant manager; LaMar Henry, vice president of agriculture; and Frank Zumbrink, present agricultural manager at Greeley. Before Sven came to Greeley in 1953, he spent 13 years in sugarbeet management in his native Denmark, including the war years under Nazi occupation. Sven and Karen continue to live in Greeley, where he now represents the Opdyke real estate agency.

* Retirement from a GW career spanning 34 years came in May for Earl Lewis, at left, assistant beet reloading manager at Greeley. Here, with his wife Lillian looking on, Earl receives his service certificate from Vice President LaMar Henry. Before he came to the heavy equipment shop at Greeley in 1957, Earl worked at Windsor on the old company farm and on the ag maintenance crew. He was succeeded by H. R. (Butch) Wagy, whose Great Western lineage goes back to his grandfather, Morris M. Wagy, who began his career in 1915.

Operation Plow-back provides rescue van for Platteville fire district . . .

* At Platteville, Colo., Grower Service Center sales volume of Telone provided for a Dodge one-ton van to be equipped and used as a rescue vehicle by the Platteville Fire Protection District. At the picnic presentation, above from left, Herman Kauffman, fire chief of Gilcrest; Lloyd Rigg, mayor of Platteville; Dean Crosier, mayor of Gilcrest; Guy Haggard of Dow Chemical; Mel Camp, president of the fire district; Vince Erickson, supervisor of the GW Service Center; and Bob Kern, assistant fire chief of Platteville.
Retirement comes for

Dr. Bob Whitney

Grass Roots Agronomist

But as thousands of his students at CSU might expect, Bob now plans to find new ways to put agriculture to work!

Retirement from academic duties at Colorado State University has come for Dr. Bob Whitney—but not retirement from agriculture!

Those involved in agriculture in Colorado have been hearing from the CSU agronomy department chairman for the past 40 years. And the things he has been saying have had an important effect on the agricultural community of the state, the nation, and in many cases, the world.

Being very unassuming in nature, however, Whitney will not readily agree with such statements, in spite of the fact that he has played a major role in molding the department which turns out the men and women who go into careers which are ultimately responsible for putting food on America's tables day after day. These people include many sugarbeet growers in Colorado and other parts of the Great Western territories and many members of the Great Western agricultural staff.

Described by some as being almost "fanatic" in his dedication and loyalty to his faculty and staff, Whitney stepped down June 30 from heading a department which has produced countless soils scientists, agronomists, and crops specialists who are now working around the globe to produce food for the people.

Whitney places a lot of emphasis on world agriculture: "People are starving and dying; there's no question about it," he said. "A moral question is involved. And I think that Americans are kind of built with the idea that we like to help people when we can. This country can't expect to feed the entire world with our agricultural products, but we can transfer the principles and practices of good agriculture to lesser developed countries so that they can help themselves."

Whitney has seen a world of changes in agriculture and students since he first joined the University in 1935 just after receiving his bachelor's degree at CSU. (He later earned his master's and doctoral degrees from Cornell University.)

He usually describes the changes as cycles, rather than just out-and-out changes. Students, besides increasing in number from about 1,700 to more than 17,000 at CSU, have completed cycles several times. Students change from studying agronomy to get off the farm, to studying the science to get back to the farm, he said.

Although he has retired as department head, Whitney plans to continue to keep office hours on campus. He explained that, maybe, he will be finding ways to keep putting agriculture to work, perhaps through international programs.

The new chairman of the agronomy department is Dr. Wayne F. Keirn, who was professor of agronomy at Purdue University. He also held faculty and graduate appointments at Iowa State University, California Institute of Technology and Cornell University.

Keirn has been visiting professor at the University of Hawaii and at the CSU department of agronomy. From 1962 to 1963 he was at the University of Lund, Sweden, as a faculty fellow under a National Science Foundation grant.

He earned an undergraduate degree at the University of Nebraska in agronomy and mathematics and his master's and doctor's degrees at Cornell University. His graduate work was in plant breeding and genetics, cytology and plant physiology.
Never-Never Land now in Beets

Never say never to Kenny Hopp, who broke old ground to a new crop!

Sugarbeets have been a commercial crop in the Loveland area since the original Great Western Sugar Company was founded there in 1901. But never in all the years since the turn of the century have sugarbeets been grown on a piece of land north of Longmont now owned by the Kragh family and farmed by Kenny Hopp.

Kenny changed the course of history this year by planting 13 acres of sugarbeets on the 160-acre Kragh farm which lies adjacent on the south to another 160 acres he farms.

The Kragh place was originally purchased in 1900 by George F. Owen from the Union Pacific Railroad for $5 an acre. Owen farmed the acreage with horses until 1940; then his daughter Mary Owen Isenhart ran the operation until 1968. Upon her death in 1970, the land was leased to Kenny Hopp by the Kragh’s, Owen's grandchildren and present owners.

Jane Kragh says, “Although my grandparents and aunt always considered the soil too poor for sugarbeets after one attempt to grow something called ‘cow beets’ in 1910 that was a disaster, Mr. Hopp has convinced us that with modern machinery, chemical fertilizers, weed sprays, bug sprays, and a good irrigation system, we can grow beets on this farm.”

Jane’s brother, James W. Kragh, an engineer for North American Rockwell, will be working on the new irrigation project this year. Kenny says, “There aren’t too many acres under irrigation yet — about 60 — but we’re developing more as we go along. I hope next year we can come up with another 20-acre field under irrigation. This farm is difficult to lay out, but with commercial and natural fertilizers it responds quite well.”

Reid Dickerson, Kenny's GW agriculturist, talks about this year’s crop: “Kenny has really had quite a struggle. We had a wet spring, but through storms he got it planted using Ro-Neet. He post sprayed, once with Dowpon, once with Betanex. The crop shows that there has been a lot of work, and the progress is now really starting to show.”

The original house and barn are still standing on the Kragh property. The two buildings are almost uniquely identical in dimensions; the nails are square; and the lumber is rough-sawed.

Kenny says, “We’ve had some trouble with vandals, and it’s a shame to see this happen to an oldtime relic like this.”

The original orchard around the house also remains standing as a haven for wildlife. The water source for the old house was a cistern, and domestic water was brought from town. Presently there is no electricity or domestic water on the farm.

“Actually, if you lived out here, you’d really be roughing it,” adds Kenny.
Jack B. Powell Appointed President of GW Sugar

In the Sugar Building, it’s only one flight of stairs down from the drafting room to the president’s office. To walk down that one flight, Jack B. Powell spent nearly 28 years working his way up, step by step, through numerous promotional-transfers in almost every area of the company. Fresh out of college, still with a crew-cut from four years in the Army, Powell came to the drafting room in 1947 as a mechanical engineer. Soon he was on the road — a traveling engineer at Colorado factories, resident engineer in Northern Ohio, then factory manager at Fremont, Ohio; Mitchell, Neb.; Brighton, Colo.; back to Nebraska at Gering, back to Denver to the manufacturing staff and then district superintendent, back to Ohio once again as district general manager, back to Colorado in the same job at Fort Morgan. Two years ago he returned to the Sugar Building to become manufacturing director, then vice president, then executive vice president. On June 25, 1975, the long trip down that one flight of stairs ended for Jack Powell with his appointment as President of Great Western Sugar.

Agricultural Management Assignments...

Retirement from a career of nearly 30 years comes Oct. 1 for Lee E. Butler, area agricultural director for Wyoming/Montana. Butler came to Billings in 1970 from three years of district agricultural assignments in Colorado and Kansas. Earlier, he was agricultural manager at Eaton, Greeley, Longmont and Ovid, and assistant at Brighton. Butler began his field career at Eaton in 1946 upon separation from six years in the Air Force with the rank of lieutenant colonel. He is a graduate of Colorado State University and Loveland High School.

The area agricultural post at Billings will be assigned to Ralph W. Hettinger in addition to his present duties as area agricultural director for North Central Colorado. In his earlier career, Hettinger spent 20 years in the Billings district.

Leonard H. Henderson, area agricultural director for Nebraska, was appointed director of agricultural staff services at the Denver office. In Nebraska for almost all of his career of 33 years, Henderson earlier was agricultural manager at Scottsbluff, Gering, and Bayard, and agriculturist at Lyman. He is a graduate of Colorado State University and Greeley High School.

Donald G. Redman, agricultural manager of the Kemp district, was named area agricultural director for Nebraska. Before he went to Goodland two years ago, Redman was agricultural manager at Eaton, staff assistant at Denver, and assistant manager at Fort Morgan. He began his career in the Ovid district in 1946. Redman is a graduate of Colorado State University and Longmont High School.

Waldo T. Peterson, director of staff services at the Denver office, was appointed agricultural manager of the Kemp district. Before he came to Denver in 1969, Peterson was agricultural manager at Greeley, assistant manager at Billings, and agriculturist at Laurel, Mont., and Kimball, Neb. He began his career at Brighton in 1950 upon graduation from Colorado State University.

James Davidson, agriculturist at Alliance in the Bayard district, was promoted to the new job of assistant agricultural manager at Sterling. Before moving to Alliance in 1969, Davidson spent seven years at Bridgeport and began his career at Alliance in 1961. He is a graduate of the University of Wyoming and Laramie High School.

Jerry F. Young, agriculturist in the Ovid district at Big Springs, Neb., was promoted to the new job of assistant agricultural manager at Bayard. Young came to Big Springs in 1962 after a brief period at Greeley. Earlier, while attending Colorado State University, he worked in process development at the Loveland sugar factory. Young went to high school at Johnstown and Windsor.
O Heavenly Father,
we pray to Thee now at harvest time not only to ask Your blessings upon our crops, Lord, but more importantly to thank You for all You have given us.

Thank You, Lord,
for bringing us to this time when we can take in the crops which You have produced. We know that the toil and sweat of our brows which we have put into these crops would have no meaning at all if it weren't for Your gift of life.
In You, Lord, rests the key to all life.

A farmer can only love the land with which You have blessed him.
A farmer can only plant a seed, he cannot make it grow; he can only distribute the water that You send him for his thirsty crops, he cannot create it.
A farmer can only be thankful for Your energy from the sun and marvel at the miracle of transformation of that energy.
For the farmer is but one of your tools, Lord, through which You work to produce more abundantly for the peoples of the earth.

And so Lord,
we pray in Jesus' name, not in a selfish way for the success of our crops, but that we have done Your will and that our work will be satisfying to You.
Amen.
THIS VOLUME IS BOUND INCOMPLETE AND LACKS:

v.64, no.1, 1976
Sunspots Predict Weather
## Contents

### FEATURES
- Weather Predictions from Solar Activity 3
- World Food 6
- Nutrition Experts Say Sugar Vital 9

### REPORTS
- Mark Named Executive Vice President 5
- Wind Erosion Control Funded 10
- Bayard Gets Top Safety Award 12
- Start Thinking Metric 13
- No Grain Reserve Forecast 13
- Environmental Impact Expenditures 14

### HOME BASE
Scientists may be able to predict weather patterns and droughts years in advance by studying the influences of solar activity on the earth's weather patterns. In a paper presented at the 1976 Annual Technical Conference of the Sprinkler Irrigation Association in February, Louis M. Thompson, associate dean, Iowa State University (Ames), shows the similarity between 20-year solar cycles and cyclical weather patterns of the Great Plains of the United States.

The solar cycle, charted by the movement of spots appearing on the sun, corresponds to serious drought trends recorded at about 10-year intervals, according to Thompson. While scientists have been aware for almost a century that a sun-weather relationship exists, no cause and effect relationship has been established. But with the development of computers and sophisticated analysis methods, the possibility of long-range weather prediction may be possible. The key is sunspot activity.

Sunspots can be seen with the naked eye, but not until Galileo developed the telescope in 1610 was any systematic study possible. In 1700, scientists developed an indexing method for keeping records of sunspot activity. The index is an expression of the number and size of the spots. With this index system, researchers can track sunspot density and movement. For (continued on page 4)
example, they have discovered that the average length of sunspot cycles is 11 years, with variations from 9 to 14 years. Cycles begin with a few spots or groups of spots appearing at 30 to 35 degrees latitude in both hemispheres of the sun. In about 4 or 5 years, spotiness increases to a maximum and activity is centered around 20 degrees latitude. Spots in both hemispheres are near the equator toward the end of the cycle.

During greater sunspot activity earth receives more charged particles, which increases static on radio communications. The amount of ultraviolet light reaching the earth is also increased. In addition, high sunspot activity disturbs the earth's magnetic field which affects compass needles.

Double sunspot cycles of 20 to 22 years are determined by the positive and negative aspects of the spots. Photographs of the spots show that one side is very dark or positive and the other light or negative. As the spots appear to be moving across the face of the sun, the edge facing the direction of movement is positive on spots in one hemisphere and negative on spots in the other hemisphere. This polarity is consistent during the 11-year cycle and reverses in the next cycle. The first 11-year cycle has been designated as the minor cycle and the second as the major cycle because of their positions on a plotting graph (Fig. 1).

In comparing these sunspot cycles to July and August temperature patterns, scientists have found that minor sunspot cycles correlate with cooler, wetter decades and major sunspot cycles associate with warmer decades. These conclusions are based on studies of temperature patterns in England, and the U.S. Corn Belt. Studies showed that the only months of the year with distinct temperature patterns were July and August and that for these months alternate decades tended to be warmer or cooler. The period from 1902 to 1910 was unusually cool and wet. The next decade had several warm summers, and the twenties were characterized by cooler summers. The thirties were warmer than normal and the forties were relatively cool. The warmer temperatures appeared after the peak of the minor sunspot cycle and near the peak of the major cycle (Fig. 2).

Similarly, droughts correspond to sunspot cycles. While droughts are difficult to characterize by weather data, Thompson points out that they are likely to occur during hot periods, "particularly in midsummer as the soil moisture is exhausted by evapotranspiration." Droughts in Nebraska since 1890, like warmer temperatures, occurred after the peak of the minor sunspot cycle and before the peak of the major cycle. The current drought is occurring in the same phase of the sunspot cycle. Other studies have shown that the centers of drought patterns in the Great Plains occurred during years of least sunspot activity.

Exceptions do exist, however. Thompson points out that in 1947 a summer drought occurred during peakspot activity. But the odds favor a drought in a year of least solar activity, he says.

Still another element scientists must study in connection with sunspots and weather cycles are disturbed or abnormal atmospheric patterns in which circulation seems to be blocked causing storms to bypass an area, usually to the north. Blocking systems occur intermittently around the earth at about the same latitude. In 1975, the drought in the Corn Belt was caused by a stationary high pressure ridge across Nebraska and Iowa from July 1 to August 10. Iowa received 1 inch of rainfall during this period. The normal is about 3.6 inches for July. Similar blocking systems occurred in Nebraska and western Iowa in 1974, and created severe droughts in Russia in the summers of 1972 and 1975.

While more extensive studies must be conducted to establish causes and effects of solar activity and weather patterns, evidence available today indicates the relationship is not coincidental. Further research may make long-range weather forecasts a reality.
Mark named executive VP

James L. Mark was named executive vice president for The Great Western Sugar Company (GWS) in an announcement made by Jack B. Powell, president of the firm, May 20. Powell also announced the appointments of three vice presidents and an assistant to the executive vice president.

Powell said Mark will now be responsible for agricultural, marketing/sales and manufacturing departments of the company, easing the load carried by the president's office. Mark is a veteran of 25 years with GWS.

Newly appointed to vice president positions are Peter J. Adolph, vice president and general counsel; C. H. "Chris" Criswell, Jr., vice president of sales; and James E. Hanna, vice president of marketing. Elmer E. Loose was named assistant to the executive vice president.

Mark joined GWS in 1951 and has extensive experience in many areas of company operations, advancing through the years with successive promotions in sales, distribution and accounting. He was named director of material in 1973, which included responsibility for purchasing, transportation and distribution. He became a vice president in 1974 and was appointed group vice president of sales and marketing in early 1975. He was promoted again to senior vice president in March of this year. Mark majored in marketing at the universities of Colorado and Denver and is a native of Englewood, Colo.

Adolph had been general counsel and director of legal affairs for the company since 1975. Previously he was vice president, general counsel and secretary for Shakey's Incorporated of Englewood, Colo. Both Shakey's and GWS are subsidiaries of Great Western United Corporation. Prior to joining Shakey's, Adolph was engaged in private law practice. His experience includes six years with the U.S. Securities and Exchange Commission and three years with the U.S. Department of Commerce. Adolph earned his bachelor of arts degree from Williams College, Williamstown, Mass., a bachelor of laws degree from Harvard Law School and a master of laws degree from Georgetown University Law Center.

Criswell became general sales manager for consumer and industrial sugar products in 1973. He had been sales manager for grocery products and earlier had held sales and merchandising positions at GWS. He began his career in the traffic department in 1951. Criswell was born in Greeley, Colo. and attended school in Denver.

Hanna moved to the sales department as director of marketing in 1973 after four years as supervisor of financial planning and analysis. Earlier, he was accounting manager for Colorado Milling and Elevator Company, which at the time was a part of the Great Western United complex. Hanna joined GWS in 1967. He earned his business degree at Colorado State University after growing up in Longmont, Colo.

Loose joined the sugar company in 1968 and served for five years as assistant statistician, statistician and data systems analyst. In 1973, he was named manager of agricultural economics. He became administrative assistant to the vice president of finance and statistical analyst in 1975 and most recently served as assistant to G. Michael Boswell, vice chairman of the board, GWS. A native of Colorado, Loose grew up near Wiggins and graduated from Colorado State University.
WORLD FOOD

Editor’s note: The following article is prepared from a paper by H. O. Kunkel, dean of agriculture, Texas A & M University (College Station), presented to participants of the 1976 Technical Conference of the Sprinkler Irrigation Association. It is printed through the courtesy of the association.

One of the most telling issues of 1976 and beyond is that our world food economy seems to be undergoing a fundamental change. The world has now basically depleted the two major food reserves that it has held through much of this century: stocks of grain held by the principal exporting countries and idled cropland in the United States. Some marine biologists think the world catch of table-grade fish may be approaching its maximum sustainable limit. Ecological stresses — overgrazing, deforestation, desert expansion, soil erosion, siltation of irrigation reservoirs and increased flooding — may well override the drive to step up food output by additional capital investment and to extend food production into other lands.

Primarily, the world food problem is one of sufficient grains because they are the principal food in the larger part of the world and the major raw material of food production in the industrialized world. Isolating the food problem to grains, however, does not simplify it. World food needs are a complex of populations, their size and ability to buy, and national policies and the problems of weather, climate, fertilization and so on inherent in these.

The world population and food situation has shifted in several important ways. The spread of family planning, especially in the developed countries, is an important progressive step. Gains in agricultural productivity have been greater than expected. Progress has been made, but new complications have arisen — stringencies in fuel supplies and rapid costs of agricultural materials (machinery, fertilizer, pesticides) aggravate an already difficult and complex set of problems.

Population Growth/Economy

Most estimates suggest that the world population crossed the 4 billion figure sometime during 1975. The projected figure for the year 2000 is about 6.5 billion if the population continues to grow at an average of 2 percent per year. The actual figure may differ, but the trend is clear: global population continues a relentless growth although a number of countries, including mainland China, have started to reduce their rates of population growth.

In addition, demands on world supplies of food have been accentuated in the past five years by growing affluence. Although weather had a persistent effect, the current “food crisis” was triggered by the 1972 decision of the Russians to buy grain instead of slaughtering its animals, historically their method for dealing with crop shortfalls. Japan, now the world’s largest grain importer, has been upgrading diets in the wake of its postwar prosperity. The recent unprecedented accretion of purchasing power in the oil-exporting countries is now reflected in their expanding food imports.

Ambassador Edwin M. Martin, chairman of the Consultative Group on Food Production and Investment in Developing Countries said at a recent symposium: “We face two central world food problems. The first is to produce enough food for everyone to be able to eat enough. The second, and much more difficult, is to enable and persuade each person to buy and consume ... the food which will provide ... an adequate diet.” Actually, it is possible for us to produce enough globally to feed everyone adequately. For one point, the grain now fed to livestock represents a large potential food reserve. In an emergency, world food supplies could be increased by diverting this grain to direct human consumption. But the fundamental problem is distribution, which Martin says is “a polite term for poverty.”

The United Nations Food and Agriculture Organization (FAO) estimates 400 to 500 million people suffer from malnutrition sufficiently to reduce their capacity to live a full life. The great portion of them live in the developing countries. Unless developing countries are able to move to self-sufficiency in food production, the problems will likely worsen. The population growth in developing countries is three times that of the developed world. But despite the increasing percentage of money people with low in-

“The world has now basically depleted the two major food reserves that it has held through much of this century...”
comes spend for food, poor families tend to neglect the special needs, especially protein, of vulnerable groups such as very young children and nursing mothers. As one researcher says, those with money eat well wherever they may be, while the poor eat poorly, whether they be in Bangladesh or Boston.

National Policies

Prior to 1940, all geographic regions of the world, except Western Europe, were net exporters of grain. North America was not the leading export region. Eastern Europe including the Soviet Union (9 million tons) and Latin America (9 million tons) exported as much or more than North America (5 million tons). But this situation has changed. North America has emerged to a position of unchallenged dominance as a global food supplier, doubling grain exports during the 1970s to a level around 90 million tons annually and accounting for over 90 percent of the net grain export.

But more and more countries, both developed and developing, are importing more than they produce, becoming nations with a primary dependence on imported foodstuffs. Of the importing regions in the world, only Western Europe has reached a point of stability as a food importer. Asia—mostly three countries, Japan, China and India—has become a massive consumptive nation. But three times the importing, and by the organization of its agriculture over the past decade has been much lower than the leadership had hoped. A change in investment emphasis is suggested to advance in the war on world hunger.

But the possibility of meteorological disaster remains very much a reality and particularly so since 1974 when Americans were forcefully reminded it could still happen here. Over much of mid-America, the spring of 1974 was too wet to plant, then drought came in the summer, followed by early frost. The United States is now in the severest drought in well over a decade. Cattle herds are being thinned, and the pace of liquidation will surely be stepped up if the drought continues. Prognosis for the 1976 wheat crops is becoming more discouraging daily.

Soviet Union. Agricultural production of the Soviet Union is severely constrained by its natural environment and by the organization of its agriculture. Soviet agriculture is, in the main, low rainfall agriculture similar to that of much of the North American Great Plains. The winters in the Soviet Union are severe; the growing and grazing seasons are short. It has no dependable region such as the U.S. Corn Belt. Additionally, the Soviets have problems with central planning, inefficient use of the labor force, weakness in management skills, poor equipment maintenance and poor incentives for those working the land. Soviet per capita consumption of grain—both that consumed directly and that consumed indirectly in the farm animal products—moved above that of the United States in 1974. But, despite demand, meat consumption per capita in the Soviet Union is about half that in the United States.

U.S. Department of Agriculture analyses indicate the Soviets have severely trimmed their livestock numbers in an apparent effort to conserve grain supplies until the 1976 crops are ready. The decision to cut livestock numbers likely resulted from the severity of the shortfall—a harvest estimated to be 137 million metric tons, about 36 percent short of the initial target of 215 million—and difficulty in handling the congestion at Russian ports caused by foreign grain already shipped.

Soviet spokesman and agricultural leader Fedor Kulakov has suggested that the return on heavy investment in Soviet agriculture over the past decade has been much lower than the leadership had hoped. A change in investment emphasis is suggested toward the exploitation of minerals and other raw materials for export. The reductions in livestock numbers this year are principally in swine and poultry. The Soviet cattle herd apparently is being given top priority so that it can weather the current shortage; hogs and poultry can be replaced much more quickly than cattle. But reduction in Soviet dependence on imports in the years ahead appears improbable. The problem is not the magnitude of their grain imports but the erratic nature of their demands.

Although the uncertain Soviet demand on grain supplies appears to be the major destabilizing factor on the world food economy, it is but one of (continued on page 8)
As population pressure began to force countries to look for land to produce rice, population growth in the developing world seems inexorable. Other nations are traveling the acquisitive road to more and more consumption.

Japan. Japan imports more grain than any other two countries combined. The country is importing at the rate of 20 million tons of grain a year, mostly feed grains and wheat, making it more dependent upon imports of grain than on its own production of around 12 million metric tons per year. As population pressure began to mount several decades ago, the Japanese began to reserve their limited lands for rice production, turning to the ocean for protein in the form of fish. Postwar prosperity has enabled the Japanese to enrich their diets and, as a result, they now make increased claims on the world’s fisheries and grain supplies.

China. The Chinese import more grain than does India. However, China appears to have its food supplies and population in balance, for the time being at least. The Chinese have used their surplus of seasonally idle labor for the construction of rural roads, irrigation reservoirs and canals, literally by the hands of thousands. It has apparently faced the population problem head on, reshaping its economic and social policies to discourage large families. But pressures on agricultural resources are being felt. The land is being shifted from soybeans to cereals. Long adept at the conservation and use of wastes for fertilizer, China has now turned to manufactured nitrogen fertilizer. Massive new nitrogen fertilizer plants are under construction by foreign engineering firms, mostly United States firms. Limited Chinese research capability, however, could well limit the returns of fertilizer application. China could come to a point of self-sufficiency in food, by moving toward population stability and thus contribute to solution of world food supplies.

India. India doubled its wheat crop between 1966 and 1971, a national performance unmatched in the world. India was nearly self-sufficient in cereals in 1972. India’s agriculture produced about all that the market could take, although malnutrition remained extensive among the poor. Since 1972, however, all has not gone well with Indian agriculture. The 1975 wheat was reduced by an estimated million tons because it lacked fuel to run its irrigation pumps. India, a major beneficiary of the “Green Revolution,” more than most other countries has been adversely affected by the short supply and high price of fertilizer. India is capable of producing more food, but it has not been able to put together all the resources to maintain the momentum.

Brazil. Brazil is running a race with China with a population growth of nearly 3 percent and a growing economy. Its potential as a source of food for the world is less than what it was thought to be. As for the Green Revolution countries — Mexico, the Philippines, Pakistan, Turkey, as well as India — it is also a case of population overrunning technology. Mexico exported part of its crop in the late 1960s; today it must import. The situation is true of Philippine rice. The Green Revolution should have bought time, 15 to 20 years to get population under control. Half of that time has passed. The efforts in population control are simply not enough.

Oil-Exporting Countries. The new claimants on world food supplies are the oil-exporting countries. With unprecedented increases in purchasing power, a substantial portion of the world population (268 million) and a history of a modest food consumption per capita, the potential demand is tremendous, particularly if oil dollars spread to the lower-income groups.

Most of the oil-exporting countries have long neglected their agriculture. They are semiarid and face the effects of severe ecological stresses in agriculture. Nearly all oil-exporting countries have food deficits, some substantial. Some countries — Ecuador, Nigeria, Iran and Iraq — are intensifying their investment in agriculture but more than capital will be required. The support system for agriculture must include a research capacity, technical advisory service, farm credit, roads and markets and, in many instances, reforms in land tenure.('/n
Future Supplies

Much of the discussion concerning world food supplies has the tone of Malthusian inevitability. It is a tone of pessimism. But while the current shortfalls in food are being ameliorated, complacency may set in. Indeed, with larger harvests the last year in many countries, much of the earlier enthusiasm for establishing international food reserves of grain appears to have declined.

News reports indicate that the current international thrust to construct the framework for creating world food grain reserves has received less than enthusiastic support from many of the richer nations. But another drought somewhere in the world will easily tip the balance to a world shortfall once again. That drought may well be under way now in mid-America.

What does this all come down to?

(continued on page 14)
Nutrition experts say sugar vital

Two leading nutrition experts have refuted the anti-sugar crusade led by actress Gloria Swanson and Sugar Blues author William Dufty. Fredrick Stare, chairman of the Department of Nutrition at the Harvard School of Public Health and Thomas Jukes, professor of medical physics at the University of California, Berkeley, state that sugar is a "normal and healthy" part of any diet and that fat, not sugar, is the real villain of American eating habits.

"Sugar is a normal part of the diet, and does not make up nearly so large a portion of the American diet as most people think it does," notes Stare. "Forty-five percent of the calories in the American diet are provided by carbohydrates. And of that 45 percent, most comes from starches."

The total percentage of sugar in the diet, according to Stare, averages 15 percent — a percentage which Stare and Jukes agree is virtually harmless. "The only sugar-caused ill is tooth decay, which is best solved by fluoridating the water," Jukes told The Denver Post recently, while visiting the city to consult with representatives of Great Western Sugar Company. The real dietary danger lies not in sugar but fats.

According to Jukes, "the American diet today is too high in fat calories. We should get more of our calories from carbohydrates, and less from fat and protein." Sugar is a carbohydrate.

Stare agrees that a drastic reduction of carbohydrates in the diet could result in a health-impairing increase in fat intake. As he explained recently in an interview with Barry Farber on WOR Radio, New York: "There are only three things you can chew on — fat, protein and carbohydrates. And if you cut down drastically on carbohydrates, you're going to eat more fat."

And fat, particularly saturated fat, is a leading contributor to heart disease. "Coronary arteriosclerosis," Stare says, "is the principal cause of death in Western civilization."

Jukes, who joins in Stare's caveat against eating too much fat, adds that he does not believe Americans eat too much sugar, no more than much fat, but not too much sugar.

Stare, whose own credentials in the nutrition field are irrefutable (he earned a PhD in nutritional biochemistry before entering medical school), discards arguments by sugar-detectors Gloria Swanson and William Dufty because "I have no respect for their qualifications in the area of nutrition, health or medicine." He refutes the claims of Swanson and others that elimination of "free" sugar — sweets, sugar in coffee and the like — increases one's pep and energy "because 75 percent of the sugar we consume is included in other foods." Cutting out "free" sugar, in other words, eliminates very little sugar indeed — certainly not enough to enhance one's physical well-being.

And to Dufty's definition of "sugar blues" as "a state of depression or melancholy overlaid with fear, physical discomfort and anxiety ... caused by human consumption of refined sucrose — commonly called sugar," Stare replies: "I disagree with it. I don't know of a responsible physician who would agree with that statement, either."

Nor does Stare know of a responsible cardiologist who would concur with the oft-expressed notion that sugar is linked to heart disease: "I don't know of a single person who worked experimentally in the area of heart disease who thinks that sugar has got anything to do with heart disease. ... It doesn't."

In addition to the many harmful things that sugar does not do are the myriad beneficial things that sugar does. Stare's analysis of the positive effects of sugar consumption — more psychological and sociological than physical — add fuel to the pro-sugar argument, as well as provide an inkling of eating habits yet to come.

First of all, sugar makes food taste better. Such an apparently simplistic statement belies the real significance of this benefit, its psychological impact on people's eating habits. As Stare puts it: "People eat not because they're trying to nourish themselves. They eat because eating is one of the pleasures of life. Sugar is added to so many foods because it makes food taste better. Food is not going to do you any good if you don't eat it."

And with the world population explosion already a reality and even more food shortages in the offing, the role of sugar in the diets of future generations is likely to be a vital one. In a world short of calories, food producers will be looking for the most efficient source of calories in terms of land usage and in terms of energy required to produce the food. This crucial fact about sugar, which will grow even more critical in years to come, is a fact that anti-sugar forces ignore entirely.

But Fredrick Stare has not ignored it, and he predicts that sugar consumption will continue to increase until it comprises 20 to 25 percent of our total calories — rather than the current 15 percent — 25 years from now. But, he hastens to add, lest the sugar-haters grow even more alarmed, "that still leaves 75 percent of your calories to come from beans or green beans or anything else, to get your vitamins and minerals."

Stare, who coauthored the book, Panic in the Pantry with Elizabeth Whelan, believes the public has been "sold a bill of goods" by consumer advocates and health food faddists who tell them that food additives will make them sick or shorten their lives. He foresees Americans moving toward a period of more convenience foods and processed food "simply because of women's liberation." He also feels "absolutely nothing is wrong" with what is commonly known as junk food because "nobody is going to live solely off potato chips."

Nobody is going to live solely off sugar, either. Yet, like potato chips it has been the target of some startling misconceptions. While many believe sugar comprises a major — and deadly — portion of the American diet, its presence, as the experts see it, is minimal; its harmful effects virtually non-existent; and its benefits — now and in the future — many.
Wind erosion control systems on the Great Plains are once again getting heavy attention from the U.S. Department of Agriculture. The department announced two programs recently that will aid wind erosion control measures in the Great Plains. One program will provide financial assistance to farmers; the other will study windbreaks in the region.

Under the first program, $15 million has been added to the 1976 Agricultural Stabilization and Conservation Program (ACP) for wind erosion control in the Great Plains. Farmers in Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Wyoming will be eligible for money to cover 50 to 90 percent of the cost of wind erosion control measures.

Field surveys conducted by the Soil Conservation Service (SCS) show some 8.2 million acres in the Great Plains were damaged by wind erosion during the period from November 1975 through May 1976. These statistics and a 1975 report compiled by the General Accounting Office stating action is needed to discourage removal of windbreaks on the Great Plains convinced SCS of the need to gather accurate, up-to-date information on windbreaks throughout the region. The SCS study will determine the number and types of farm windbreaks now on the land, trends in their removal and planting and reasons for removals.

ACP supplemental funds paid to farmers will be available only in counties that now participate in the Great Plains Conservation Program. These funds were initially appropriated by Congress for immediate relief of drought-caused wind erosion problems. Because those problems have been eased by rains in some areas, the money will be used for permanent conservation practices to prevent recurrence of the wind erosion damages. Cost sharing will be limited to three practices: establishing field windbreaks, permanent vegetative cover and strip cropping systems. Special practices to solve unique problems may also be approved.

Only annual conservation agreements will be available under the 1976 ACP funding program. Payments to a farmer, including both regular payments and payments under this allocation, are limited to $2,500.

Five million dollars of the total allocation will be held for Great Plains states that justify additional need. The $50 million will be allocated among the 10 states as follows:

- Colorado: $884,342
- Kansas: $1,097,282
- Montana: $947,760
- Nebraska: $981,508
- New Mexico: $829,063
- North Dakota: $806,678
- Oklahoma: $1,016,663
- South Dakota: $690,219

Texas: 2,400,109
Wyoming: 963,578

In the SCS study, recent aerial photographs will be compared with those made in 1970-71 to determine the number of windbreaks planted and the quantity removed in the last five years. The study will also identify the type of windbreaks being removed, such as trees. Finally, field personnel will establish criteria for removing windbreaks. Criteria will include clearing the land, trends in their removal and planting and reasons for removals.

Wind on this farm piled soil two feet deep along fences after fall plowing of unprotected fields left topsoil exposed to 50 mph winds gusting to 60 mph.
Sixty-eight employees of the Bayard, Neb. sugar factory won first place in Great Western Sugar's 1975 safety competition. Second and third place awards went to the Ovid and Longmont, Colo. factory employees.

The honor for safest work performance in the company during the year was conferred upon the Bayard employees at a dinner-dance in Scottsbluff, April 30. Jack W. Eastman, senior vice president of manufacturing, presented the award to factory manager Vernon F. Zimmerman.

In announcing the winner of the safety contest, Eastman noted Bayard's victory was the first for that factory in the 24-year history of safety competition among 18 Great Western installations and their support units in six states.

Special recognition was given to the plant's 14-member safety committee headed by Stanley Stricker, assistant
Start thinking metric

The meters are coming, but there is no need to worry. Recently enacted metric legislation calls for gradual, voluntary conversion to the world’s predominant system of weights and measures, with no set deadline.

Before the Metric Conversion Act was signed into law by President Ford, the United States was the only major country that had not moved to adopt the metric system of measurement—a simple decimal system with units related by factors of ten. Some educators estimate 25 percent less time will be required to teach basic arithmetic to children using the metric system.

In contrast, our customary “English” system of measurement requires memorization of many numerically unrelated units on every level. Take, for example, units of length, where 5.280 ft. equal a mile; 5.50 yards, a rod; 3 ft., a yard; 12 in., a ft.; and so on.

Using the metric system to state different lengths, where the meter is the base unit, you simply shift the decimal point. While meters, centimeters, kilometers and so forth may sound foreign to anyone not familiar with the metric system, the gradual, voluntary conversion that the act establishes allows the country to slowly familiarize itself with the new system so we will eventually “think metric.”

Business and education will lead the way to the new system, and dual measurements printed on the products we buy, much of which is already being done, will help acquaint us with many of the new measurements.

The Metric Conversion Act calls for a 17-member Metric Board to familiarize the public with the metric system by coordinating various information and education programs as conversion is implemented.

Metric Converters Help

For those who want to get a head start learning the metric system, however, help is available in the form of metric converters. One such converter from Borden’s Sterling Plastics division utilizes a simplified slide-rule design to convert our customary measurements into corresponding metric measurements. Recommended by Consumers’ Research Magazine, the inexpensive converters are available in many school and office supply stores and come with operating instructions and a common equivalent chart.

There are only 9 basic metric measurements which most people will use in everyday life:

- kilometer — about 0.6 mile
- meter — about 1.1 yards
- centimeter — about 0.4 inch
- millimeter — about 0.04 inch
- liter — about 1.06 quarts
- milliliter — about one-fifth of a teaspoon
- kilogram — about 2.2 pounds
- hectare — about 2.25 acres
- metric ton — about 1.1 short tons

Numerous metric brochures, charts and reports are available for nominal fees from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. A list of publications and prices may be obtained by writing and requesting the “weights and measures” list.

No grain reserve forecast

Despite scientists warnings that droughts or other disasters could create a food shortage, the U.S. government won’t be making purchases to set up a grain reserve this year. According to The Kiplinger Washington Letter, the government “will keep its hands off” grain markets now until elections. Grain exports will continue and President Ford will back them if crops are normal, says Kiplinger. Because of farmers’ reactions to Ford’s 1975 grain embargo, and official predictions of abundant crops, high export and domestic demand and strong prices, “the administration is not inclined to meddle.”

Preserving the environment is neither a cheap nor an easy undertaking. Nevertheless, it is an important one, and Great Western Sugar has spent nearly $38 million doing it over the past 23 years.

Since 1953, the Company has spent a total of $37,764,035 on environmental equipment, its operation and maintenance, and on environmental testing. Though the environmental impact program was initiated during the 1950s, most of the activity has been concentrated during the past 10 years.

Not all of the $37 million have been nonproductive ones, according to Philip J. Hatch, manager, Great Western Sugar Environmental Affairs and Pesticides Program. Some items, such as pulp dryers and diffusers, are considered partial earners. And without Concentrated Steffens Filtrate (CSF) operations, which are considered environmental expenditures, "we would be faced with a considerable disposal problem and would have to build sewage disposal plants at all, or most, Steffens Houses," Hatch said. Thus do CSF operations rank as another partial earning expenditure.

The $22,628,000 total in partial earning expenditures leave a total of $15,136,035 of "nonproductive" dollars spent over the last 23 years. Environmental spending for a small factory averages about $1.5 million; for a large factory, about $2.5 million. The factory-by-factory breakdown of expenditures is shown in the table.

Most of the environmental impact money buys equipment such as diffusers, flume water clarification equipment, storage, surface aerators, flue gas scrubbers, fly ash and particulate matter collectors. Maintenance on the equipment runs an additional $400,000; another substantial chunk is spent on testing.

According to Hatch, the testing of air emission standards, water discharges, ammonia content in the water and numerous other standards are mandatory. "All our factories operate under air emission and water discharge permits with the federal and state Environmental Protection Agency. To ensure compliance, we must do periodic testing. Water discharges are monitored weekly."

Hatch predicts that approximately $100,000 will be spent on such testing this year, with $116,000 projected for the year to come.
The food preservation season is here and this year crops have been arriving two or three weeks early. So the time to plan freezing and canning schedules is now.

While most fresh fruits and vegetables are available year round, prices are at their lowest during peak supply periods — a good time to buy for freezing and canning. The accompanying tables indicate peak supply times for fruits and vegetables, but newspapers, television, radios and store and roadside displays will give up-to-the-minute information on availability of products. Some items, such as potatoes, onions, celery, carrots, parsley, and bananas, come to market in fairly steady quantities all year and have been omitted from the tables.

### How to Spot Antiques

As wood ages its color does also; therefore, if an underside or interior area of an “antique” is scraped, it will show at once how the surface has aged if it is authentic. Another clue is decorative markings. They show age and approximate year of construction. For example, crude dovetails on heavy drawers of bureaus and chests signify the early 1600s. Look, too, for signs of alteration such as new screws. Prior to 1850 screws did not taper and the slot in the head was hand cut. Modern screws are machine cut and, therefore, more uniform in shape.

Antique veneers were hand crafted. They are thicker, approximately 1/8 inch, than modern veneers. Transparent polish denotes age, too. It is a good characteristic.

Be wary of carved pieces, especially mahogany. Look for areas of lightness which may mean acid or bleaching agents were used in an attempt to give the piece authenticity.

### Peak Supply Times for Vegetables

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Peak Months</th>
<th>In Good Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparagus</td>
<td>Apr. and June</td>
<td>Apr. to June</td>
</tr>
<tr>
<td>Avocados</td>
<td>Dec. and Mar.</td>
<td>Year round</td>
</tr>
<tr>
<td>Beets</td>
<td>July</td>
<td>June to Sept.</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>Sept.</td>
<td>Sept. to Dec.</td>
</tr>
<tr>
<td>Escarole, endive</td>
<td>July</td>
<td>Aug. to Dec.</td>
</tr>
<tr>
<td>Greens (all types)</td>
<td>July</td>
<td>July to Sept.</td>
</tr>
<tr>
<td>Green onions</td>
<td>July</td>
<td>June to Sept.</td>
</tr>
<tr>
<td>Parsnips</td>
<td>Oct.</td>
<td>Year round</td>
</tr>
<tr>
<td>Peas</td>
<td>July</td>
<td>Year round</td>
</tr>
<tr>
<td>Peppers</td>
<td>Sept.</td>
<td>Year round</td>
</tr>
<tr>
<td>Radishes</td>
<td>June</td>
<td>Sept. to Oct.</td>
</tr>
<tr>
<td>Turnips</td>
<td>Sept.</td>
<td>July to Nov.</td>
</tr>
</tbody>
</table>

### Peak Supply Times for Fruits

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Peak Months</th>
<th>In Good Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apricots</td>
<td>July</td>
<td>June to Aug.</td>
</tr>
<tr>
<td>Cherries</td>
<td>July</td>
<td>Aug. to Sept.</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>Mar.</td>
<td>Oct. to June</td>
</tr>
<tr>
<td>Grapes, table</td>
<td>Aug.</td>
<td>June to Nov.</td>
</tr>
<tr>
<td>Lemons</td>
<td>June-Aug.</td>
<td>Year round</td>
</tr>
<tr>
<td>Limes</td>
<td>May - Oct.</td>
<td>Year round</td>
</tr>
<tr>
<td>Persimmons</td>
<td>Oct.</td>
<td>Apr. to June</td>
</tr>
<tr>
<td>Pineapple</td>
<td>June</td>
<td>Sept. to Dec.</td>
</tr>
<tr>
<td>Rhubarb</td>
<td>July</td>
<td>June to Aug.</td>
</tr>
<tr>
<td>Raspberries</td>
<td>May</td>
<td>Apr. to Aug.</td>
</tr>
<tr>
<td>Tangerines</td>
<td>July</td>
<td>June to Aug.</td>
</tr>
<tr>
<td>Watermelon</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Safe Drinking Water

If your home water supply is interrupted, limited amounts of water may be obtained by draining the hot water tank or by melting ice cubes. Also, water may be dipped from the toilet flush tank, but this water should be purified. When available, water from stock tanks, irrigation tanks, cisterns and farm ponds may be used after proper purification.

Purification. Some simple procedures, requiring the use of either heat or certain chemicals, and clean containers will destroy the usual harmful germs that may be present in water obtained from emergency sources.

The heat method involves three steps: Strain water through a clean cloth to remove any sediment or floating matter. Boil the water vigorously for at least one full minute. Allow the water to cool and it is ready to use. Add a pinch of salt to each quart of boiled water or pour it back and forth from one clean container to another several times to improve the taste.

An alternative purification method uses chemicals. Strain the water through a clean cloth and purify with chlorine or iodine depending on availability.

Liquid chlorine laundry bleach found at grocery stores can be used carefully. The amount of chlorine used will depend on the percentage of chlorine content. Labels on bottles will state the percentage. Then follow amounts shown in the table.

<table>
<thead>
<tr>
<th>Percent Chlorine</th>
<th>Drops Per Quart Clear Water</th>
<th>Drops Per Quart Cloudy Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>4 to 6*</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>7 to 10</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Not known</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

*Common household laundry bleach

The next steps are to: Mix thoroughly by stirring or shaking water in container. Let stand for 30 minutes. A slight chlorine odor should be detectable in the water. If not, repeat the dosage and let stand for an additional 15 minutes before using.

Tincture of iodine from a medicine chest or first aid kit will also purify water. Add 5 drops of 2 percent tincture of iodine to 1 quart of clear water. Add 10 drops to one quart of cloudy water. Let the water stand for 30 minutes before using.

Iodine or chlorine tablets obtained from drug or sporting goods stores provide complete instructions on the package. Water purified using any of these methods should be stored in clean, closed containers. It can be used for cooking, drinking or brushing teeth.

Bar-B-Q-Beef a la Slow Cooker

4-5 lb. chuck roast
2 c. chopped celery
14 oz. bottle ketchup
1/2 c. Worcestershire sauce
2 tsp. dry mustard (use less if hot)
salt and pepper
1/2 tsp. ground cloves*
1/2 tsp. ground allspice*
*Make a small bag out of old sheet and tie ingredients inside.

Trim excess fat from meat and cut in chunks. Put meat, celery, ketchup and Worcestershire sauce in pot and cook 4 to 6 hours or until tender. Be sure to rinse ketchup bottle out with a little water and add to pot also. If too much moisture is on meat, tilt or remove lid while cooking. If too dry, add water or ketchup.

Shred meat when it is tender and add:
1/4 c. wine vinegar
1/4 c. brown sugar
Let cook for at least 1 hour before serving.

Hint: Chop celery in blender. Add 1 cup water and 3 to 4 stalks of 2-inch long celery slices.

Fall Fashion Predictions

Sweaters will be major wardrobe items this fall — belted, buckled and loose in greys, reds and browns. Gauze fabrics in smock tops will be popular items. Hats are coming back to complement close-cut hairdos. Long, shaggy hair for boys and men went out two years ago. Men's hair is trimmed and styled. Moustaches remain stylish but sideburns are shorter. The look of the 1930s is here but in newer fabrics. Cottons are back and so are machine washable woolens. Be sure to follow laundry directions carefully. Laundering acrylics takes extra care, too. Dryers will make the fabric "pill." Clothes made of acrylics should be dried on a hanger in the open air. To correct past mistakes, use a straight edge razor to remove "pill."
WHAT SUGAR POLICY ??

$248

GW Pure Sugar
Extra Fine Granulated

$107

GW Pure Sugar
Extra Fine Granulated

January 1977

SCIENCE

Upbeet

SPRING 1977
Grams of sugar printed on cereal packages

As of November 1, 1976, Kellogg cereal packages list the number of grams of sugar per one-ounce serving. William LaMothe, president of Kellogg Co., of Battle Creek, Mich., explained that the company decided to list grams per ounce rather than percent sugar in order to give consumers a more accurate indicator of the amount of sucrose they are eating. For example, LaMothe said, "A package of pre-sweetened cereal with a listing of 39 percent sugar actually contains less sucrose than a can of cola with a listing of 10 percent sugar. When the information is given in terms of servings, that same size box of cereal would contain 11 grams of sugar and the same size can of cola would have 37 grams in it." Gram information enables people on restricted diets to know exactly how much sugar they are eating. (Denver Post, Denver, Colo., Oct. 21, 1976)

McMillan retires

Paul N. McMillan, Lovell agriculturalist, retired in December after 34 years with The Great Western Sugar Company (GWS). McMillan joined GWS as an apprentice in May 1942. He was promoted to fieldman and worked at Minatare, Scottsbluff and Billings in that capacity. In 1960, he was named agricultural superintendent at Billings, and from 1969 to 1976, he was an agriculturalist at Lovell. A graduate of the University of Nebraska at Lincoln with a BS degree in agriculture, he taught vocational agriculture for two years in Mitchell public schools before joining GWS. McMillan plans to remain in Basin, southeast of Lovell, at least until his youngest of four children graduates from high school in 1980. He was honored with a retirement party November 12.
“Everybody talks about the weather,” Mark Twain once wrote, “but nobody does anything about it.”

For several months both before and after any national election in the United States, certain aspects of the economy fall naturally into the category of Mark Twain’s weather. An incumbent president can act but generally does not, and the aspirant—his opponent—for the Oval Office cannot act but talks a great deal about what he would do.

Rhetoric is a good deal like Mark Twain’s thunder. “Thunder is good, thunder is impressive,” he wrote in 1908, “but it is lightning that does the work.”

It has become evident that the election campaigns did not give the American farmer any clear, factual picture of the condition of his own economy, let alone the U. S. economy at large.

For the short term, Rocky Mountain area sugarbeet growers have an apparently bleak future. A single, token effort was made on behalf of the farming industry at-large five weeks before the election—in the form of a generally viewed ineffective response by President Ford to requests from farmers and ranchers for an improvement in farm prices. But farmers are still losing money on virtually every kind of crop.

The action that the president took specifically affecting the sugar industry was to increase the import tariff on foreign sugar from 0.625 cents a pound to 1.875 cents a pound. Benefits from that increase are yet to be seen and for that matter may never be seen.

In November, representatives of sugarbeet and sugar cane growers testified during Trade Commission hearings. They said, essentially, that growers are plainly and simply in serious trouble.

This situation exists despite the fact that the 1976 beet harvest was an exceptionally good one. A great portion of the problem lies in the most basic, the simplest, of the laws of mankind—the law of supply and demand. There is too much sugar in the world to be used up through that basic law.

There is, in fact, a worldwide surplus of sugar. That surplus, coupled with a complex set of circumstances, has helped place the American sugar growers and processors in a precarious position.

First, the decline in recoverable beet sugar per ton of sugarbeets harvested has been noticeable in recent years, forcing The Great Western Sugar Company to negotiate contracts with sugarbeet growers in the western states to arrive at means to set a fair adjustment in the long existing mono standard payment schedule.

Second, with total world sugar production up markedly (6.5 million tons increase for 1976-77 over 2.3 million tons increase a year earlier) and with U. S. production making but modest gains on a relative basis, the need to maintain domestic sugar production has become a necessity, if the United States is to avoid being totally controlled by foreign producers. Such encouragement has not come from the government.

Third, the amount of sugar which Americans consume, per person, has dropped below the average amount recorded in recent years (with the exception of the wartime years and the extraordinary year of 1975).

Fourth, corn sweeteners have made significant inroads into the supply with disruptive effects on the market.

The United States, with little if no protection since the lapse of the
Sugar Act and failure to enact new legislation, falls into the category of "victim" without an effective means of administering a sugar program. This victimization is evident. Preliminary estimates by Dr. Helmut Aalfeld, managing director of F. O. Licht, West German-based statistical firm, place world sugar production for the 1976-77 crop year at 88.2 million metric tons, with consumption worldwide set at between 82.9 and 84.7 million tons.

This country is a net importer of sugar. It has no surplus to export to improve its balance of payments. As a result, imports of sugar have increased yearly since 1972 by an average of approximately $600 million per year, to where it now averages well over $2 billion for the last three years. And all the while, inflation has continued while acreage for sugarbeets appears to be flattening despite higher yields.

According to a statement issued by the Denver-based Rocky Mountain Farmers Union: "Conditions in rural America are incredibly bad and continuing to deteriorate. Input prices and operational costs continue high, credit is tight and expensive, and the prospect of selling farm products at a profit are dim."

In the opinion of Myron J. Schober, director of communications for the Farmers Union, there is but one solution to insure those higher market rates. Imports should be reduced through higher tariffs. With tariffs up, foreign sugar logically would be more expensive and the glut of that sugar, as it moved off of shelves, would be replaced by domestic sugar beets.

General farm prices, he pointed out, are at 70 percent of parity, the lowest level in five years. The parity price on sugarbeets is $38 a ton and costs to grow them now stand at between $28 and $35 a ton.

"Unless somebody does something," Schober said, "the beet growers will be badly injured." In other words, lightning must strike. It is lightning that does the work.

One of the most cogent observations on the situation was made during the recent sugarbeet harvest in Utah by Laurence Smith, Utah dis-

Many of today's problems, he said, were precipitated by, and are attributable to, the stringent controls placed on the industry from 1971 through 1974 by the Cost of Living Council. Low crops in 1973 and 1974 set the stage for depressed prices, and Blake called the high sugar prices of 1974—at which time high fructose corn syrup made inroads—an "aberration" which created a serious oversupply of foreign sugar.

But most companies, such as The Great Western Sugar Company, view the inroads of corn syrup into the market as more than an aberration, since some estimates range as high as 20 to 30 percent of the future market.

But the high price of sugar itself, Blake summarized, "made the United States a dumping ground for homeless sugar produced in foreign countries."

The situation in Colorado and other sugarbeet producing states, then, can hardly be termed a domestic problem. Other countries obviously have carefully designed their sugar policies as economic insurance against temporal and volatile price fluctuations. The United States has not. Tariff protection is now negligible at best, and dependence upon foreign sugar could cause problems increasingly similar to those created by dependence on imported petroleum.

While sugar consumption in the United States is again slowly reapproaching its 50-year stability figure—approximately 100-plus pounds per person per year—the demand for sugar in the exporting countries is beginning to rise significantly because of birth rates which are higher than those in the United States, because of better economic conditions there and because of greater affluence tied in part, ironically, to increased sugar exports.

Sugar remains an exportable surplus in those countries, while the United States imports 45 percent of its sugar. And because exports mean money, sugar can be held in the future for sales overseas or to meet the rising domestic requirements in the export countries.

Should the latter happen, as inevitably appears, available sugar on the world market—the major source of the U. S. supply—would be reduced by marked amounts.

Unless domestic production is nurtured, the country will continue to be forced to compete in an international market which will see a declining sugar supply for American consumers.
The Grower-Great Western Joint Research Committee (JRC) is pleased to present a summary of its research grants and activities for the year 1976. Many of the research projects have been completed. Others are still in progress and their findings will be reported at a later time.

The JRC was formed in 1972. Its purpose is to further the science of sugarbeet farming. Four representatives of The Great Western Sugar Company (GWS) and five growers, one representing each of the five states—Kansas, Colorado, Nebraska, Montana, and Wyoming—in which GWS contracts for sugarbeets make up the committee.

Agricultural researchers submit research proposals and cost estimates early in the year. Payments are made in December after preliminary reports are received. Researchers present final written and oral reports at the committee's annual meeting in January.

To finance the JRC, growers contribute a penny a ton for all beets produced. GWS matches that amount and handles details and bookwork for the committee. Since 1972, the committee has awarded $501,300 to support sugarbeet research. In 1976, the committee made grants of $86,336 for research projects.

The JRC reviews all research proposals submitted by state agricultural universities and then allocates funds to projects they believe will advance the sugarbeet industry as a whole.

Following is a summary of research grants and projects funded by the JRC for 1976.

Colorado State University

Colorado State University (CSU) received $28,000 for five research projects.

- A. D. Dotzenko, professor of agronomy, and M. D. Glenn, graduate research assistant, CSU, compared minimum tillage practices with conventional growing methods in northeastern Colorado. Special reference factors were weed control, rates of nitrogen fertilizer, water infiltration rates and seedling emergence. The study found minimum tillage practices resulted in reduced labor needs.

- R. L. Zimdahl, associate professor, botany and plant pathology, investigated the effect of Atrazine soil residue on sugarbeets. Atrazine analysis currently takes six weeks. This study, still in progress, seeks faster methods to determine the level of residual Atrazine which would injure sugarbeets.

- E. E. Schweizer, U. S. Department of Agriculture project leader, conducted research on sequential pre-
planting and post-emergence herbicide treatments to determine what was the most efficient method of weed control for sugarbeet crops. (Similar studies were conducted in Montana, Nebraska and Wyoming to compare soil and climate conditions.) Sequential application of herbicides was shown to provide the best total weed control.

• P. N. Soltanpour and A. E. Ludwick, associate professors in the CSU agronomy department, developed a single soil test that will determine fertility needs for nitrate, phosphorus, potassium, zinc and iron.

• J. O. Reuss, professor of agronomy; A. E. Ludwick, associate professor of agronomy; and D. G. Westfall, senior plant nutritionist for GWS, investigated methods for predicting in-season nitrogen fertilizer requirements for sugarbeets based on solid and petiole tests. The project measured yields. The study is still in progress.

Kansas State University

Kansas State University (KSU) received $8,500 to conduct three sugarbeet research projects.

• John Lawless, crop scientist; Herb Sunderman, soil scientist; and Dave Peterson, engineering project leader, all of the KSU Colby Branch Experiment Station, conducted three studies on sugarbeet crops. In one study, beet emergence was found to be significantly better when the standard chevron press wheel was used.

In another project, the team compared water use efficiency with resulting yields. Highest water use efficiency resulted in significantly reduced yields.

Still under investigation is the effect of nitrogen and phosphorus fertilizer rates on sugar percentage, yield and amount of sugar per acre. The effect of split applications of nitrogen on sugarbeet yields is also being studied.

• De Lynn Hay, extension irrigation engineer, is tabulating the costs of sugarbeet production and net returns from a demonstration farm.

• Steve J. Thien, associate professor, KSU department of agronomy, tested five chemical crust inhibitors to determine which best aided plant emergence. Rainfall interfered with test results.

University of Wyoming

University of Wyoming scientists received $12,500 for research on maggot control, weed control and sugarbeet stands.

• K. James Fornstrom, associate professor of agricultural engineering, and C. C. Burkhardt, professor of entomology, compared two methods of sugarbeet root maggot control; waterside injection and band application of insecticides. In this study, band application proved most effective.

• Harold P. Alley, professor of weed science, conducted a study of weed control. Sequential application of herbicides proved to be the best method of total weed control in sugarbeets.
• K. James Fornstrom, associate professor of agricultural engineering, investigated practical techniques of establishing sugarbeet stands with no adjustment by machine or hand labor. The results showed sugarbeets planted at a spacing of five to eight inches yielded equally with those in the tests that had been thinned.

**Montana State University**

Montana State University received three research grants totaling $14,500.

- Vincent A. Haby, assistant professor of soils, Southern Montana Agricultural Research Center, conducted two studies of sugarbeets. Still in progress is a study of the nutritional status of sugarbeets grown in the Yellowstone Valley. Haby is relating sugarbeet nutrition to recoverable sugar production.

In a second study, Haby investigated the effect of banded starter fertilizers on sugarbeets in south central Montana. Preliminary results indicate that the starter fertilizer made no significant difference.

- Don Baldridge, superintendent and agronomist from the Southern Montana Agricultural Research Center, is testing various chemical weed control systems to determine the most efficient method. Baldridge is also measuring the response of sugarbeets to foliar spray chemical growth regulators.

- Ardell D. Halvorson, soil scientist; and Glenn P. Hartman, soil scientist and superintendent, both with the U. S. Department of Agriculture, Eastern Agricultural Research Center, tested the effect of varying amounts of nitrogen fertilizer on crown production. They found that higher rates of nitrogen fertilizer resulted in greater crown production.

**University of Nebraska**

The University of Nebraska received $22,816 for sugarbeet research projects.

- Gail Wicks, associate professor of weed control at the North Platte Station, is testing a sequential use of selective herbicides to determine the most efficient method of weed control.

- Eric D. Kerr, district extension plant pathologist for the Panhandle Station, found that beet yield is reduced when powdery mildew is present. In another project, Kerr is studying the effect of irrigation practices, cultural practices, fertilizer and pesticide uses, presence of weeds, stress factors, cropping history and soil texture on proliferation of Rhizoctonia rot on sugarbeets. Post harvest data is being completed, but Kerr has found that when a leveler is dragged over a field, Rhizoctonia is moved from one spot to another.

- Robert Wilson, Jr., district weed specialist at the Panhandle Station, conducted three research projects on herbicides. In the first, Wilson found that several herbicide applications might provide acceptable weed control in sugarbeets.

A second study showed sprinkler applied herbicides are comparable to those applied in the conventional ways.

A third research project documented symptoms of herbicide injury to sugarbeets. While inconclusive by themselves, the results will be valuable diagnostic tools for further determining any beet injury.
Plant breeding and crop protection are major areas of concern for The Great Western Agricultural Research Center. The Center’s objective is to increase the productive potential and processing quality of Great Western Mono Hy beet varieties and to develop systems of beet culture that will enhance the profitability of growing beets.

The breeding activities encompass a wide range of strains aimed at providing the best possible hybrid varieties for Great Western and other domestic growers as well as varieties adapted to production in foreign lands. Crop protection activities embrace many concerns among which are insect and disease identification and control, soil management, plant nutrition, chemical weed control, planting, germination and seedling emergence. Crop protection addresses the care of growing plants and also protection of the harvested beets while they are awaiting processing. Treatments to reduce losses in storage include modifications in mechanical handling and chemical applications to reduce respiration in addition to the experimental application of growth regulating chemicals during the growing season.

This season the Center tested 340 varieties in Colorado, Nebraska, Kansas, Montana and Wyoming and 150 varieties in Ohio. In addition to the varieties tested for productivity, about an equal number of lines and strains were tested for disease resistance. Center research staff directly supervised or actually planted some strains designed to test or develop varieties for sale outside the Great Western area. These tests were located in the Red River Valley of the North and in Idaho, Washington, Texas, Utah, California, Michigan, Oregon, Arizona and Canada.

Great Western varieties were tested overseas in comparison trials with European strains in 17 foreign countries. This breeding work is designed to produce superior varieties of sugar beets almost anywhere they are grown.

Crop protection work includes testing and refining the use of chemicals labeled for sugarbeet production. Great Western research people work closely with all agricultural chemical companies in the United States and many foreign countries in search of new chemicals that might help in beet culture. Researchers aid the chemical companies by gathering residue samples for analysis and efficacy data so that effective chemicals can be labeled for use on sugarbeets. Herbicides, fumigants, insecticides and plant growth regulators are some of the chemicals being tested. Fertilizer usage and its effect upon yield and purity is a study of much importance. Anti-crusting compounds are being tested along with plant growth regulators and seed treatment systems designed to improve germination.

All of these tests are carried out at Great Western’s laboratory, greenhouse, experimental farm and cooperating growers’ farms. One of the most important aspects of the Center’s research work is the field trials carried out throughout the area on cooperating growers’ farms. This research involves the help of local agriculturalists as well as the cooperating growers and gives a practical view of the performance of the varieties, chemicals, fertilizers and cultural systems under field conditions.

In order to evaluate the tests carried on during the year, samples are harvested and delivered to the Longmont service laboratory where the data necessary to determine the results are obtained. This highly automated technical laboratory is operated from mid-September until mid-November and again for about three weeks in January. The data from this lab is fed through the Great Western computer in Denver and the results are printed out daily so that researchers can make recommendations for growers and evaluate the results for planning their work for the following season. This past season more than 35,000 experimental samples were processed in this lab.

This issue of Upbeet reports results from 1976 studies of herbicides, fertilizers and soil crusting. In some instances, results are similar to previous studies. Of special note, however, are new phosphorus fertilizer recommendations and suggestions for treating soil crusting.

From these results come improved varieties of beets, new herbicides and herbicide systems, new insecticide uses, improved fertilizer practices, all providing the means for more profitable sugar beet production and superior quality beet supply for Great Western factories.

The Great Western Agricultural Research Center revised phosphorus fertilizer recommendations for 1977. New recommendations represent a 50 pound per acre decrease in the application rate.

The new phosphorus recommendations are based on results of 10 experiments conducted by the Center and Colorado State University. These experiments showed that, even with low levels of phosphorus in the soil, there is no statistically significant change in the yield or quality of the sugar beets. Therefore, the Center revised its previous recommendations. The new figures are presented in Table 1.

As with all fertilizer applications, specific recommendations must be based on the results of soil tests. Phosphorus recommendations can be based on a surface sample. Nitrogen tests, however, require deeper samples.

The Center suggests a three-foot sampling depth. (If the field has con-
bustently produced low sugar content, a six-foot sample is preferred.) The top foot of the sample should be analyzed for phosphorus, organic matter and nitrate-nitrogen. All other foot increments should be tested for nitrate-nitrogen. Samples should be gathered before April 1, since warm weather will affect the microbial conversion of organic nitrogen to nitrites and, hence, the fertilizer recommendation. Send the samples to the Great Western soil testing laboratory in Sterling.

The nitrogen fertilizer recommendations for a three-foot sampling depth and various levels of organic matter are presented in Table 2. If the field had legumes as a previous crop, or if it had a manure application, you must subtract the nitrogen made available by these sources from the figure given by the table. If the previous crop was alfalfa, for example, you must subtract 50 pounds of nitrogen fertilizer per acre from the standard recommendation. Similarly, beans as a previous crop contributed 30 pounds of nitrogen per acre. Each ton of manure contributes 5 pounds of nitrogen per acre to the soil, each ton of low straw-content manure, 7 pounds.

Samples taken from a depth other than three feet require special computation. First, sum up the total nitrate-nitrogen in the soil profile. If this is expressed as parts per million (ppm), multiply by 3.6 to convert the figure to pounds per acre. This will make the figure compatible with the table.

Next, multiply the sum by the profile factor in Table 3 that corresponds to the profile factor in Table 3.

Growers familiar with the nitrogen testing system may use it. Remember, however, that sugarbeet roots extend four feet or more into the soil. If only a three-foot sample is taken, the profile will be about 18 percent too low. Therefore, you have to multiply the figure obtained in the three-foot profile by 0.18, and add the product to the original figure. This will give you the figure to use in determining the fertilizer recommendation with the budget system.

Regardless of how the figures are obtained, experiments have shown that the maximum nitrogen application rate needed to produce optimum economic returns is 125 pounds per acre. "The only possible exception to this rule," says the Research Center, "is where new ground is coming under irrigation for the first time." In this case, the application rate may need to be as high as 150 pounds per acre, depending on the residual levels of nitrate-nitrogen in the soil.

Part of the nitrogen, and all of the phosphorus, can be applied at planting time as a starter fertilizer. For best results, the Center recommends banding a liquid material (such as 10-34-0) one half inch to the side and two inches below the seed during the planting operation. The Center also suggests an application of 20 pounds of nitrogen per acre on light-textured soils, 30 pounds per acre on heavier soils. The nitrogen application should be accompanied by an appropriate amount of phosphorus fertilizer, according to the ratio of nitrogen to phosphorus in the liquid fertilizer.

Table 1. New P fertilizer recommendations, 1977

<table>
<thead>
<tr>
<th>Phosphorus soil test (ppm P)</th>
<th>Fertilizer requirement (lbs./A P2O5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 (Very low)</td>
<td>100</td>
</tr>
<tr>
<td>8-14 (Low)</td>
<td>50</td>
</tr>
<tr>
<td>15-22 (Medium)</td>
<td>30</td>
</tr>
<tr>
<td>&gt;23 (High)</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2. Nitrogen recommendation for a 20 T/A or greater yield goal based on a three foot sampling depth at various soil organic matter contents.

<table>
<thead>
<tr>
<th>Soil test N03-N (lbs./A)</th>
<th>Soil organic matter content (%) 0-0.5</th>
<th>0.6-1.0</th>
<th>1.1-1.5</th>
<th>1.6-2.0</th>
<th>&gt;2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-22</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>23-43</td>
<td>125</td>
<td>125</td>
<td>110</td>
<td>100</td>
<td>85</td>
</tr>
<tr>
<td>44-65</td>
<td>120</td>
<td>105</td>
<td>95</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>66-86</td>
<td>100</td>
<td>85</td>
<td>70</td>
<td>60</td>
<td>45</td>
</tr>
<tr>
<td>87-108</td>
<td>75</td>
<td>65</td>
<td>50</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>109-130</td>
<td>60</td>
<td>45</td>
<td>35</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>131-151</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>152-173</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>173</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*For lower yield goal subtract 10 lb N/A per ton from the N recommendation.

Table 3. Profile factors to be used to determine projected N03-N levels for sampling depths other than three feet.

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Profile factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1.36</td>
</tr>
<tr>
<td>4</td>
<td>0.82</td>
</tr>
<tr>
<td>5</td>
<td>0.72</td>
</tr>
<tr>
<td>6</td>
<td>0.67</td>
</tr>
</tbody>
</table>

The Great Western Agricultural Research Center has established a relationship between nitrogen fertilizer applications and crown size and between crown size and yield losses. Averaging figures from six locations around the country, the Center found that an increase in nitrogen in the soil resulted in a corresponding increase in crown size. Large crown beets present problems in topping. Generally, the tests showed that proper topping of the beet increased the amount of recoverable sugar by an average of eight pounds of sugar.

nitrogen fertilizers & crown size affect purity and sugar yield
per ton of beets. A similar improvement resulted from reducing the nitrogen application by 40 pounds per acre.

Research also indicated that, when properly topped, a large crown beet causes higher yield losses than a properly topped small crown beet. When improperly topped, the large crown contributes more impurities.

What the research points up is the necessity for proper management. Using an excess of nitrogen fertilizer can reduce the yield of recoverable sugar.

### research center recommends soil crusting treatment

Among the problems faced by sugarbeet growers, the most recent to be attacked by agricultural science is soil crusting. After a heavy rain, many soils develop a hard surface crust. If the rain comes between planting and emergence of the seedling, the crust can prevent the seedling from emerging.

Normally the seedling will push through the cracks that develop as the crust dries, but cracks develop in a random pattern. There is no assurance that the soil will crack sufficiently to allow sugarbeet seedlings to emerge.

Addressing this problem, scientists at The Great Western Agricultural Research Center tested several different soil cracking compounds. As a result of these laboratory tests, the Center has been able to make some recommendations on the application of these compounds.

Though the findings remain to be field-tested, the Center suggests that soil cracking materials be used on a trial basis. The two materials most effective in tests were Coherex and Petroset SB. The material should be applied by a solid stream nozzle with an orifice diameter of 0.046 inches.

Apply the chemical directly over the seed at planting, behind the dragchain or scratcher. The chemical should penetrate the soil to a depth of at least one quarter inch.

### effective herbicides recommended

Each year The Great Western Agricultural Research Center tests dozens of herbicides designed to control such crop pests as kochia and redroot pigweed. The results in 1976 were similar to the results obtained in previous years. Consequently, the recommendations for 1977 remain as they were previously.

Among the herbicides applied before planting, Nortron was the most effective on a wide range of weeds and had a greater effect on weeds that germinate later in the season. HOE-23408 controlled grass very effectively. Antor (H-22234) proved excellent against grassy weeds and redroot pigweed. Nortron gave the best control of kochia when applied at two pounds or more per acre. There was little difference among the various forms of Nortron in weed control, but the flowable form seemed to have somewhat more effect on beets.

Among the mixtures applied before planting, all the Nortron mixtures proved effective against different kinds of weeds. The mixtures tested included Nortron mixed with HOE-23408, with Antor and with Ro-Neet. All were effective with no undue crop damage so long as the dosages were applicable to local soil conditions. As might be expected, the Nortron mixtures were especially effective against late weeds and showed good weed control as late as September.

Also tested were various herbicides applied after the crop and weed seedlings emerged. HOE-23408 gave excellent control of grassy weeds. Nortron EC and Nortron F were both tested. Nortron EC proved the more effective. Betanex and Betanal were effective when mixed with Nortron and HOE-23408. Also effective were the three-way mixtures Betanex, Herbicide 273 and HOE-23408; Pyramin, Betanex and HOE-23408; and Nortron, Betanex and HOE-23408.

The Center also tested herbicides applied in sequence. This involves applying one herbicide before planting and another after the seedling

### Table 1. Average weed and crop responses for three preplant mixtures, 1973-74

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Number Observations</th>
<th>Fixed Dose (lbs./A)</th>
<th>Beets* Injury (%)</th>
<th>Stand (%)</th>
<th>Weeds* Kochia (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nortron + Antor</td>
<td>35</td>
<td>2 + 2.2</td>
<td>14</td>
<td>96</td>
<td>87</td>
<td>92</td>
</tr>
<tr>
<td>Nortron + Ro-Neet</td>
<td>61</td>
<td>1.7 + 1.9</td>
<td>19</td>
<td>98</td>
<td>74</td>
<td>89</td>
</tr>
<tr>
<td>Nortron + Pyramin</td>
<td>29</td>
<td>2.0 + 2.2</td>
<td>10</td>
<td>104</td>
<td>62</td>
<td>83</td>
</tr>
</tbody>
</table>

*Scores and seedling counts as percent of controls.

### Table 2. Average weed and crop responses for three post-emergence herbicides, 1973-75

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Number Observations</th>
<th>Fixed Dose (lbs./A)</th>
<th>Beets* Injury (%)</th>
<th>Pigweed (%)</th>
<th>Weeds* Kochia (%)</th>
<th>Grass (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOE-23408</td>
<td>13</td>
<td>1.5</td>
<td>6</td>
<td>103</td>
<td>88</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>Nortron + Betanal</td>
<td>32</td>
<td>1.5 + .5</td>
<td>23</td>
<td>91</td>
<td>93</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Betanal + Betanex</td>
<td>21</td>
<td>.5 + .5</td>
<td>14</td>
<td>100</td>
<td>91</td>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

*Scores and seedling counts as percent of controls.
emerges. A mixture of Nortron before planting followed by Betanex and Betanal after emergence achieved close to 100 percent weed control, with excellent control of late weeds. A mixture of Nortron and HOE-23408 followed by a mixture of Nortron and Betanex gave similar results. Ro-Neet or Antor followed by a mixture of Betanal and Betanex also gave excellent results.

All these results are similar to results obtained in 1973-75. Some of these earlier results are presented in Tables 1 through 3.

In 1977, the Center plans to screen more new herbicides and to reevaluate older ones. This spring there will be strip trials of several herbicide treatments.

The Center has identified five Nortron mixtures to be tested for their effectiveness when applied before planting. Six post-emergence treatments with various mixtures of Nortron and Betanex will also be tested.

### Table 3. Average weed and crop responses for four sequence applications, 1973-75

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Number Observations</th>
<th>Fixed Dose (lbs/A)</th>
<th>Beets* Injury (%)</th>
<th>Beets* Stand (%)</th>
<th>Weeds* Pigweed (%)</th>
<th>Weeds* Kochia (%)</th>
<th>Weeds* Grass (%)</th>
<th>Weeds* Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nortron/Betanal</td>
<td>10</td>
<td>2.2/5+.5</td>
<td>20</td>
<td>99</td>
<td>99</td>
<td>93</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td>Betanex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nortron/Nortron</td>
<td>14</td>
<td>1.9/1.2+.4</td>
<td>14</td>
<td>101</td>
<td>100</td>
<td>82</td>
<td>100</td>
<td>94</td>
</tr>
<tr>
<td>Betanal- Betanex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ro-Neet/Betanal</td>
<td>13</td>
<td>2.9/5+.5</td>
<td>13</td>
<td>102</td>
<td>98</td>
<td>75</td>
<td>99</td>
<td>90</td>
</tr>
<tr>
<td>Betanex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antor/Betanal</td>
<td>20</td>
<td>3.7/6+.6</td>
<td>20</td>
<td>88</td>
<td>98</td>
<td>67</td>
<td>98</td>
<td>86</td>
</tr>
<tr>
<td>Betanex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Scores and seedling counts as percent of controls.

The extent of these tests will depend on Environmental Protection Agency regulations and on the labeling status of the chemicals involved.

The Center also plans to evaluate chemicals applied directly to the seed to help promote stand establishment and reduce the injury to crops from pesticides.

### Aerial Photographs Available

Sugarbeet growers wanting new or updated aerial photographs of their property may contact the U.S. Geological Survey. They offer photographs taken from aircraft, Skylab and satellite. Aircraft photos show details as small as individual homes; Skylab shots show large buildings; and satellite pictures reveal forests, rivers and cities. The costs range from $3 to $40 depending on size (up to three feet square). Contact the U.S. Geological Survey at the Earth Resources Observation System Data Center, Sioux Falls, S.D. 57198.

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Sugarbeet grower reduces labor cost to $6 per acre

Sugarbeet grower Frank A. Barnes of Longmont, Colo., produced a 20-ton crop of sugarbeets this year for a total labor cost of $6 per acre, $36 per acre below the average grower’s cost.

Barnes, whose crop produced a 16.3 percent sugar content, says he cut costs on his 100-acre farm last year through a combination of good management and research. He listed a good seed bed, precision drill, shallow cultivation and a reduced seeding rate (about three seeds per square foot) as crucial to his success.

Also contributing to the low-cost operation were: reduction of stand to the desired plant population with a John Deere Selectronic thinner and a 5-inch knife where required; a follow-up cultivation and furrowing out for irrigation as needed; and use of hand labor to “rogue” weeds in portions of the field where needed, at the rate of $2.30 an hour. Soil samples indicate that Barnes can reduce plant food in 1977, making his operation still cheaper next year.

Barnes added that he relied on herbicides Roneet for preplant and Betenal-Betanex tank mix for post-control on escapes and mistakes.

“Sugarbeet growing on my farm has become easier, and it is big business,” said Barnes, who predicted that he could slash labor costs even further next year. “We need a viable industry and reliable cash crop in our area, for it means dollars to us all.”

With the help of one hired woman, Barnes and his wife Marian harvested the 100-acre 1976 crop with a six-row top windrower and harvester that Barnes built himself. He also developed a simple, easy-to-mount “sideboard closer” which makes beet hauling easier.

Barnes is a director of the Beet Growers Association and a member of the Grower-Company Joint Research Committee that has advised members in the industry of promises ahead for weed control.
Declining sugar yields resulting from purity of beet crops grown in most areas of the world call for quick, innovative economic and agricultural remedies. In their absence, a domino reaction can end or seriously retard the sugarbeet industry in many areas, including the Rocky Mountain States.

The problem is beet purity. As it has declined, so has the amount of sugar that can be extracted from the beets. Despite the fact that average acre yields have increased in past years providing additional returns to growers, processors have suffered losses from declining sugar yield. In the last six years, growers in the Rocky Mountain region have produced an average increase of 1.58 tons per acre at an average value of $41 per acre or $26 per ton of beets.

On the other hand, The Great Western Sugar Company (GWS) recorded a decline of 16 pounds of sugar per ton of beets during 1970-75. The loss, absorbed by the company, was more than 80 million pounds of sugar each year or the equivalent of annual production for a medium-size factory. The financial loss amounted to about $12 million in sales at current sugar prices of 15 cents per pound.

Realizing that no processor can face these diminishing profits year after year, GWS and the Rocky Mountain growers have responded to the urgent need for new approaches in the industry with a two-part program: revamped beet payments to include variances for purity and new agricultural management techniques aimed at increasing sugar yield.

Economic measures

The new provisions for beet payments, agreed to in April 1976, are unprecedented in the industry. Under the provisions, GWS is responsible for monitoring purity of beets delivered by each grower. To accomplish the task, the company has installed purity testing equipment in five major growing areas: Sterling, Billings, Loveland, Scottsbluff-Gerling and Kemp. For the first year, the company invested $1.75 million in new equipment and salaries for the testing laboratories.

The 1976 agreement also provided for an autonomous committee to perform three tasks: establish the average purity that prevailed in 1960-66 crops, develop a formula to adjust for differences between the 1960-66 average and actual 1976 tested beet purity and outline procedures for testing purity.

The purity committee was made up of one representative of the company and one from the growers. Robert R. Owen, president of the producer's cooperative, and John Hedde, general chemist for GWS, named three additional members: Forrest E. Walter, professor of economics, Colorado State University, Fort Collins; R. A. McGinnis, independent consultant, San Rafael, Calif.; and John Hupfer, U.S. Department of Agriculture, Washington, D. C. GWS and growers shared expenses for the purity committee.

Using the 1960-66 base period standard developed by the committee, GWS tested 40 percent of the 1976 beet crops to establish a current purity base from which 1977-78 payments will be calculated. Each major growing area was represented, approximately 140,000 individual purity analyses of 2,300 contracts.

In 1977, GWS will sample test all beets received. Growers whose beets test above the purity standard will receive more than contract payment while those whose beets test below the standard will receive less.

Testing requires that a tare, sugar and purity sample be taken on each load of beets delivered to a factory. Two 25-pound samples are tagged with a tare and sugar ticket and purity ticket (Fig. 1). Samples are placed in moisture-proof bags and sent simultaneously to a purity and sugar laboratory. They are not removed from the bags until analyzed.

When ready for analysis, beets are reduced to a juice or extract which is instrument tested for sucrose and solids concentration. The sugar and purity tickets travel with the samples through each testing stage. The instruments used to measure sugar and dissolved solids content automatically stamp readings on the tickets. Purity is then calculated by dividing the dissolved solids reading into the sucrose concentration reading.

Purity results are recorded on an individual ledger which contains the
grower’s name, contract number, date delivered, date sliced, final net pounds, percent of sugar, pounds of sugar produced, purity percent and purity product.

Purity testing will aid the processor by establishing more equitable payments for sugar beets, and growers will have the opportunity to earn more money per ton for high purity beets under the new agreement.

Agricultural management

The problem remaining, then, is declining beet purity being experienced in all areas of the United States as well as other parts of the world.

During January 1976, discussions on the new payment procedure raised the question of what the farmer can do to control purity. Subjects of concern were new seed varieties, chemicals, effects of available plant foods, plant population and harvesting methods.

To get some of the answers, GWS conducted an analysis of the farming practices of those growers involved in the 1976 purity tests. The analysis ruled out new seed varieties, insecticides, herbicides and nematocides as causes of low purity. It showed that new seed varieties will produce purities equal to or greater than older varieties and that pest controls increase total per acre revenues.

The study substantiated research indicating excess nitrogen, whether organic (soil organic matter, manure, crop residue) or inorganic (commercial fertilizer), lowers purity. Previous research showed purity continues to drop, and more rapidly than percent sugar, as nitrogen increases.

The GWS analysis showed purity as well as total per acre revenues are affected by nitrogen applications in excess of 150 pounds per acre. The effect was noted in the correlation between low brei nitrate readings and high sugar content and purity.

Related to the nitrogen effect were beet stand, crop rotation programs, length of growing season and irrigation. Results from the 1976 study showed stands below 70 percent affect purity — the lower the stand the greater the negative effect. Earlier research found stands, determined by row width and spacing, will reduce purity if the number of plants is not sufficient to deplete nitrogen.

Crop rotation programs and resulting soil nitrogen availability also affected purity. In 1976, GWS found that 39 percent of the acres studied produced lower purity than crops preceded by beets (Table 1). Other major crops which normally precede beets had less influence on purity. The

difference resulted from residual nitrogen carryover from corn crops. This situation was particularly apparent in Colorado where up to 78 percent of beet crops were preceded by corn.

Agricultural experts have also found date of germination and harvest may significantly influence beet quality because a longer period of healthy growth gives the crop a better chance to exhaust the soil nitrogen supply.

They also found that, since irrigation influences nitrogen availability, a proper schedule must be maintained throughout the growing season to encourage optimum growth and complete utilization of nitrogen.

Overall, the 1976 GWS study and earlier research show farm management practices do relate to sugar beet purity. Of particular importance to farmers is planning a food program for sugar beets and other crops in order to minimize expense and maximize returns. Since nitrogen requirements vary by location and individual grower, GWS recommends farmers consult their agriculturist to plan a total plant food program.

These economic and agricultural measures being pioneered by the Rocky Mountain sugar beet industry are positive measures taken to insure the growth and continuation of the industry. What is needed now is continued research into causes for low beet purity and commitment from the members of the industry to pool their resources for the long-term goal — a solvent U.S. sugar beet industry.

Table 1. Crop Rotation Patterns

<table>
<thead>
<tr>
<th>Growing Area</th>
<th>% Beets After Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Colorado</td>
<td>48</td>
</tr>
<tr>
<td>Eastern South Platte*</td>
<td>78</td>
</tr>
<tr>
<td>Buff area**</td>
<td>30</td>
</tr>
<tr>
<td>Kemp</td>
<td>48</td>
</tr>
<tr>
<td>Nebraska</td>
<td>11</td>
</tr>
<tr>
<td>Billings</td>
<td>34</td>
</tr>
<tr>
<td>**Total</td>
<td>39</td>
</tr>
</tbody>
</table>

*Growing area along the South Platte River.
**Areas in Eastern Colorado other than those along the South Platte.

Colorado agriculture down six percent

Colorado farmers and ranchers contributed a total of $2.03 billion (excluding government payments) to the state's economy in 1975 according to the 1976 edition of Colorado Agricultural Statistics. This figure was down 6 percent from 1974, but agriculture is second in the leading economic activities in the state of Colorado. There are 29,500 farms and ranches on 39,900,000 acres of land in the state. The livestock industry constituted 35 percent of the 1975 total with wheat 12.2 percent, sugar beets 6.1 percent, corn grain 4.4 percent, milk 3.1 percent and sheep and lambs 2.5 percent. Other state agricultural activity made up the remaining 16 percent. Colorado ranks fourth in the nation in production of sugar beets. Colorado Agricultural Statistics is available at the Colorado Crop andLivestock Reporting Service, 2490 W. 26th Ave., Denver, Colo. 80211.
### Eaton High 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daryle Tateyama</td>
<td>8968</td>
<td>2</td>
</tr>
<tr>
<td>Charles Scheid</td>
<td>8583</td>
<td>2</td>
</tr>
<tr>
<td>Wilbert Winter</td>
<td>8530</td>
<td>1</td>
</tr>
<tr>
<td>Vic Leffler</td>
<td>8370</td>
<td>8</td>
</tr>
<tr>
<td>John Leffler</td>
<td>8324</td>
<td>7</td>
</tr>
<tr>
<td>Charles Leffler</td>
<td>8260</td>
<td>3</td>
</tr>
<tr>
<td>Robert Rundle</td>
<td>8221</td>
<td>2</td>
</tr>
<tr>
<td>Harold Tateyama</td>
<td>8059</td>
<td>1</td>
</tr>
<tr>
<td>Edwin K. Tateyama</td>
<td>8021</td>
<td>1</td>
</tr>
</tbody>
</table>

Front row (l to r): Edwin K., Daryle and Harold Tateyama; Vic Leffler; Randy Honstein; Charles Winter, Jr.; Larry Honstein. Back row: Leonard Michal; Donald Honstein; John Leffler; Kenneth C. Fagerberg; Charles Scheid; Charles Leffler; Robert Rundle

Harold and Edwin K. Tateyama, high sugar producers, Eaton, 3,319,689 pounds of sugar, 443 acres

### Greeley High 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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<tbody>
<tr>
<td>W. M. McKay</td>
<td>9436</td>
<td>3</td>
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<tr>
<td>W. E. McKay</td>
<td>9001</td>
<td>4</td>
</tr>
<tr>
<td>William G. Leafgren</td>
<td>8914</td>
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<tr>
<td>Larry Leafgren</td>
<td>8857</td>
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<tr>
<td>Daniel Frank</td>
<td>8757</td>
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<tr>
<td>Ritchie E. Pyeatt</td>
<td>8721</td>
<td>6</td>
</tr>
<tr>
<td>Terry L. Rothe</td>
<td>8711</td>
<td>1</td>
</tr>
<tr>
<td>J. Maynard Koehn</td>
<td>8687</td>
<td>2</td>
</tr>
<tr>
<td>Emanuel Buderus</td>
<td>8558</td>
<td>1</td>
</tr>
<tr>
<td>Lowell Buderus</td>
<td>8482</td>
<td>4</td>
</tr>
</tbody>
</table>

Front row (l to r): Ritchie Pyeatt; Harold Lee Long; Emanuel Buderus; William G. and Larry Leafgren. Back row: Daniel Frank; Terry Rothe; Manual Geisick; W. E. McKay; Lowell Buderus; W. M. McKay; Harold Long; Werner Detterer

W. M. and W. E. McKay, high sugar producers, Greeley, 2,418,437 pounds of sugar, 271 acres
For Walter E. Nygren, 1976 marked his fourteenth year as a High 10 grower. For The Great Western Sugar Company (GWS), it was the forty-first year to honor growers for high sugar production.

A Longmont grower, Nygren was one of over 200 sugarbeet growers in 15 factory districts who received special recognition for 1976 crops. High 10 growers were recognized for producing the greatest amount of sugar per acre.

Awards were also presented to the high sugar producer in each factory district. Merle Hojio, Loveland district, won the award for the eleventh year.

High 10 and high sugar producers were feted with banquets held in each Rocky Mountain sugarbeet region.

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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</thead>
<tbody>
<tr>
<td>Eugene Hettinger</td>
<td>8687</td>
<td>5</td>
</tr>
<tr>
<td>Alex H. Schwindt</td>
<td>8658</td>
<td>4</td>
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<tr>
<td>Jacob Stromberger</td>
<td>8461</td>
<td>1</td>
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<tr>
<td>Harold Stromberger</td>
<td>8397</td>
<td>1</td>
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<tr>
<td>Robert J. Winter</td>
<td>8377</td>
<td>1</td>
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<tr>
<td>Neill Brunner</td>
<td>8332</td>
<td>3</td>
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<tr>
<td>Ronald Erbes</td>
<td>8300</td>
<td>1</td>
</tr>
<tr>
<td>Kenton Brunner</td>
<td>8270</td>
<td>3</td>
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<tr>
<td>Kenneth D. Schleiger</td>
<td>8242</td>
<td>2</td>
</tr>
<tr>
<td>Victor Koehler</td>
<td>8136</td>
<td>3</td>
</tr>
</tbody>
</table>

Front row (l to r): Harold Stromberger; Henry Schwindt, Jr.; Robert J. Winter.
Middle row: Victor and James E. Koehler; Jacob Stromberger; Eugene Hettinger. Back row: Kenneth D. Schleiger; Ronald J. Weber; Kenton Brunner; Neill Brunner; Alex Schwindt; Ronald Erbes

William Sayles, Merle Hojio and Donald Caines, high sugar producers, Loveland, 3,036,697 pounds of sugar, 390 acres
Front row (l to r): Ronald Baker; Robert Sheppard; Frieda M. Bostron; Fred C. Weller. Middle row: Kenneth Bostrom; Ed and Elmer Amen; Eufracio Romero. Back row: Joe Corsentino; Richard Lipe; Steve and Duane Bruntz.

Clarence and Ralph H. Goeglein, high sugar producers, Ft. Morgan, 6,125,456 pounds of sugar, 1,015 acres.

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard Lipe</td>
<td>9893</td>
<td>6</td>
</tr>
<tr>
<td>Ed Amen</td>
<td>9034</td>
<td>2</td>
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<tr>
<td>Elmer Amen</td>
<td>9008</td>
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<tr>
<td>Kenneth Bostrom</td>
<td>8814</td>
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<tr>
<td>Fred C. Weller</td>
<td>8673</td>
<td>1</td>
</tr>
<tr>
<td>Ronald Baker</td>
<td>8572</td>
<td>1</td>
</tr>
<tr>
<td>Frieda M. Bostron</td>
<td>8473</td>
<td>1</td>
</tr>
<tr>
<td>Steve Bruntz</td>
<td>8411</td>
<td>1</td>
</tr>
<tr>
<td>Duane Bruntz</td>
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<td>1</td>
</tr>
<tr>
<td>Robert Sheppard</td>
<td>8318</td>
<td>3</td>
</tr>
</tbody>
</table>

Front row (l to r): Richard Townsend; Edwin Deeds; Michael Burk; Pervadus Wade; Robert Henry. Back row: Tim Paulter; John Hill; Gary Townsend; John Deeds; Dean Townsend; Gary Paulter; Linda Henry.

Kenneth and Clarence Roberson, high sugar producers, Kemp, 4,895,344 pounds of sugar, 705 acres.

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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</thead>
<tbody>
<tr>
<td>Michael Burk</td>
<td>8325</td>
<td>2</td>
</tr>
<tr>
<td>Glenn Burk</td>
<td>8171</td>
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<tr>
<td>Robert B. Henry</td>
<td>7779</td>
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<tr>
<td>Linda J. Henry</td>
<td>7736</td>
<td>3</td>
</tr>
<tr>
<td>Richard Townsend</td>
<td>7678</td>
<td>2</td>
</tr>
<tr>
<td>Edwin Deeds</td>
<td>7555</td>
<td>2</td>
</tr>
<tr>
<td>John Deeds</td>
<td>7474</td>
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<td>Gary Townsend</td>
<td>7430</td>
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<tr>
<td>John Hill</td>
<td>7298</td>
<td>1</td>
</tr>
<tr>
<td>Dean Townsend</td>
<td>7290</td>
<td>1</td>
</tr>
<tr>
<td>Timothy Paulter</td>
<td>7290</td>
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### SCOTTSBLUFF

**HIGH 10**

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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<tbody>
<tr>
<td>Victor Rien</td>
<td>10206</td>
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<tr>
<td>W. O. Barbour</td>
<td>10120</td>
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<tr>
<td>D. R. Reichert</td>
<td>9370</td>
<td>12</td>
</tr>
<tr>
<td>Roger L. Yost</td>
<td>9364</td>
<td>5</td>
</tr>
<tr>
<td>Victor Ruppel</td>
<td>9342</td>
<td>6</td>
</tr>
<tr>
<td>John H. Reichert</td>
<td>9143</td>
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</tr>
<tr>
<td>Monty Reisig</td>
<td>9009</td>
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<tr>
<td>Steven D. Reisig</td>
<td>8976</td>
<td>9</td>
</tr>
<tr>
<td>John Bauer, Jr.</td>
<td>8945</td>
<td>9</td>
</tr>
<tr>
<td>Dave H. Stricker</td>
<td>8859</td>
<td>1</td>
</tr>
</tbody>
</table>

*Front row (l to r): W. O. Barbour; Victor Ruppel; Roger Yost; Harold Rein. Middle row: John Reichert; D. R. Reichert; Dave Stricker; Victor Rien. Back row: John Bauer, Jr.; Monty Reisig. Insert: Steven D. Reisig*

*Alex H. Reifschneider, high sugar producer, Scottsbluff, 1,886,375 pounds of sugar, 240 acres*

### GERING

**HIGH 10**

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harold Ruppel</td>
<td>8677</td>
<td>7</td>
</tr>
<tr>
<td>George E. Bott, Jr.</td>
<td>8593</td>
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<tr>
<td>Leland L. Buehler</td>
<td>8586</td>
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<tr>
<td>Kent K. Buehler</td>
<td>8509</td>
<td>4</td>
</tr>
<tr>
<td>Lon A. Nichols</td>
<td>8494</td>
<td>4</td>
</tr>
<tr>
<td>Robert Ott</td>
<td>8402</td>
<td>7</td>
</tr>
<tr>
<td>Wilbert Ruppel</td>
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<td>1</td>
</tr>
<tr>
<td>Wilbert Stricker</td>
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</tr>
<tr>
<td>LaVern M. Blehm</td>
<td>8348</td>
<td>7</td>
</tr>
<tr>
<td>Wilford Kaufman</td>
<td>8340</td>
<td>4</td>
</tr>
</tbody>
</table>

*Front row (l to r): Leland Buehler; Wilford Kaufman; Harold Ruppel; Wilbert Ruppel. Middle row: George E. Bott, Jr.; Wilbert Stricker; Kent Buehler; Robert Ott. Back row: LaVern M. Blehm; Harry A. Maier. Insert: Lon A. Nichols*

*Gary and Melvin Grasmick, high sugar producers, Gering, 1,871,411 pounds of sugar, 191 acres*
## Longmont High 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ronald Klein</td>
<td>9463</td>
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</tr>
<tr>
<td>Floyd Adler</td>
<td>9299</td>
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<td>Jerry Miller</td>
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<tr>
<td>Albert Stroh</td>
<td>8916</td>
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<tr>
<td>Walter E. Nygren</td>
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<td>Mark Nygren</td>
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<tr>
<td>William Mayer</td>
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<tr>
<td>Edward Rademacher</td>
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<tr>
<td>Bruce Rademacher</td>
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<tr>
<td>Bruce W. Frederiksen</td>
<td>8287</td>
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<tr>
<td>Delbert L. Spaur</td>
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<td>2</td>
</tr>
<tr>
<td>Ruth Spaur</td>
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<tr>
<td>Wallace J. Lebsack</td>
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<td>5</td>
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<tr>
<td>Gary L. Lebsack</td>
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<tr>
<td>Randall Lebsack</td>
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</tbody>
</table>

Theodor Blehm, high sugar producer, Longmont, 2,182,801 pounds of sugar, 2,750 acres

## Brighton High 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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</thead>
<tbody>
<tr>
<td>Dennis Weichel</td>
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<tr>
<td>John D. Kornman</td>
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</tr>
<tr>
<td>James L. Sirios</td>
<td>8212</td>
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<tr>
<td>Dominic Petrocco</td>
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<td>1</td>
</tr>
<tr>
<td>Dave Petrocco</td>
<td></td>
<td>1</td>
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<tr>
<td>Alvie Blood</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Charles Blood</td>
<td></td>
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<tr>
<td>Merle Blood</td>
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<tr>
<td>Sam Sasaki</td>
<td>7692</td>
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<tr>
<td>Yoshiko Sasaki</td>
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<tr>
<td>Mark Kauffman</td>
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<tr>
<td>Lee Kauffman</td>
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<td>Vern Kauffman</td>
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<td>Joe E. Sasaki</td>
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<tr>
<td>Kay Sasaki</td>
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<tr>
<td>Tom Sasaki</td>
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<tr>
<td>Edwin L. Weickum</td>
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</tbody>
</table>

Lloyd Land, high sugar producer, Brighton, 2,008,447 pounds of sugar, 325 acres
### Ovid High 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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<tbody>
<tr>
<td>Richard Van Velson</td>
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<tr>
<td>Francis J. Schiel</td>
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<tr>
<td>Ronald F. Schiel</td>
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<td>O. N. Beck</td>
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<td>Albert Neubauer</td>
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<tr>
<td>Harold Bieber</td>
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<tr>
<td>Alan Bieber</td>
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<tr>
<td>Vernon L. Parker</td>
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<tr>
<td>Sharon M. Parker</td>
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<tr>
<td>Phillip Stieb</td>
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</tr>
<tr>
<td>Ronald Stieb</td>
<td>7109</td>
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<tr>
<td>Paul Stieb</td>
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</tr>
<tr>
<td>Bob Gruntorad</td>
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<tr>
<td>Charles R. Washa</td>
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<tr>
<td>George Jenik</td>
<td>7109</td>
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</tbody>
</table>

Sharon M. and Vernon L. Parker, high sugar producers, Ovid, 4,523,096 pounds of sugar, 703 acres.

### Sterling High 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>John C. Mollendor</td>
<td>8940</td>
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<tr>
<td>Robert Mollendor</td>
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<tr>
<td>Chris H. Bieber</td>
<td>8623</td>
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<td>Gordon E. Heermann</td>
<td>8515</td>
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<tr>
<td>Garry Wallin</td>
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<td>1</td>
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<tr>
<td>Michael Vasa</td>
<td>8505</td>
<td>1</td>
</tr>
<tr>
<td>Patrick Vasa</td>
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<tr>
<td>Phillip Vasa</td>
<td>7981</td>
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<tr>
<td>Burt A. Randall</td>
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<tr>
<td>Mary E. Randall</td>
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<tr>
<td>Mike Raffaeli, Jr.</td>
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<tr>
<td>Brendon Barger</td>
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<td>Richard L. Hirsch</td>
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<td>Louis Rizzolo</td>
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Gene, L. E., Stan and Leslie Smith, high sugar producers, Sterling, 7,300,816 pounds of sugar, 1,115 acres.
BAYARD
HIGH 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
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<tbody>
<tr>
<td>Louie Sauer, Jr.</td>
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<td>Herman Schmall</td>
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<td>Margaret M. Hodge</td>
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<td>Victor Propp</td>
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<td>Myron Bauer</td>
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<tr>
<td>Harvey Deines</td>
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<tr>
<td>Henry Jerger, Jr.</td>
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<tr>
<td>Norman A. Kuxhausen</td>
<td>9373</td>
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<tr>
<td>Harry Meter</td>
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</tr>
<tr>
<td>Herman Andreas</td>
<td>9257</td>
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</table>

Front row (l to r): Henry Jerger, Jr.; Herman Schmall; Russel L. Hodge, Jr.; Norman Kuxhausen. Middle row: Louie Sauer, Jr.; Victor and Stanley Propp; Herman Andreas; Myron Bauer. Back row: Harry Meter, Harvey Deines

Mr. and Mrs. Robert Sterkel, high sugar producers, Bayard, 4,366,520 pounds of sugar, 756 acres

MITCHELL
HIGH 10

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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<tbody>
<tr>
<td>Robert M. Ullrich</td>
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<tr>
<td>Wesley Ullrich</td>
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<td>Marlon L. Hessler</td>
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<tr>
<td>Morris E. Hessler</td>
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<tr>
<td>Robert L. Hessler</td>
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<tr>
<td>Alex Strauch</td>
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<tr>
<td>Reuben Strauch</td>
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<tr>
<td>Walter Debus</td>
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<tr>
<td>Gene Hoff</td>
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<td>Richard W. Butcher</td>
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<tr>
<td>Alvin L. Lebruska</td>
<td>7753</td>
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Front row (l to r): Reuben Strauch; Robert, Morris and Marion Hessler; Richard W. Butcher. Middle row: Walter Debus; Gene Hoff; Jerry Lind; Richard K. Butcher; Reuben Debus. Back row: Robert Ullrich, Alex Strauch; Bill Sommer; Alvin Lebruska

Mr. and Mrs. Ernest Eskam, high sugar producers, Mitchell, 3,158,085 pounds of sugar, 470 acres
**BILLINGS**

**HIGH 10**

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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<td>William Michael, Sr.</td>
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<td>Carl Dorn</td>
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<td>Louie Sticka</td>
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<td>David Robertus</td>
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<td>Ed DeRudder, Jr.</td>
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<td>Jim DeCock</td>
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<td>Robert DeCock</td>
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<tr>
<td>Monte Dvorak</td>
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Ted Kallen, high sugar producer, Billings, 5,538,302 pounds of sugar, 778 acres

**LOVELL**

**HIGH 10**

<table>
<thead>
<tr>
<th>Grower</th>
<th>Lbs. sugar per acre</th>
<th>Years in High 10</th>
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<tbody>
<tr>
<td>I. J. Frank</td>
<td>9472</td>
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<tr>
<td>Roger Rodriguez</td>
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<td>Norman Frank</td>
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<td>L. J. Decker</td>
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<td>Charles H. Shumway</td>
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<tr>
<td>Daniel J. Shumway</td>
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<tr>
<td>Brian L. Johnson</td>
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<td>George Wambeke</td>
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<tr>
<td>James L. Jones</td>
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<tr>
<td>Charles A. Hessenthaler</td>
<td>8724</td>
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</tr>
</tbody>
</table>

Paul Rodriguez, Jr., high sugar producer, Lovell, 4,691,173 pounds of sugar, 602 acres

**CONGRATULATIONS, HIGH 10'S!**
All about sugarbeets

B P O L E R A V Z A N G I A P M A C E C
R D E S W E E T E N E A T O X I C O O L
E B E E T S O D O R D E L G N A R P S A
X M L W V E R I N A N Y S I O L M A U R
R O O E J U T I C O P A H U I M A S M I
E L I E T A R A I L C O L B T Y T R U F
T A T B R E I T O C C O I I A M U T H I
E S E U S U A I H Y D E T O Z M R F A C
M S P O L R D A Z A N C B X I A A R M A
O E D R T I R L L N O I T A R U T A S T
C S A L L I R D I R M U I Y A L I I Y I
A M I Y M S O A K E R J T A L E O S O O
R F Y E S G L Y M A L I T R O N N E B N
F Y T O R E T E M I R A L O P L R R I X
E E T A R T L I F U L T O L N A I B E N
R P A T I O L E P O Y L P F T X G S M N

Answer words suggested by the following clues are hidden in the diagram. Words appear across, up, down, backward or diagonally and appear in a straight line. Study the clues, then search for the definitions in the diagram. Circle each of the 31 hidden words.

1 — A plant requiring two years for full life cycle.
2 — The finely divided beet particles, as produced by sawing for purity testing.
3 — A hydrometer scale, calibrated to read percent sugar by weight in pure sugar solutions.
4 — The period of the year during which the beet factory makes sugar.
5 — The process of removing undissolved solids, by settling or filtration, from a liquid.
6 — To wash a material free from sugar.
7 — To sow seeds.
8 — An older term for purification.
9 — Liquid after passing through a filter.
10 — Removal of solid particles from liquid by passing the liquid through a permeable membrane.
11 — Referring to plants or plant life.
12 — A file used in sharpening the edge of the splitters in a beet knife.
13 — Partially decomposed vegetable matter.
14 — Almost any sugar-containing liquid in the main line of the beet-sugar manufacturing process, up to the molder station.
15 — The process of coming to full development.
16 — To mechanically crush or pulverize.
17 — The final low purity syrup spun off after repeated crystallizations in the extraction of sugar.
18 — Monosodium glutamate.
19 — A leaf stalk.
20 — An instrument used for determining sugar concentration by the use of polarized light.
21 — A measure of sucrose concentration based on its ability to rotate the plane of polarized light.
22 — Multifold.
23 — A measure of the sugar in relation to the total dry substance; specifically, the percentage of sucrose on total solids.
24 — An instrument used in measuring total solids in solution.
25 — A polarimeter with a scale reading percentage of sucrose.
26 — The treatment of sugar liquors with gases, either carbon dioxide or sulphur dioxide.
27 — A colloquialism for storage bins for granulated sugar.
28 — An extension of a wet beet hopper in which frozen beets are thawed in rail cars by soaking with warm water.
29 — Having many roots.
30 — Material which must be discarded.
31 — To produce premature flowering or fruiting of a plant.

Answers to
All About Sugarbeets puzzle
International students visit Sugar Company

Economic students from Europe and the East got some in-field instruction as guests of The Great Western Sugar Company (GWS) in July. The visitors, graduate students from the Economics Institute at the University of Colorado, Boulder, visited GWS as part of a program designed to acquaint them with all phases of economic activity, including agriculture. As one of the ten major Colorado manufacturers that employ 1,000 or more people, GWS was selected as an excellent case study for the students.

During their tour of the Research Center and the Sugar Building, the visitors were given detailed explanations of the facilities and past, present and future projects.

GWS Offices Moved to Denver

Great Western Sugar (GWS) accounting, agriculture and manufacturing offices in Longmont have been transferred to the Sugar Building in Denver, Colo. The accounting functions have been aligned into two new districts: the western district covering Longmont, Greeley, Loveland, Brighton, Fort Morgan, Ovid and Sterling and headquartered in Denver. The new western division for manufacturing will also be headquartered in Denver and will include Longmont, Loveland, Greeley, Brighton, Fort Morgan, Kemp, Billings and Lovell.

U.S. Agriculture Showed $12 Billion Surplus in 1976

Despite a 6 percent increase in agricultural imports to $10.1 billion, U.S. agricultural trade produced a record surplus of over $12 billion in fiscal year 1976. The surplus offset a nonagricultural trade deficit of $8 billion and once again agriculture put the nation’s total trade balance in the black — this time by $4 billion for the 12-month period. The record export value came from an increase in volume of shipments of over 20 percent, about 103 million metric tons, which more than offset a decline of about 11 percent in the unit value of export commodities. (USDA News, July 29, 1976)

Tormey Honored for 30 Years of Service

Dale B. Tormey, Eaton agriculturalist, received his 30-year pin from Frank Zumbrink, Eaton agricultural manager. On hand for the presentation is Ralph W. Hettinger, western district agricultural manager.

Since August 5, 1946, Tormey has served as a Great Western Sugar agriculturalist in the Eaton district. Born just outside of Eaton, he joined GWS after earning a bachelor of science degree in animal husbandry from Colorado A & M University (now Colorado State University) in Fort Collins and a stint in the U.S. Army as a first lieutenant. He and his wife, Nancy, have raised five children; two daughters now live in Denver, a son and a daughter in Eaton and a son in Yemen.

Davis Takes First Place for Sugarbeets

Janie Davis, a senior at Burlington (Colo.) High School, won two sugarbeet competitions this year. Judges for 4-H and The Great Western Sugar Company (GWS) thought her 6-beet sample worthy of first place in the Kit Carson county contests. The beets were judged for uniformity in size and shape. Janie grew the beets on a five-acre plot for her 4-H project. She received her GWS award from Bill Ullman, GWS agriculturalist.
Sewing with Knit Fabric

Chances are your family is sold on comfortable knits. To get best results with the knit garments you sew, choose a suitable pattern. Avoid bias-cut or circular skirts. Since most knits have the greatest stretch on the cross grain, select a style with as few cross-grain seams as possible to avoid puckers.

Some patterns are marked "knits only" or "for sweater knits only." Do not attempt to use these patterns on woven fabrics; they will be too small.

Choose lighter weight jersey knits for infants. Double knits and heavily textured weaves tend to look bulky.

If stretch is your objective in using knit fabric, line and/or interface with other stretch fabrics, or cut lining and interfacing on the bias.

Select the correct machine needle. On knit fabrics use either a ballpoint needle or a very fine, sharp needle. If your needle is dull or burred it may cut or tear the fabric and result in seam-line fraying.

On double knit and tricot use 10 to 12 stitches per inch.

Slightly stretch tricot when you stitch it. Extra thread in the seam will keep threads from breaking when the fabric is stretched. Make two straight seams an eighth inch apart, or make one straight seam with a zigzag seam next to it. Trim the seam allowance close to the outside seam.

To stabilize shoulder seams on stretchy fabrics, sew a piece of pre-shrunk binding tape in the seam.

On knit fabrics use a stretch stitch, small zigzag stitch or stretch the fabric when sewing seams. Use thread made with a synthetic fiber (such as polyester) since it has some give.

Stabilize the zipper location with seam tape on stretchy or sheer fabrics.

If fabric is bulky, overcast or use a zigzag edge on facings or hem.

Let knit and bias-cut garments hang 24 hours before hemming. Use a tailor's hem (loose catch stitch), stretch lace or fusibles.

Egg 'n Potato Hash
6 servings

- 3 tablespoons butter
- 1 can (12 oz.) luncheon meat, cut in 1/4-inch cubes
- 1/4 cup chopped green pepper (approx. 1 large)
- 3 cups diced potatoes (approx. 3 medium)
- 8 eggs
- 1/2 cup milk
- 2 teaspoons prepared mustard
- 1/2 teaspoon salt
- 1/4 teaspoon pepper

In large skillet, saute meat and green pepper in butter until green pepper is tender but not brown, about 5 minutes. Remove with slotted pancake turner or spoon; set aside. Place potatoes in skillet. Cover and cook over medium-high heat, stirring occasionally until potatoes are tender and browned, about 10 to 15 minutes. Reduce heat to medium. Meanwhile, mix remaining ingredients until blended; stir in reserved meat mixture. Pour over browned potatoes. As egg mixture begins to set, gently draw a pancake turner completely across bottom and around sides of skillet, forming large, soft curds. Continue until eggs are thickened, but do not stir constantly. Cook until eggs are thickened throughout but still moist. (It is better to remove scrambled eggs from pan when they are slightly underdone. Heat retained in eggs completes the cooking.)

Social Security Earnings Checkup

Most people in the United States today make contributions to social security and should check social security earnings records periodically. Unless an error is reported within three years, three months and fifteen days after the year in which the wages were paid or after the taxable year in which self-employment income was derived, the Social Security Administration warns that correction of the records may not be possible.

A statement of social security earnings can be obtained by sending Form OAR-7004 to the Social Security Administration, P.O. Box 57, Baltimore, Md. 21203. The form, which can be obtained at any local Social Security office, must be signed by the person whose record is requested, but the statement will be sent to anyone designated by that person. The statement shows all social security earnings from 1937 until a date six or eight months prior to the date of the earnings statement requested.
U.S. Retains Agriculture Lead

The United States is still ahead of the Soviet Union in the use of fertilizer and farm equipment, farm efficiency, crop yields, livestock productivity, value of production and output per person. According to the U.S. Department of Agriculture’s Economic Research Service, America leads in equipment with one combine for every 150 acres compared to the Soviet’s one combine for 460 acres. Figures indicate there is one tractor for every 88 cultivated acres in the United States and one tractor for 265 cultivated acres in the Soviet Union. In manpower, over 25 percent of the Soviet labor force work in agriculture compared with only 4 percent in the United States. Another indicator of America’s superiority is that although the Soviets have two and a half times as much land, only one-fourth is suitable for agriculture compared with half of total United States land. American weather conditions are also far more favorable. (USDA News, Oct. 18, 1976)

Maine Revives Sugarbeet Industry

Eleven thousand acres of sugarbeets have been planted in Maine and southeast Canada in an effort to re-establish the sugarbeet industry in that area. After a $10 million failure in 1969, the Maine Sugar Beet Growers Association is cautious but optimistic about the 1976 crop. The Easton, Me. mill has stood silent for six years, but 170 workers are now on the job for the Triple A Sugar Corporation. As an inducement to growers, Triple A Sugar has offered to provide beet harvesting machinery at little cost, while holding out the prospect of a share in the mill’s profits through membership in a cooperative. The company also advanced $25 an acre to farmers when their beets reached the six-leaf stage. (Colorado Times, Fort Morgan, Colo., Sept. 13, 1976)
Weather Modification: Still a New Science

Until 1946, efforts to change the weather consisted mainly of prayers, a little incense, some rain dancing and a whole lot of talk. That year, a General Electric scientist, Vincent Schaefer, seeded clouds with dry ice to produce rain, and with that exploit initiated the new science of weather modification. Thirty-one years later, the complex science of weather modification is still in its infant stage.

While fairly reliable technology exists to make snow and rain, and some experiments have suppressed hail, scientists are still uncertain about how these techniques work and what their ultimate impact could be.

Producing rain and snow

Cloud seeding to induce snow or rain is the most common form of weather modification. Clouds are composed of countless water droplets that are so light and minute they are blown upward by every air current. In the upper reaches of the cloud, air temperature is below the freezing point, yet the water droplets are so pure they do not freeze. In this supercooled state, water droplets collide and combine with each other to form bigger water particles. Although these water formations are heavier and denser, they rarely have sufficient weight or density to reach the ground as rain. In most instances, rain requires the catalyst of ice crystals.

In addition to water droplets, a rain cloud contains tiny ice crystals that attract water droplets and create particles numerous enough and heavy enough to fall to the earth. In cloud seeding, silver iodide, a chemical that mimics the effect of ice crystals, is dispersed into the cloud. The presence of silver iodide triggers the formation of condensation nuclei and promotes rain or snow. This process is dependent, however, on a number of variables including temperature, wind velocity, sufficient moisture and appropriate atmospheric pressure.

When all variables appear to be correct, weather modifiers can use two methods to dispense silver iodide: ground generators, which burn a silver iodide solution, or flares shot from planes. Ground generators are much cheaper than the pyrotechnic device which requires expensive equipment and trained pilots. But, ground generators systems can be used only in mountainous areas where updrafts are constant and can be relied upon to carry the silver iodide upward into the clouds. Once silver iodide is injected, a strong central wind will carry it to the upper layers of the cloud.
cooler temperatures allow condensation (Fig. 1).
The ground generator system was used this past winter in Colorado where the lack of snow posed severe hardships for the state's ski industry. The state legislature, realizing no snow pack threatened the agricultural, as well as the skiing, industry, appropriated $187,000 in emergency funds to seed clouds over the Rockies.
The seeding was a success according to Lewis Grant, professor of atmospheric science at Colorado State University (Fort Collins). “There was an overall precipitation increase of 15 percent in winter snowpack,” Grant says. Such an increase could mean an additional 1 to 1.5 million acre feet of water in Colorado's streams this summer and fall.
Success is not always the outcome, however. With so many variables affecting results, scientists cannot always be certain which clouds will yield precipitation. Some clouds have so little moisture that even with heavy applications of silver iodide, they will never produce rain or snow. Others are going to snow or rain by themselves, so that seeding is unnecessary and may even cause disastrous excesses.
“It is as important to know when to do nothing as something,” Grant cautions. “We know nature is efficient 75 percent of the time. Twenty to 25 percent of the time she is not, and we can seed with good results. However, we just don't know all the variables, yet.”
Similarly, Arnett Dennis, a research meteorologist at the National Oceanic and Atmospheric Administration (NOAA), reports random experiments in both Florida and Colorado comparing cloud seeding and nonseeding days show incidents of precipitation were greater on the seeding days. Yet, Dennis claims weather knowledge and seeding principles are still very limited: “We often do not know why it works or why it does not work on a particular day.”
Of major concern to scientists is summer cloud seeding. Dennis explains, “The winds blow in different directions at different altitudes and the rapid rising motion accelerates condensation,” making summer rainmaking a risky business.
Results from summer cloud seeding have been inconsistent. According to Dennis, NOAA’s summer cloud seeding in Florida yielded positive returns. But, five years of summer cloud seeding in South Dakota yielded a small overall increase in the counties where the seeding took place.
More ominous, however, are accusations linking summer cloud seeding with disasters. For instance, the South Dakota School of Mines has been accused, in a multimillion dollar lawsuit, of causing the Rapid City flood. Lewis Grant sees no reasonable basis for the suit. “They were seeding with ordinary table salt,” he explains. “If they had used silver iodide, there would be a question.” At the same time, Grant emphasizes that summer cloud seeding is a touchy prospect.
Cloud seeding has also been linked to the Big Thompson flood. Many people in the canyon swear they saw the pyrotechnic flash created by seeding from planes prior to the flood. Harris Sherman, executive director of the Department of Natural Resources, which is responsible for issuing cloud seeding permits, said “No legal cloud seeding was going on in that area at that time.”
Colorado law requires permits for weather modification without which firms or individuals may be charged with a misdemeanor punishable by a $5,000 fine and six months' imprisonment. In addition to a permit, the Colorado Department of Natural Resources required a $1 million bond before issuing permits to three commercial companies to seed clouds over the Rockies last winter.
Besides the real possibilities for mishaps, cloud seeding, summer or winter, is often misunderstood and mistrusted by the public. Many Denver residents, for instance, objected to cloud seeding in the mountains last winter because they assumed seeding would rob the clouds of moisture Nebraska and Kansas should get.
While the assumption seems logical because clouds roll eastward over Denver, it does not correspond to meteorological reality. Nebraska and Kansas get their precipitation from weather systems that blow up from the Gulf of Mexico. Furthermore, cloud seeding in one area can bring moisture to surrounding regions.

Responding to the public's fears and recognizing the inadequacies in scientific data on weather phenomena, scientists are cautiously moving ahead with research that may some day produce safe, reliable rainmaking techniques.

Suppressing hail

Apparently further off but also in the research stages are efforts to suppress hail. For farmers in particular, hail storms can be an extremely destructive weather element. A heavy storm can destroy a crop in five minutes. Again, the technique being used is cloud seeding, but regular attempts at hail suppression in the United States have met with little success.

Soviet weatherologists, however, claim fantastic results. Russian scientist E. D. Fyodorov, director of the Institute of Applied Geophysics, describes the Soviet method: "Hail formation zones in clouds approaching the protected area are detected by radar at the range of up to four kilometers. Anti-aircraft guns and missiles fire explosives into the cloud to stimulate (condensation) and thereby prevent the formation of large hailstones." Fyodorov states the technique reduces hail damage by four to five times.

Canadians, too, have had some success with hail suppression. Peter Summers, now with the U.S. National Center for Atmospheric Research (NCAR), began work on a program in an Alberta, Canada, farming region in 1956. For the first ten years of the project, Summers says, researchers did nothing but collect data on hail storms. Now the Canadians have begun seeding a 10,000-square-foot area. According to Summers, farmers consider the project a success.

In all three countries, regardless of results, scientists appear to be working on the same theory. Dennis of NOAA explains, "There are several theories on how hail storms work, but most people theorize that additional crystallizing agents will start more hail embryos forming and yield smaller hailstones, which are far less destructive to crops and buildings."

However, data indicate hail-storm modification efforts may be a boon or a burden. Science magazine reports (January 14, 1977, "The Paradox of Hail Suppression"), "Under different circumstances, cloud seeding may result in either increased or decreased hail."

With that menacing thought in mind, U.S. scientists are moving very cautiously, aware they face a complex subject. Hail storms are more difficult to study than snow storms because they occur at strange intervals. Some summers little or no hail falls, while other years bring several crop-shredding storms. This situation provides little opportunity for observing, taking measurements, comparing figures and drawing conclusions from the data.

"Hail is very hard to study because it is so variable from year to year. There is still a controversy on exactly how it works and scientists do not always agree on the data," Peter Summers says.

In 1972, NCAR initiated a hail-suppression program of randomized seeding in northwest Colorado. The program was abandoned in 1974 because, Summers claims, the seeding did not have much effect. At present, NCAR is collecting more data before evaluating the program.

Why, then, are Canadian and Russian scientists having success with hail suppression? One theory purports that U.S. research requirements are much stricter than in other countries. A simpler, more logical explanation is that weather patterns differ from country to country and that the powerful and complicated forces involved respond differently in different areas.

Without doubt, farmers, more than any other group look to science for relief from the weather. But, the complications in studying and modifying the multitudes of weather phenomena will take time and extensive research. In the meantime, weather scientists will proceed with caution in applying the present technology to provide some relief to farmers and insure food supplies.
Beleaguered cane and sugarbeet growers in the United States are finally getting some help from the federal government. Citing the present low price of sugar, the White House announced on May 4 subsidy payments for domestic sugar producers.

The Carter administration's plan calls for a maximum of two cents a pound in direct price-support payments. The payments will be made whenever the price of imported raw sugar falls below 13.5 cents a pound, which is the average estimated break-even price for domestic producers. The subsidy is supposed to cover the difference between the actual selling price of sugar and the 13.5-cent target price. The two-cent maximum, however, means that if the price falls below 11.5 cents a pound, the target price cannot be met even with the subsidy.

The White House stresses that the subsidy is an interim measure designed to help growers keep their heads above water until an international agreement on sugar can be worked out. At the time of the announcement, talks were in progress in Geneva and were scheduled to last until May 27. The administration hopes that "unilateral agreements will make further action unnecessary."

The policy does not include provisions for lower import quotas as some producers had hoped. Both Secretary of Agriculture Bob Bergland and the International Trade Commission had suggested lowering the import quotas earlier this year. In rejecting the quota proposals, the President contends they "are not in the interest" of either consumers or producers.

Elaborating on that statement, a government spokesman said President Carter feels that import quotas would increase the cost of sugar for consumers without "the offsetting benefits of price stabilization." USDA estimates that each penny of subsidy will cost taxpayers $125 million a year, compared to one sugar industry estimate that each penny in higher prices costs consumers $225 million.

The President is also concerned that quotas would harm developing nations whose economic well-being depends on sugar exports. But "probably the most important reason" for the rejection of lower import quotas, the spokesman says, is that the President feels international agreements are the best long-term approach to solving the problems of domestic sugar producers.

The American sugar industry has been under intense economic pressure for some time. This situation is being created by a number of factors. First, sugar is an international commodity, and America is the world's largest single importer of sugar. Second, the world is producing excess inventories. Third, the United States lacks an effective sugar policy. The combined effect is unrealistically low prices. Domestic producers, forced to compete with the rest of the world in an unprotected market, are selling their sugar for less than it costs to produce.

In March, the International Trade Commission (ITC) acknowledged that sugar imports were threatening America's sugar industry and recommended lowering the import quota. Carter apparently killed that proposal. For now, at least, the quota will remain at seven million tons per year. This figure is so much higher than what the United States actually does import—about four million tons—that it is, in effect, a nonquota.

The sugar industry itself is somewhat divided on the quota issue. Sugar producer organizations such as the U.S. Beet Sugar Association and the American Sugar Cane League look favorably on lower import quotas as the best method of adjusting the low price of sugar. The Sugar Cane League, in fact, goes even further. It not only recommends "a realistic import quota" of 4.2 million tons, but suggests as well that the quota be combined with price supports to assure growers a fair return. The U.S. Cane Sugar Refiners Association, on the other hand, opposes any program that would either increase the tariff or decrease the import quota. Yet, most agree that some method of assistance to domestic producers is necessary.

In determining what the assistance should be, the government must walk a thin line. Letting the price of sugar go too low could irreparably damage the industry. But letting the price go too high could be equally disastrous. The danger here is twofold: consumer reactions and challenges to the industry from other sweetening products.

In the sugar price boom of 1974, American consumers, scared by shortage horror stories and the prospect of endlessly increasing prices, put away two- and three-month supplies. Before long, they had stopped buying altogether. They were able to draw from the stores they had hidden away in their pantries. Needless to say, prices soon began going down while stocks
of unsold sugar, foreign and domestic, rose steadily. This brief but possibly critical interlude contributed to the present depressed price of sugar.

Another result of the fantastically high prices of 1974 was accelerated use of high fructose corn syrup. It began replacing sugar in products where liquid sweeteners were usable. That meant soft drinks, canned goods, even bakery products. Corn syrup had an inherent competitive advantage: it was cheaper to produce than sugar.

Any government policy, then, must be carefully designed — and presented — to take into account not just the sugar producers but consumers as well. The Carter administration's approach is intended to have just that kind of tailoring. It provides a subsidy to producers that eliminates any direct cost to consumers and is ultimately cheaper than lowering import quotas.

Most important, it is considered a temporary measure in the hope that an international agreement can be reached. The Agriculture Department says that U.S. representatives have gone to Geneva "committed to try and seek a good, workable international agreement." The American delegation is reportedly seeking a price "corridor," with a minimum world sugar price of 10 to 12 cents a pound and a maximum price of 16 to 20 cents. The United States is seeking stockpiling arrangements, whereby sugar exporting nations would be required to hold back or release their stores of sugar as necessary to keep the price within the corridor.

An international agreement would probably not take effect until mid-1978 at the soonest. In the meantime, the sugar industry will have the subsidy. In addition to that, sugar people now have representation in the Department of Agriculture through the Sugar Taskforce established by Bergland as one of his first acts after assuming duties as Secretary. The Taskforce is given specific responsibility for making recommendations to Bergland on the sugar industry. The Taskforce replaces the old Sugar Division of USDA, which was abolished when the Sugar Act expired in 1974.

Though the Carter administration has not given the sugar industry exactly what producers wanted, it has given substantially more help than has been the case since the repeal of the Sugar Act. Whether the administration's policy of using international agreements to bring relief to the industry will work, and how well, remains to be seen. But for now, growers and processors have slightly more reason for optimism, however guarded.

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**1976 Sugarbeet Crop Report**

The final breakdown of the 1976 sugarbeet crop shows 5,044,032 tons of beets received by The Great Western Sugar Company in the five-state western area. Average sugar content of beets harvested was 15.87 percent (derived from a weighted average of sugar content times tons of beets). Initial average payment was $17.44 per ton, with a second additional average payment of $1.25 per ton. To date, the total paid for the 1976 crop is $101,436,000, with an average payment of $20.11 per ton.

<table>
<thead>
<tr>
<th>Area</th>
<th>Tons</th>
<th>% Sugar</th>
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<tr>
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<tr>
<td>Northeastern Colo</td>
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<tr>
<td>Montana/Wyoming</td>
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</tbody>
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**GWS GROWERS HONORED**

On February 23, the best sugar growers in the state of Colorado were honored at the Denver Agricultural and Livestock Club's annual Production Achievement Awards Program and Banquet. The state's top sugar producer received the Denver Ag and Livestock Club Dinner Bell Award, co-sponsored by KWGN-TV, Channel 2. The award was presented by George Salem, popular Channel 2 announcer. Winner of the 1976 award was Jim McCall of Delta County with a record 10,065 pounds of sugar per acre on 33 acres. Second place in this division went to Ronald Klein of the Longmont district. W. E. McKay and W. M. McKay of McKay Farms, Greeley district, took third place. The Klein and McKay production rates in bushels per acre were 9,468 and 9,436 respectively.

At the dinner, the top sugar producers in each factory district were also recognized for their achievements. Awards went to the above-named top growers and the following: Richard Lipe, Fort Morgan; Daryl Tateyama, Eaton; Chris H. Bieber, Sterling; Eugene Hattinger, Loveland; Dennis Weichel, Brighton; Francis J. Schiel, Ovid; Tim and Gary Pautler, Kemp; and Carl C. Madson, Rocky Ford. In addition, growers who produced at least 10,000 pounds of sugar per acre merited special awards from Colorado State University.

Bill Lawson of the Colorado Department of Agriculture served as master of ceremonies for the proceedings. Commissioner of Agriculture J. Eyan Goulding presented state awards at the banquet. District awards were presented by George Lapaseotes, former director of governmental affairs for The Great Western Sugar Company, and Ken Mellin, district manager for DeKalb Ag Research, Inc.

Winners of the competition were determined in accordance with strict regulations and specific requirements. Among the companies sponsoring awards at the banquet were The Great Western Sugar Company, Holly Sugar Corporation, Pioneer Seeds, DeKalb Ag Research, O's Gold, Golden Harvest and Northrup, King & Company.
Drought

What it means to GWS growers

Fate dealt a good hand to Great Western Sugar (GWS) beet growers compared with other farmers threatened by widespread drought. Early spring found GWS growers with sufficient water to get seedlings off to a good start and higher reserves than many seriously parched areas of the West. Weather worries are not over yet, however. While most reservoir supplies around the five-state western GWS region are currently sufficient, additional rainfall is needed to replenish the reserves and permeate the moisture-deficient subsoil layers.

In Colorado, about half of the snow courses measured are at the minimum record level for early spring, and nearly all streams are projected to flow below previous minimums. The real trouble spots for Colorado agriculture are the south and central areas of the Western Slope where farmers count on heavy winter snow accumulation in the mountains to supply runoff for spring irrigation. Early this spring, dry conditions in the state’s southeastern portion were severe enough to create an encore scenario of the 1930’s dust bowl. Farmers in other parts of the West face the possibility of a similar condition which could remove tons of valuable topsoil in a matter of minutes.

Fortunately, GWS crops in Colorado are largely concentrated in the north central and eastern parts of the state. According to the Colorado office of the U.S. Crop and Livestock Reporting Service, irrigation waters coming from reservoir supplies in that area should be adequate to get growers through the season. However, Ralph Hettinger, GWS agricultural manager for the Colorado region, points out that the term “adequate” water supply necessarily implies that growers use conservation practices in applying water. According to Hettinger, beets normally require about 30 inches of irrigation water. Beets can get by with less water, and this year they will have to.

Reports on the drought in Kansas are tinged with a similar mix of optimism and pessimism. Bill Kastens of the Kansas Crop and Livestock Reporting Service reports a slightly below average water table one month into spring in GWS Goodland fields, an area which produced about 17,600 acres of sugar beets last year. Kasten comments that, thus far, growers are able to get all the water they need but adds that at mid spring they are “way short” of rainfall. “I’m not so concerned with water supply here as I am with the cost of energy needed to pump the water from the wells.”

Last year, Scottsbluff County in Nebraska's panhandle region planted 36,610 acres of sugar beets and the same amount is expected in the 1977 season. This area produces nearly half of the Nebraska sugar beet crop and is served by the GWS factories in Scottsbluff and Mitchell. According to Don Hulcher, statistician with the Nebraska Crop and Livestock Reporting Service, Scottsbluff County may have the biggest headstart in spring precipitation. Good rain and wet snows fell on the areas that need it most, although subsoil conditions are still short of moisture in over half the state this spring.

“The first of March things didn’t look good at all,” says Hulcher, but April precipitation nearly doubled the usual rate for that month. In spite of this rainfall, Hulcher believes, “The crop is far from being made; we have a long way to go.” He terms the water supply only adequate and indicates that reservoirs will have to supplement the lack of snowpack runoff from the mountains.

In Billings, Mont., GWS growers rely mostly on irrigation waters flowing from the Yellowstone River. According to Merle Riggs, agricultural manager for GWS in Montana, the Yellowstone, which depends on snowpack accumulation for runoff, currently has one of the lowest flows on record. Riggs reports, “Growers are getting about half the moisture they’d like to have, but if they don’t let fields soak too long, it’ll be sufficient.” He also urges that care be taken to use conservation methods.

Bud Leis at the U.S. Crop and Livestock Reporting Service in Billings feels that the worst drought conditions exist in the state’s north and northeastern regions, with centrally located Billings on the dividing line. Here, as anywhere else, the effects of the drought are totally unpredictable.

Leis says, “If we have normal precipitation, we’ll be okay; otherwise we could be in bad shape.”

Growers in the Lovell, Wyo., area will have the lowest water level in 20 years, but with good conservation management, water supplies should be sufficient. Gordon Aycock of the Billings office of the U.S. Bureau of Reclamation says, “I don’t anticipate any real problems this irrigation season. There should be adequate storage throughout the year.”

Predictions

The scourges of the drought were observed at the start of spring in many major U.S. agricultural areas. Water reservoirs in California and Illinois had lost enough moisture to necessitate mandatory water rationing in some areas there. In March, farmers in the San Francisco region were having as much as 75 percent of their water allocations cut by the Bureau of Reclamation’s Central Valley Project. Officials in the state, which contributes 25 percent of the nation’s agricultural commodities, feared losses of up to $2.5 billion this year.

Kansas, Oklahoma and Colorado have a lot of catching up to do in order to restore seriously depleted subsoil moisture in some parts of those states. Wheat belt farmers relying on rainfall cannot mortgage their operations much higher if they suffer losses. Many wheat growers will not break even this year unless prices reach $3 a bushel.

In some sections of Nebraska, spring surface reservoirs and underground wells have already dried up and competition between farmers and urban residents for available water has generated tension there. Minnesota and Wisconsin were in serious trouble at the start of planting, and strict rationing has been initiated in some towns.

Everyone can observe the effects of the present drought but no one—not even the experts—is willing to predict coming weather conditions or
what direction the drought may take. For example, state climatologist Tom McKee of Colorado State University has little faith in recurring cycle theories. “I think you’ve got to be very careful about speculating on the weather,” he says. McKee points out that although there have been distinct periods of drought in the thirties and fifties, as well as currently, the sixties also had some very dry periods. “There were some areas in which the sixties could be termed the driest years.”

McKee maintains that there is no viable cause and effect relationship established in reference to such dry spells. He cautions that existing statistics on drought occurrences bear watching but “I just don’t think we’re at the point where we can predict.” He does say that over a given period of years statistics can indicate what percentage of those years would be dry, but forecasting the exact time of these dry conditions would remain impossible.

Norman J. Rosenberg, agricultural meteorologist at Kansas State University, feels the outcome of summer rainfall will add more to the realm of predictability than anything else. “If the summer is as dry as last year,” he says, “the drought will have a much worse effect than it’s had already.” Rosenberg acknowledges that the spring had gotten off to an unusually good start, but that the rainfall would have to continue. He also agrees that weather predicting is not reliable at this point. “There’s no way to forecast what will happen; I do know that there’s not enough evidence, yet, to think that this drought is over.”

Arnold Klute specializes in moisture flow and soil physics at Colorado State University, and his concern is snowfall this winter. “The irrigated areas will get along okay this year,” he says. “But a lot depends on what happens this winter as far as next year is concerned.” Klute compares the existing moisture to a bank roll: “The more you keep pulling from it, the more it’s going to be depleted.”

Bill Holmes, senior vice president of the Mountain Claims Production Credit Association office serving north central Colorado, concurs with Klute that snowfall in the winter of 1977 will be critical. He believes that snow pack from next winter will be needed to offset any supplies used from reservoirs this summer. While others worry about the effect of the drought on this year’s crop, he is looking toward the future. “We are not so concerned with 1977 as we are for 1978 crops, should the drought continue.”

The drought has created myriad problems but yet it may have brought some good. Professor Gaylord V. Skogenboe is a specialist in drainage and irrigation at Colorado State University. He feels that the drought has put more of a focus on farm water management. According to Skogenboe, the drought quickens the time element to improve methods and practices, thus providing the impetus that some growers may need to revise their conservation techniques. “Farmers in Colorado are used to conserving because they have less water to work with,” says Skogenboe. Growers in Montana, a normally water-rich area, will have more adjusting to do.

Skogenboe believes that the drought could have a positive outcome if it leads to a collective management approach in which farmers would employ more effective methods of using and storing water. If such a collective method were adopted, then growers would be better prepared the next time a drought strikes.
Ways to reduce sugar loss

Editor's note: In the spring 1977 issue of Upbeet, the article "Increased Production and Profitability" described activities at the Great Western Agricultural Research Center. The 1976 studies focused on herbicides, topdressing, fertilizers and soil crusting. Special attention was devoted to new phosphorus fertilizers and recommendations and suggestions for treating soil crusting.

This issue of Upbeet continues the Agricultural Research Center's report. Topics discussed include the development of a beet with better storage characteristics, beet treatment to reduce loss of sugar during storage, and insect and disease control.

Growth Regulators

In an effort to reduce the loss of sugar during storage, the Research Center last year tested two methods of beet treatment. For the third consecutive year, Great Western scientists studied the effect of soil-injected ethylene on sugar loss. They also conducted a small-scale test of propylene.

In each of the past three years, ethylene injected into the soil before harvesting has significantly reduced sugar loss. This year beets treated with ethylene lost 25 percent less recoverable sugar than nontreated beets. Unfortunately, the results of the study have been somewhat inconsistent in other areas. Until consistent increases in yield or quality can be demonstrated, the ethylene treatment will not be commercially feasible.

The results of the propylene test were more encouraging. In the test, propylene applied as a gas directly on harvested beets reduced both respiration rate and quality loss. The treatment of beets at piling time would be more practical than soil injection. What remains is to show that propylene is as effective as ethylene in controlling sugar loss. "The results," says the Center, "were dramatic and consistent enough to warrant extensive testing."

Cultivars

Last year the Research Center went in search of a beet with better storage characteristics. The Center evaluated 60 different strains for respiration rate and accumulation of raffinose and invert sugars. Each variety was tested for a long storage period of 137 days, in addition to the usual period of 106 days.

The results were mixed. Because each storage characteristic is controlled by a different gene, some varieties showed improvement in one or more of the characteristics, while others showed little or no improvement.

The variety Mono Hy D2, developed by Great Western, had a consistently lower respiration rate than Mono Hy Al, which itself averaged somewhat better than normal. On the other hand, Mono Hy E2 and USH20 averaged a higher than normal respiration rate.

Similarly, Mono Hy D2 had the lowest invert sugar accumulation, and Mono Hy Al was lower than normal. Two other varieties, HH19 and USH20, show a consistently higher than average accumulation of invert sugars.

Diseases

The Research Center's recommendations for insect and disease control in 1977 remain much the same as last year. Growers may refer to Sugarbeet Insect, Nematode and Disease Control Guide, which was published in 1975 and revised in 1976. Sugarbeet root maggot infestation should remain at low levels in 1977, provided that recommended insecticides are applied as usual. The approved insecticides are Dasonit, Dazinon, Dyfonate, Furadan, Temik and Thimet. Tests conducted at the Center by Y. Mok Yun resulted in the recommendation that Dyfonate and Temik be applied at planting time in a band. They should be incorporated to a depth of about two inches. Reduced rates of Temik and Furadan are effective when applied in a narrow band directly over the seed bed. This should be done immediately before planting. In Wyoming, Mun also recommends side dressing of Dyfonate at planting time.

If a grower fails to apply a recommended insecticide before planting, he may still get satisfactory results from an early application of either Temik or Diazinon before the seedlings emerge.

There is no insecticide approved for controlling the flea beetle larva, but the chemicals approved for root maggot control also give some protection from the larvae.

Nematode control remains in the same state as a year ago. Experiments again showed Telone II to be superior to Temik. Both Telone II and D-D proved satisfactory. Telone II was applied at 15 gallons per acre, D-D at 20 to 25 gallons per acre.

Additional tests conducted over the previous two years indicate that the control of sugarbeet powdery mildew can increase yield by more than two tons of beets per acre. The only compound approved by the Environmental Protection Agency for control of this disease is sulfur. The Center is not including sulfur application in its 1977 recommendations, however. Although it seems to be effective, there is "no sufficient evidence yet to warrant such treatment."

The Center tested two brands of sulfur in 1976: That and Magnetic 6. Both were effective. Neither brand is yet approved for use on sugarbeets, but both are expected to gain approval this year. Other tests indicated that an application rate of five gallons per acre is minimum for adequate protection. The same tests showed that adding Bond, a spreader, to the sulfur did not improve the spray coverage, always a problem with the sulfur application. It did prolong the life of the sulfur, however.

The last day for sulfur application is August 31. In most areas, one application is enough, though heavily infested areas may require two.
Focus on new herbicides

In the constant search for better and more economical methods of sugarbeet production, agricultural researchers are focusing on new herbicides and weeding systems. The challenge they face is to develop a weeding system with a longevity sufficient to control weeds from emergence until the crop canopy can competitively suppress emerging weeds. During the initial six weeks of crop growth, weed absence is critical because it encourages season-long, labor-free beets and thus improves production significantly. Ultimately, growers aim for sugarbeet production management without hand labor, mechanical thinning and excessive cultivation. According to Ed Sullivan of the GW Agricultural Research Center, hopes for developing an effective weeding system are presently centered on second-generation sugarbeet herbicides such as Nortron and Nortron mixtures.

First generation herbicides

The most popular herbicides used in chemical weeding of sugar beets—namely Avadex, Eptam, Ro-Neet, Endothal and TCA—are too short-lived in the soil to successfully contain early weed emergence. Systems which combine these chemicals with post-emergence chemicals such as dalapon, endothal and Betanal require timely application and overlap activity that is difficult to achieve under field conditions. In many cases, in-row tillage and additional hand weeding after thinning may be necessary for economically clean fields. While reliance on older chemicals results in a chemical weeding that permits mechanical stand adjustment, it has yielded little progressive improvement in management simplicity, crop yield or acre returns.

Second generation herbicides

Pyramin and Treflan are early examples of chemicals having residual utility. However, the new herbicides exemplified by Nortron have an even more useful persistence as well as irreversible control on weeds and growth-promoting activity. Nortron and mixtures will work whether soil-applied before planting or foliar-applied after plant emergence and have a placement versatility often lacking in first generation sugarbeet herbicides. The new herbicides, including Antor, Betanex and HOE-23408, also have superior tank-mix potential with Nortron and in complementary application. In addition, second generation sugarbeet herbicides require less active ingredients per acre due in part to chemical potentiation in mixture and improved weed-killing power. Nortron is a mitotic poison preventing cell division. Inherently, new candidate herbicides have greater crop and human safety. Although out-of-pocket expenses are somewhat higher for new chemicals, costs are offset by higher crop yields and simplified management.

Herbicide potentiation

In the early sixties, scientists discovered that such combinations as Tillam + Avadex, Pyramin + dalapon, Pyramin + TCA and later, Pyramin + Betanal and Betanal + Betanex have increased killing power on weeds beyond a complementary effect. In 1972, results with the Nortron mixtures Nortron + Ro-Neet (preplant) and Nortron + Betanal and/or Betanex (post emergence) had greater potentiation on weeds. For example, a 1 + 1 pound per acre application of Nortron + Ro-Neet demonstrates equivalent or greater efficacy than 2.5 to 3 pounds per acre of each chemical applied singly. In addition, control longevity from the mixture exceeds that for Ro-Neet alone. The post mixture Nortron + Betanex and/or Betanal is also synergistically responsive because Betanex gives increased penetration when applied with Nortron. Split post emergence application of Nortron + Betanal herbicides may have even further effect in eliminating preplant applications under certain conditions. These observations suggest that the concept of dual synergism may lead to chemical weedling activity on sugarbeets of a high magnitude and scope. However, crops can be injured by these mixtures, depending on dosages, growth stage and environmental conditions.

Dual synergism

Recent research results propose that through the concept of dual synergism, mixtures can be developed which will enhance lethal activity on undesired vegetation while promoting crop vigor and yield. Research has isolated plant growth regulators that kill specific weeds, severely retard weed growth and prevent seed formation. Now, efforts are concentrated on developing advanced herbicide-crop stimulator designs that permit final stand sowing, elimination of cultivation, complete machine production and crop yield increases per acre. Initially, these systems are based on chemicals like Nortron, Betanex, HOE-23408 and naturally occurring plant growth regulators like GA, although synthetic plant auxin-herbicide combinations are also being investigated.

Total pest management on sugarbeets will still involve integrated utilization of available tools to maximize production and profit. However, test results suggest that second generation herbicides are feasible for effective weed control and the development of favorable potentiating chemicals to enhance production with a minimum outlay of human labor and fuel. Biological and ecological aspects of pest control on sugarbeets are being combined with chemical inputs in order to minimize environmental pollutants, however short-lived. In weed control, early chemical persistence and crop competition form the long-term design for basic improvement in crop production.
Handling soil samples

As sugar beet growers well know, nitrogen balance in the soil is critical to the delicate compromise between yield and quality. They know, too, that the use of residual soil nitrate-nitrogen level in a sample soil profile has long been considered a proven, effective method of making recommendations about the need for nitrogen fertilizer.

But soil sampling may not be as foolproof a method as it seems. Several factors could cause the laboratory-tested sample to inaccurately represent nitrogen levels in the field. When they do, any recommendations based on these samples would also be inaccurate.

The relative dryness of the field sample is a case in point. It is a well-known fact that, once a sample is dried, the nitrogen concentration stabilizes. The sample can be stored for months and still yield analytical results that reflect accurate levels of nitrogen. Yet, as those who work in soil-testing laboratories can testify, all soil samples are not dried immediately after collection. Many enter the laboratory still field-moist.

Drying

What is the effect of storing and transporting field-moist samples on the nitrate-nitrogen level? Do these levels accurately reflect the levels that were present in the field?

To answer these questions, D. G. Westfall, senior plant nutritionist for The Great Western Agricultural Research Center, undertook a project aimed at determining what effect soil sample handling, between collection in the field and drying in the laboratory, would have on the analyzed nitrate-nitrogen level in the soil. Westfall hoped to establish some criteria for sugar beet growers so that if a difference did occur, they would be assured of reliable nitrate-nitrogen results and an accurate nitrogen fertilizer recommendation.

Two soils, one containing a high level of residual nitrate-nitrogen (25 parts per million), the other containing a low residual level of nitrate-nitrogen (5 parts per million) were used in the study. Since trends were the same in both, only results from the high residual nitrate-nitrogen soil are presented here. Samples were collected in the field, retained in their field-moist condition and subjected to various conditions that might occur under common sample handling procedures.

When the samples were kept at room temperature for seven days, the nitrate-nitrogen concentration increased dramatically. The initial residual nitrate-nitrogen level when the sample was collected in the field was 25 parts per million (ppm) (90 pounds per acre). Seven days later, the concentration had increased to 54 ppm (195 pounds per acre) — a 105-pound-per-acre rise in available nitrogen in the week since the sample was collected.

The increase was approximately linear for the first five days, increasing at a rate of about 18 pounds of nitrogen per day. In an attempt to simulate the heat that would influence the soil samples if they were carried in a vehicle during the hot part of the day, Westfall placed the samples in the sun for four to six hours daily. The nitrate-nitrogen concentration increased from 25 ppm to 63 ppm, or 227 pounds of nitrate-nitrogen per acre (Fig. 1). Over the seven-day period this represents a 137-pound net increase in nitrate-nitrogen per acre as a result of improper handling.

Needless to say, these changes are quite significant. They would result in gross inaccuracies in any nitrogen fertilizer recommendation calculated from these analytical results.

Even if the samples had been kept in their field-moistened state for only one or two days, major increases — increases that could significantly affect a nitrogen fertilizer recommendation — would occur. Samples stored at room temperature for only one day showed an increase of 25 pounds of nitrogen per acre. After two days, nitrogen had risen by 43 pounds per acre. The samples that were exposed to

![Figure 1. Effect of Soil Handling Before Drying on Nitrate-Nitrogen (NO₃-N) Content of High Residual Nitrogen Soil](image-url)
to the sun for four to six hours showed even larger increases — 36 and 58 pounds of nitrogen per acre per day, respectively.

If samples had remained field moistened for as long as five days before drying and analysis, errors as large as 100 pounds of nitrogen per acre could be expected.

**Refrigeration**

Some people, knowing that they cannot dry a soil sample the minute they collect it, refrigerate the sample in an attempt to minimize changes in the nitrate-nitrogen concentration. But experimentation revealed that the nitrate-nitrogen level still increases beyond the point of making a reliable recommendation. The nitrate-nitrogen level in refrigerated samples increased from 28 ppm or 100 pounds of nitrogen per acre, to 41 ppm or 148 pounds per acre over seven days (Fig. 2).

When samples were frozen, however, only a slight increase occurred over the seven-day period. The nitrate-nitrogen level increased from 28 to 33 ppm — only an 18-pound-per-acre error in the nitrogen fertilizer recommendation, which would be insignificant.

**Summary**

Proper soil sample handling is a must for obtaining a nitrate-nitrogen analysis that truly represents the field level of residual nitrate-nitrogen. But large increases in nitrate-nitrogen concentration can occur in the lapse between field sampling and drying. The changes are of sufficient magnitude to result in significant errors in nitrogen fertilizer recommendations. When samples cannot be dried immediately, freezing is the only acceptable method of sample storage.

If the analytical results in the laboratory are to result in accurate nitrogen fertilizer recommendations in the field, the soil sample must be placed in a dryer within 12 hours of collection. Only then can the grower be sure that his samples have been handled properly and that the nitrogen fertilizer recommendations will be correct.

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**Saccharin ban contested**

In March of this year, the Federal Drug Administration (FDA) announced that it would ban saccharin after tests revealed that use of the sugar substitute in massive amounts had caused cancer in rats. Meanwhile, the government continues to subsidize tobacco growers despite the fact that cigarettes have long been identified as a cause of cancer in humans.

The saccharin ban was prompted by the Delaney clause which prohibits the use in food of any material that causes cancer in animals. Announce ment of the ban triggered outraged protest from millions across the country. Overweight and diabetic Americans claimed that without saccharin they would not have a low-calorie or safe sugar substitute. Even those who do not use saccharin termed the Delaney clause ineffective and inequitable in banning saccharin without also banning tobacco, a proven carcinogen. Some members of Congress have moved to force the FDA to reconsider its position and weigh all the factors involved before reaching a final decision. At press time the FDA had agreed to permit the sale of saccharin as a nonprescription over-the-counter drug.

Meanwhile, the inequity of banning saccharin while permitting the sale of cigarettes prompted other congressmen to investigate government subsidization of tobacco. Rep. Jim Johnson (R-Colo.) is urging the government to end price support and marketing assistance programs. Johnson does not propose that the government ban tobacco products; he feels strongly, however, that the subsidization of tobacco is at odds with the over $5 billion in tax dollars that has been spent on cancer research since 1965.
In 1975, the world's population reached four billion. By the year 2000, this figure is expected to hit the seven billion mark. Over 90 percent of this growth is taking place in developing countries, but it is the affluent nations which must provide the technology and resources to solve the problem of feeding these billions. If the Earth, with its limited agricultural capacity, is expected to supply this quantity of food, then action must be taken now.

Of the 2.3 billion acres of land in the United States, only a limited amount can be devoted to agriculture. Much of this acreage has already been appropriated by urban development, submerged land, protected parkland and wildlife refuges. As the national and world population steadily rises, the United States must identify and safeguard its remaining agricultural resources. Among the many agencies, both public and private, now researching this crucial problem is the United States Department of Agriculture's Soil Conservation Service.

The Soil Conservation Service (SCS) has undertaken the monumental task of studying the nation's land in order to identify those areas best suited or most adaptable to agricultural purposes. In a potential cropland study recently conducted by the SCS, land was divided into three categories—prime farmland, high potential farmland and medium potential farmland. Prime farmland is defined as land best suited for producing food, feed, forage, fiber and oilseed crops. Whether pasture, crop, range, forest or other open land, all prime farmland shares certain outstanding features: 1) a quality soil requiring little or no erosion protection, 2) a growing season adequate for continuous or near-continuous farming without environmental damage, 3) a moisture supply sufficient to produce sustained high yields of crops economically, and 4) a responsiveness to fertilizer or other chemical application with limited loss of residue. In short, prime farmland is land which has the potential to produce the greatest volume of food with the least output of energy.

In the second category of high potential farmland, the SCS classified acreage with topographic or soil characteristics that would require soil and water management to dispose of unwanted water or prevent erosion and sedimentation. Medium potential land is that which would pose serious erosion and water disposal challenges. Converting this land to agricultural use would be costly but not impossible; with the technology currently available, even these acres could be planted in crops should the need arise.

For the potential cropland survey, SCS field people studied 41,000 sites in 506 randomly selected countries in all 50 states, Puerto Rico and the Virgin Islands. All sites studied were limited to nonfederal land. According to the SCS, last year the total acres planted in all crops amounted to 400 million; the agency estimates that 250 million of these acres can be considered prime farmland. Results of the potential cropland survey indicate that the United States has an additional 111 million acres of land not now in crops that could ultimately be converted to cropland. Of this acreage, 24 million acres have been classified as prime farmland, 54 million acres as high potential land and 33 million acres as medium potential cropland.

In its survey, the SCS did not include urban and submerged land because it considers any land which has been committed to irreversible uses unavailable for cropping in the future. By charting the status of available farmland, however, the agency has been able to compile figures on the changing state of agricultural land. According to SCS, 3 million acres of potential farmland are lost each year; two thirds of this acreage is consumed by urban build-up and the remainder is devoted to water use such as lakes, rivers, ponds and reservoirs. Additional farmland is endangered when suburbs leapfrog agricultural acreage to build away from urban centers. Unless legislative action is taken to protect these acres and keep them in farming, they will inevitably be lost to suburban and urban sprawl.

As part of its study of national land, the SCS is also compiling the Impor-
tant Farmlands Inventory, twelve hundred color county maps showing the specific location of prime farmland in the United States. To create these maps, data gathered by SCS field representatives is programmed into an automatic mapping system at the cartographic division. In areas where land use changes are significantly high, the SCS plans to remeasure acreage and revise maps every five years.

Each county map published by the SCS will show the location of prime farmland as well as additional farmland of statewide or local importance that may be too sloping to be classified as prime land. The maps will also include unique farmland—that is, land other than prime farmland that is currently used for the production of specific high value food and fiber crops such as citrus, olives, cranberries and other fruits and vegetables.

Because the Important Farmlands Inventory is such a comprehensive and massive undertaking, SCS estimates the project will not be completed until 1980. During the past year, 122 counties in 46 states were inventoried; 154 additional counties have been selected for study in 1977. Recently, the SCS published its first group of maps, accounting for more than one-third of the nation. Included in this first collection are maps showing sugarbeet acreage in Adams and Boulder Counties in Colorado as prime farmland.

In some local areas where concern for additional farmlands for food production exists, other acreage is inventoried, although these lands are not identified as having national or statewide importance. According to Robert Dansdill, soil scientist in the Colorado office of the SCS, much of the work on these local projects is done by agencies directly concerned.

In Denver, a study of some local lands has been compiled by the Denver Regional Council of Government (DRCOG) and its regional planner, Gail Hill. The preliminary work completed by Hill will be used by the SCS Colorado office for inventory maps forwarded to the national office in Washington, D. C. In drawing up the maps, DRCOG used information obtained through SCS rather than conducting their own soil surveys. In order to check on the initial lists of soils, DRCOG consulted district conservationists to see how their findings corresponded. In addition, a series of discussions were held in order to get a final consensus. Out of these meetings came a list of what soils would be considered prime in each county, and only then were the maps completed. Hill stresses, however, that this procedure provides only preliminary criteria for specification of prime agricultural lands and has not been reviewed by the council or counties involved.

Bill Johnson, chief of the comprehensive planning section at DRCOG, explained the main thrust of DRCOG's work on the local map project. "What we're talking about is criteria for a baseline survey, and we have never had this baseline survey before. We will use this information as one of the factors in designating land for future development to the year 2000. The criteria, that is the specifics, for designating land that is prime agricultural for future use, have not been determined yet."

The work conducted by the DRCOG and local agencies across the country will provide detailed information to support the new U. S. Department of Agriculture (USDA) policy announced in June. This policy advocates reserving the nation's best farm, range and forest lands to assure that this land is never converted to non-agricultural use. The SCS emphasizes that the inventories which they have compiled do not constitute an official designation of any land area for a specific use. Such designations are the prerogative of responsible state and local officials.

The SCS warns that decision makers must be aware of long-term implications of various land use options. Actions that put high quality farmland in irretrievable situations should be initiated only if these actions are clearly in the public interest. The USDA has urged all federal agencies to adopt the policy that federal activities taking prime farmland will be carried out only when alternate sites are not available and the activity meets an overriding public need. Such policies are not overly cautious. With the world's ever-increasing population and the changing status of agricultural territory, USDA and SCS are justifiably concerned about any action that tends to impair the productive capacity of American agriculture.
Fighting inflation with efficient herbicide application

With inflation on the rise again, Americans everywhere are preparing for another bout with high prices and tight money. President Carter, in an appeal to Americans' better instincts, is expected to encourage individuals in every industry to contribute their efforts to curb inflation. For example, Carter may urge businesses to think in terms of cutting costs rather than raising prices. Hopefully, if this program is followed in enough sectors of the economy, inflation may be kept under control.

For the farmer, now faced with increasing operational costs and reduced profits, the idea of cutting costs may seem idealistic rather than practical. But with inflation already taking its toll on the agricultural community, growers are seeking ways to use their equipment and supplies as efficiently and economically as possible. One way to cut costs and reduce waste is the development of effective methods of herbicide application.

For greatest efficiency, herbicides should be applied only at the rate needed. Too little herbicide will not curb weeds completely and results in lower yields. Too much herbicide, on the other hand, damages crops and wastes costly chemicals. To maximize productivity and minimize waste, the grower should follow manufacturer's instructions explicitly. This precautionary measure will be fruitless, however, if application equipment is not kept in prime condition.

According to agronomist Douglas R. Murphy, the grower who uses an improperly calibrated sprayer or worn-out equipment costs himself valuable herbicide dollars and reduced crop yields. All spraying equipment and parts should be thoroughly inspected before initial use each season and checked regularly thereafter. Special attention should be focused on the pump, the agitation system, the pressure regulator and the nozzle tip. These are areas which can cause trouble if maintenance is neglected.

The most popular pumps used in spray application are the roller pump and the centrifugal pump, each offering distinct advantages and disadvantages. Among the chief benefits of the roller pump are its reasonable cost, easy maintenance and efficient operation at tractor PTO speeds. However, roller pumps also wear easily, especially when abrasive materials are used. For this reason, abrasive materials should be avoided in roller and other rotary-type pumps. If such materials must be used, the pump mechanism should be checked regularly for possible damage. Centrifugal pumps (as well as diaphragm and squeeze hose pumps) hold up well under heavy use, withstand abrasive materials and deliver a greater volume of liquid at a lower pressure. But centrifugal pumps also require a strong power source and will not perform at tractor PTO speeds without a speed-up mechanism.

Agitation is another factor that must be considered in order to achieve effective herbicide application. When chemicals are not thoroughly mixed, the bulk settles to the bottom of the tank, and the top layers are too weak to control weeds. On the other hand, excessive agitation during tank mixing causes herbicides to settle out and set up in the spray tank. Murphy recommends moderate but continual agitation to mix chemicals and to take full advantage of the chemical potency. In mixing different types of herbicides, additional care is required. Many combinations of herbicides are safe and effective, but if a combination is at all doubtful, it should be mixed in small quantities outside the mixing tank.

The third feature that affects herbicide application is the pressure regulator. The pressure regulator insures continuous application of the herbicides, ideally in a constant, steady spray. When the regulator is improperly calibrated, however, the difference in pressures creates an uneven application that can injure crops by over-spraying and under-spraying.

The effectiveness of herbicide application can also be affected by the nozzle tip type and condition. The three major categories of nozzles are flat spray, cone spray and flood spray. Each individual nozzle type delivers a distinctive spray pattern designed for different crop requirements.

The flat spray category includes flat fan and even spray nozzles. Designed for broadcast applications, the flat fan has an "F" designation and overlaps with adjacent flat fan nozzles for even spray distribution. Even spray nozzles, which carry an "E" designation, are designed for band spraying and deliver an equal amount of herbicide across the spray pattern. For optimum performance, both types of nozzles require a pressure of approximately 30 psi.

Cone spray nozzles operate at higher pressure and produce fine spray droplets. The two general classes of cone nozzles are solid cone and hollow cone. Both feature large openings to distill weed control. In situations in which drift from herbicides must be avoided, flood type nozzles should be used. They deliver a spray of larger droplets that is not as susceptible to drift. In addition, flood nozzles can distribute high volumes of spray at low pressures.

No matter what type of nozzle is
used, it is important that it be kept in prime condition. Although the nozzle is a vital component of the herbicide system, nozzle tip care is frequently overlooked or insufficient, resulting in costly and excessive waste. Some simple precautions and good maintenance practices can avoid unnecessary loss of valuable herbicide dollars.

Nozzle tips are constructed of brass, aluminum, plastic and stainless steel. Each of these four materials offers certain benefits and drawbacks. Brass and aluminum are least expensive but they also have the shortest lifespan. Plastic is more expensive but will last almost twice as long as brass. Stainless steel, while most costly of the four, also offers a life expectancy three times that of brass. Choice of a nozzle tip, therefore, should be determined by spray requirements rather than by cost.

Although the rate of wear differs, all nozzle tips will deteriorate under heavy use. Usually, the tip's opening enlarges to a point at which excess herbicide is delivered. Tests have shown that when wettable powders are used, application may increase by 12 percent after only 50 acres have been sprayed. Therefore, whenever abrasives are employed, nozzle tips should be inspected often for evidence of enlargement.

Proper cleaning of the tip will help increase the life of the nozzle. Nails or wire should never be used to clear out a clogged opening because these sharp objects may further enlarge the orifice and destroy the nozzle completely. For best cleaning results, the nozzle tip should be removed and soaked in order to remove the blockage. If the opening remains clogged, a soft toothbrush can be used to scrub out the debris. Good nozzle tip care also requires that tips be examined for wear and damage before initial use each season. To guarantee completely efficient spraying, the grower should consider replacing nozzle tips every year.

These spraying and tuning tips offered by agronomist Murphy will not solve the problems of the agricultural industry. However, by implementing these suggestions and other proven efficiency practices, farmers will be able to substantially reduce operational costs. And in today's economy, where economic survival may very well depend on the ability to minimize inefficiency and waste, any method of better production deserves careful consideration.

A question of balance

Conduct your own man-on-the-street interview asking people what they think of sugar and the responses will more than likely be on the negative side: "It is not very good for you." "It has no food value." These attitudes toward sugar have become prevalent in the past few years with growing public concern about nutrition and a deluge of antisugar literature.

In 1975, William Duffy's book Sugar Blues hit the national scene with the message that refined sugar is responsible for depression and general ill health. Duffy believes sugar is addictive, a destructive drug. He even calls himself a former sugar junkie who has kicked the sugar habit.

Duffy's lead was followed by pediatrician Linda Smith, who cited sugar and poor nutrition in general for many children's behavior problems. Food faddists and amateur nutritionists jumped on the antisugar bandwagon.

Sensational stories began to appear everywhere from the National Enquirer to Mademoiselle magazine. Everyone who seemed to be anyone healthy denounced sugar, saying sugar at best was nothing but empty calories. Without adequate research or complete information, unqualified individuals began to effect a negative attitude toward sugar consumption in general. The lack of proper nutritional information and the sensationalism of the "new sugar blues" began to snowball. People like Duffy blamed refined sugar for everything from migraine headaches to acne.

While the sugar furor grew to a minor uproar, nutritionists and scientists began to study what was already being called the "sugar problem." They looked at many sides of the argument and determined to take a new stand for the all important balance in nutrition, that is a complete, balanced diet. The idea is nothing new or revolutionary. It is what everyone from the school nurse to great grandparents have been saying all along. It is altogether sensible and altogether healthy.

According to Margaret Doyle, University of Minnesota nutritionist, one of the real problems of modern nutrition is getting people to pay attention to sensible information about food habits. While millions of dollars feed the bank accounts of the "super-nutritionists," their versions of what good nutrition is tend to be fad-oriented and distorted. Doyle and other experts agree, the facts about proper, balanced nutrition need to be better communicated by those most qualified to do so.

Nutritionists and scientists actively involved in nutrition and health research need to get their message and their findings to the general public. They may not be dramatic and sensational. They just might be more factual and healthy.

The message is that good nutrition consists of adequate amounts of water, protein, fat, carbohydrates, minerals, vitamins and fibers. Sugar is an important part of this nutritional mix. Participants of the Fifth International Sugar Research Symposium, held in Mexico in 1972, agreed, "...it seems important to emphasize that it is the total diet, not an individual food, that needs to be adequate in its content of essential nutrients."

This view was supported by Paul M. Newberne at the National Academy of Sciences Forum held March 25 through 26, 1975: "One cannot forget any of the other major ingredients since a balance of all of them is required for optimum nutrition."

Optimum nutrition, then, includes sugar. It is a widely consumed and relatively inexpensive carbohydrate. The key, according to the Marabou conference in Sweden, August 1973, and the National Academy of Sciences Forum, is moderation.

Moderate, balanced consumption of sugar is healthy. Sugar abstinence or an excessive intake of sugar is not healthy. Sugar, in moderation, just like protein and fat, in moderation, make for a balanced, nutritive diet.
In March of this year, officials of the Continental Illinois Bank and Trust Co. of Chicago announced their intention to withdraw a proposed “ag-land” trust fund. Under the terms of the original proposal, a $50 million fund would have been created to invest in farmland on behalf of clients and employee profit sharing and pension plan trusts. However, following discussion with business experts, government officials and agricultural communities, the bank decided that the disadvantages of such a venture passed likely gains. Secretary of Agriculture Bob Bergland met with bank representatives to discuss the withdrawal of the program. Bergland commented favorably on the bank’s “open-mindedness and willingness to discuss problems of mutual interest.”

Much of what we take for granted these days did not exist in past centuries. Our ancestors got along without many items which today we consider basic necessities. Consider sugar, for example. Although sugarbeets were common lower-class food during the middle ages, refined sugar was not introduced to Europe until the thirteenth century. Even then, it was such a rare commodity — and such an expensive one — that small cubes were occasionally given to royalty as prized gifts. Most ordinary folk lived their lives without even seeing sugar. Honey was the popular sweetener of those who could afford it. The less prosperous simply did without sweeteners of any kind.

Awards for 4-H projects in the Kemp District were presented in January at the Kemp District High-Ten Banquet in Goodland, Kan. Agriculturalist James Busch was present to award the trophies to the first and second place winners.

James Mosbarger, son of Mr. and Mrs. Gary Mosbarger of Goodland, took first prize for his outstanding three-acre project. He also received a $125 award for winning first place in the Colorado-Kansas competition for 4-H beet projects. In addition, he won a scholarship to the National Western 4-H Round-Up held in Denver during Stock Show week.

Stan Hornung received second place for his 4-H beet-growing project. Stan is the son of Mr. and Mrs. Palamon Hornung of Stratton, Colorado.

Recent tests at the Rio Grande Valley Sugargrowers, Inc. in Texas indicate that sorghum may be a feasible source of crystallizing sugar. Previously, sorghum has been used chiefly in the manufacture of syrup. Now, however, specialized varieties of sorghum and improved production methods have led the way toward processing sorghum for sugar.

The biggest hurdle that researchers faced was the removal of objectionable starch, which blocked the formation of sugar crystals. Chemists working on the Texas tests developed a process that enables them to separate the starch before it reaches solution. In the complex eight-step procedure, raw sugar-bearing juice is extracted and passed through alternating phases of clarification and evaporation to crystallization. This processing of sorghum does not require specialized equipment or construction of new facilities. All recent tests used standard cane harvesting and processing equipment.

The prospect of practical sugar production from sorghum has been aided by the development of three high-sucrose sweet sorghum varieties: Rio, Roma, and Ramada. These have been specially selected for their various growth stages and ability to adapt to specific regions. These three varieties of sorghum, each with individual characteristics, were found to prevent sugar loss during production. (Sugarbeet Grower, September, 1976)

With the Food and Drug Administration’s (FDA) controversial ruling on saccharin, alternative artificial sweeteners are now being investigated. According to the New York Times, one sugar substitute which may prove feasible is neohesperidine dihydrochalcone, made from an extract of orange and grapefruit peels. The sweetener was developed by U. S. Department of Agriculture researchers who were looking for a use for food waste products. FDA is currently conducting safety tests, and results should be available soon. One drawback of the citrus-derived sweetener is its unique taste; scientists feel that new drinks would have to be formulated in order to disguise the fact that it does not taste exactly like sugar.

The New York Times Magazine recently reported on a new vaccine that may prove a breakthrough in combating tooth decay. Dental research indicates that Streptococcus mutans, the bacteria which induces tooth decay, can be overcome by the body’s own immunization system. The secret lies in a class of antibodies produced in the saliva glands that sets to work on the bacteria and its enzymes when they enter the mouth. Scientists are working to develop an effective vaccine from these antibodies. Tests on rats, hamsters and monkeys show positive results, and researchers are contemplating clinical testing some time in the future.

Dietary Goals,” a publication for the Senate Select Committee on Nutrition and Human Needs, has drawn sharp criticism from members of the food industry for its unfavorable comments on certain substances, including sugar. In a letter to the Senate Committee, the Sugar Association stated that the report contained “many examples of what we consider to be both misuse of information and the use of misinformation.” According to the association, the report ignores the conclusions of the GRAS (Generally Recognized as Safe) Review Committee of the Federation of American Societies for Experimental Biology and thus, “flies in the face of the pertinent statistics and the scientific facts.” In regard to the report’s comment that sugar is a cause of diabetes, the association argued that no scientific evidence supports that statement. In fact, the association claimed many positive attributes for sugar, such as making nutritious foods more palatable and providing an economical source of energy. In conclusion, the association stated, “A group of laymen under no circumstance should have been asked to come up with goals and recommendations in so sensitive a scientific area as nutrition when the well-being of so many is at stake.” (Food Chemical News, February 28, 1977)
Shake «p processed foods available to consumers.

Fifty years ago, almost all sugar produced was used in the home to prepare baked goods, candy and desserts. All sugar was derived from sugarbeets and sugar cane. Today, more than two-thirds of sugar produced in the United States is used by industry and practically all of this in the fantastic number of processed foods available to consumers.

Last year, sugar use in processed foods accounted for 40 percent of total deliveries, while beverages, primarily soft drinks, totaled 23 percent.

With the great product diversity created by industry growth and the varied demands of the consumer, increasing sugar use has opened the market to corn sweeteners, including dextrose, regular corn syrup and blends such as the recently developed high-fructose corn syrup (HFCS).

HFCS is an entirely new concept in sugar composition. In this syrup a portion of glucose has been isomerized to fructose or levulose. Inexpensive commercial production of this corn syrup has become a reality only in the past few years.

The high sugar prices of 1974 and 1975 coincided with a technological breakthrough in the isomerization of HFCS and stimulated the use of non-sucrose caloric sweeteners. Since most U.S. sweetener consumption is indirect, in the form of processed foods and drinks, and since many instances exist in which non-sucrose sweeteners can be used, the abundance and relative inexpensiveness of HFCS had a significant impact on the sugar market. High-fructose corn sweetener is often used in beverages because of its liquidity. In addition, it has a greater sweetening capacity per unit of measure than conventional corn syrup, which makes it less expensive to use.

Despite the economy and availability of HFCS, sucrose use in beverages and foods increased overall in 1976. Within the food industry the increase was a mere 2 percent in processed foods but nearly 20 percent in confectionaries.

One reason HFCS did not achieve expected inroads in confectionaries is its incompatibility with some foods. For example, while it is technically possible to use HFCS in candy, it is often not very practical because the corn sweetener has a shorter shelflife. HFCS also absorbs water and this limits its applicability in most candy and in many other foods as well. The new corn sweetener is almost never used in baked goods because no practical process for crystallizing the blend has been developed.

The confectionary and bakery industries require sucrose in the form of granulated crystals ranging from Confectioners AA, an extremely large crystal approximately one-eighth inch in its longest dimension, to powdered sugars used to produce the creamy frosting or icing on cakes. This variety and exactness of grain size required in many industries precludes the use of HFCS.

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Early in 1976 the corn-sugar industry projected an HFCS domestic market of 3 million plus tons by 1980; a 2- to 2.5-million ton market seems more probable. Use of HFCS will also be affected by increases in corn prices expected this year because of the strong domestic and foreign demand as well as the dry weather in grain-producing areas. Corn sweetener prices are naturally responsive to these changes as much as to the price of sugar. If sugar prices rise, however, then HFCS will be more competitive and production will increase.

In the United States, HFCS is competing not only with sucrose sweeteners but with conventional corn syrup and dextrose. Dextrose is the most costly corn syrup to produce. HFCS exceeded dextrose consumption for the first time in 1976. Per capita consumption of dextrose was five pounds, while HFCS averaged seven pounds, two pounds more than its 1975 total. In 1976, conventional

(continued on p. 22)
Sugar plants may be fuel source

"The energy crisis won't be solved by some fairy godmother waving her magic wand and solving the whole thing at once. It will be done by little things, in bits and pieces."

So says Dr. Edward Lipinsky. And he is most certainly right. Lipinsky, of Batelle Laboratories in Columbus, Ohio, recently headed a study that suggests what some of those bits and pieces might be. The study, conducted by Batelle for the Energy Research and Development Administration (ERDA), investigated possibilities for manufacturing fuel and chemicals from sugar cane, sugarbeets and sweet sorghum.

The results were mixed. Generally the study concluded that while fuels can be made from sugar, the conversion process is too expensive for these fuels to compete with petroleum and natural gas in the near future. The production of industrial chemicals, however, offers more hope. And even though sugar cane is the prime candidate for this production, beet growers may eventually be the big winners.

There are some possibilities for fuel production from sugar, but applications are limited and costs are high. The two products most often mentioned are substitute natural gas (SNG) and methanol (wood alcohol).

It is technically feasible to produce SNG from sugar. This is done in the laboratory by the same process that produces natural gas inside the earth, and it produces the same product, methane gas. The process is called anaerobic digestion. An anaerobe is an organism that can exist without oxygen. These bacteria are introduced into a mass of material such as whole sugar cane, and the action of the bacteria produces the gas. When this is done commercially, the process has to include high temperatures, to speed it up. Still the process may take as long as 20 days and is so expensive that it is unlikely that SNG can compete with its natural counterpart in the near future.

Methanol can also be produced from sugar and is highly recommended by some as a fuel additive. Proponents say that gasoline of five or ten percent methanol can give better gas mileage and less pollution. Opponents say the opposite. Both sides can claim tests that prove their cases, since test results have been highly variable. Methanol could be used as a turbine fuel or in modified engines. But it is expensive to produce, and the controversy surrounding it makes it even more of a long shot in the fuels sweepstakes.

The production of industrial chemicals is somewhat more promising, especially ammonia and ethanol (ethyl alcohol).

Ammonia can be fermented from bagasse, the stalks left over from sugar cane after the juice has been squeezed out.

This is more economically feasible than fuel production, and it "produces" fuel indirectly by freeing the natural gas now used to make ammonia for other, more urgent applications such as heating homes.

Bagasse can also be used directly as a fuel itself. After being dried, it can be burned to produce electricity. In an intriguing scenario, bagasse is described as setting the sugar cane processor free from the whims of oil producing and exporting countries. This concept sees the processor using part of the normally wasted stalks directly as fuel for cane processing and diverting the rest to the production of fertilizer ammonia. This would give the processor complete energy independence and provide growers with a local source of fertilizer, an eminently workable arrangement.

Another possibility is the production of ethanol from sugar cane. Ethanol in its commonly known form is the active ingredient in beer, wine and whiskey. It is also widely used in industry as a solvent and like methanol, can be used as a fuel additive.

As a fuel, ethanol is the twin brother of wood alcohol; it is expensive to produce, controversial and, therefore, not a likely candidate for production.

As an industrial solvent, however, ethanol may well play a role in saving petroleum. All the ethanol used in industry is manufactured from petroleum and natural gas. Only the beverage industry uses fermented ethanol. This could very well change in the near future. The industrial market would support a higher price to begin with, and, as petroleum prices continue to climb, ethanol fermented from sugar cane may become competitive.

Ethanol can also be used as a source of ethylene, a gas used to produce several kinds of plastic. Polystyrene (toys and brooms), vinyls (phonograph records, shower curtains) and polyethylene (garden hoses) all use ethylene somewhere in their production. Still, it's the same story: cost is high, too high to make it competitive with the same product now produced from natural gas. It is a possibility for the future, however, if petroleum prices go high enough.

For all these products, sugar cane
is seen as a better source than beets. One of the main reasons for this is that beet pulp is 10 times more valuable for cattle feed than for fuels or chemicals. As more and more cane processors divert production to fermentation chemicals, sugarbeets will be expected to fill in the gap in sugar production. The ability of beet growers to do this, of course, depends on the solving of problems that have been with beet growers for years.

Since no more land is likely to become available for sugarbeets, it is important that the beet grower be able to use the land he has more intensively. The biggest obstacle to this is the nematode problem. Nematode parasites are found everywhere sugarbeets are grown. They cause large losses in beet crops. In recent years, eastern Colorado has reported losses of up to 50 percent. The only way to control these losses is to rotate beets with other crops that are not hosts to the parasites. This allows part of the nematode population to die off, reducing losses the next time beets are planted. Most rotation patterns allow for beet crops every three or four years.

The key to this problem seems to be slow release pesticides, which will continue to be effective for long periods of time. They alone may not solve the problem — nematodes can remain dormant in the soil for as long as ten years — but as research continues beet growers may be able to modify the crop rotation pattern for more beet crops and more profit.

Research is vital. In the future, sugar will be much more than a food additive. Products distilled from sugar may go into fertilizer, phonograph records, toys — even gas tanks. As petroleum prices go higher and higher and industry turns more and more to other sources for chemicals, the sugar industry must be ready with some of the answers.

Farm exodus declines

After half a century of steady decline, the American farm population may finally be leveling off. From 1970 to 1975 the average annual rate of decline was only 1.8 percent, compared to 4.8 percent from 1960 to 1970.

The figures are encouraging, but the farm population is far behind the rest of rural America, which is burgeoning. From 1970 to 1973, for example, the population of nonmetropolitan areas grew 4.2 percent. During the same period, the population of cities grew only 2.9 percent.

The discrepancy between farm and rural growth reflects, in part, the growing trend away from the small family farms of the past toward large farming operations. It is not uncommon for a small farmer to sell his land to a corporate farming enterprise and then start a small business in a nearby rural community.

Industry is moving into rural areas, too. Nonfarm jobs in these areas are steadily increasing — by 2.5 million in the period 1970 to 1974. Ironically, these industries may be partly responsible for the low rate of decline in the farm population. Many industrial employees are also part-time farmers, growing food mostly for their own consumption. Depending on the size of their farms, these employees may be counted in the census as farmers, helping to offset the decline.

Further encouraging the growth of rural America is the much-talked-about return to country life. More and more Americans, seeking escape from what they see as the urban "mess," are leaving the cities for small towns and rural communities. Some work in local industry; others commute to jobs in nearby cities.

If the present trends continue, the small family farm will disappear. Most of the commercial production of crops and livestock will fall to the large farming operations, which will have the capital and technological expertise for more efficient techniques. At the same time, there will be an increase in the number of part-time farmers who hold jobs off the farm while still producing small quantities of food.

The future of the rest of rural America is uncertain. As more industries move to the country, as more people tire of urban life and flee to small towns, the rural communities must themselves become urbanized to some extent. At best, they will be able to provide social services and opportunities available now only in the cities. At worst, they may become extensions of the urban life their champions are trying to escape.
Rural homeowners get financial assistance

Rural homeowners needing financial assistance in repairing or improving homes can apply for help from the U. S. Department of Agriculture's Farmers Home Administration (FMHA). Under the FMHA loan program, eligibility for a loan depends on income and place of residence. Adjusted income can be figured by tallying the total incomes of all household adults, deducting five percent and subtracting $300 for every minor child. Eligibility based on place of residence is determined by both locale and population.

Once a family qualifies, the size and nature of the loan is determined by income. Low income families may apply for repair loans that will enable them to restore their present homes to meet health and safety standards. These low income loans may range up to $5,000 with a repayment period of 10 to 20 years and an interest rate of one percent. Families with more substantial incomes may qualify for home improvement loans in order to add family conveniences or bring property up to FMHA minimum standards. Up to $7,000 may be borrowed with a repayment term of 25 years and interest rates ranging from one to three percent, depending on adjusted income.

The higher income homeowner may apply for available improvement loans repayable in 33 years at the regular interest rate or less, depending on family size and income.

Homeowners should submit applications for loans to an FMHA county office listed in the telephone directory under the U. S. Government Department of Agriculture listings. Individuals requiring additional information about the types of assistance available should contact the Farmers Home Administration or the Rural Development Service at the U. S. Department of Agriculture, Washington, D. C. 20250.

Shakeup in sugar

(continued from p. 19)

Corn syrup was consumed at a per capita rate of eighteen pounds, virtually no increase from 1975. Future consumption forecasts predict that dextrose and regular corn syrup totals will match and slightly exceed 1975 figures. HFCS consumption, however, is expected to gain an increase of two to four pounds per capita.

While HFCS is making inroads in the U. S. market, it does not now constitute a threat to sucrose consumption in most other high income countries. First of all, the price of corn is higher as a result of tariffs and other fiscal realities. The European economic community currently imports about 15 million tons of corn each year. Secondly, sugar producers in Europe are concerned about competition from nonsucrose sweeteners since they are already working with sugar surplus. Lastly, HFCS is not as popular in the world market for the simple reason that sugar consumption abroad involves a smaller percentage of processed foods, even in Europe. However, the growth of processed foods is a trend in every industrialized country and is likely to remain so. This fact will have a long-range effect on the world sugar economy.

Another influence on the impact of HFCS and the state of the world sugar market in general is the changing rate of sugar consumption. Since 1940, the per capita consumption of sugar in the United States has stayed virtually the same at 100 pounds per person, a level which seems to be the peak in other developed countries as well. Developing countries, however, have a per capita consumption of sugar well below the 100 pounds of the United States.

"Today 90 percent of the current yearly increase in sugar consumption is in the developing areas where the rate of population growth is staggering."

During the 1974 and 1975 period of high prices, the rate of consumption in developing countries dipped only slightly. In low income importing countries, however, the effect of the price rise was much more sharply felt, and consumption was reduced 30 to 50 percent and more. Because these countries account for such a small segment of world consumption, however, the tripled world prices reduced international consumption by only two million tons, because consumption rose in low income exporting countries during this period.

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Microwave Ovens

Microwave ovens have proved a boon to restaurants, snack bars and the homemaker wanting more time and convenience. However, the ovens do require that users demonstrate caution and common sense. Microwave owners should heed the following warnings:

- Never use the microwave feature if the door is damaged, that is, has a tear or gap in the closure seal, broken hinge, or bent or warped door.
- Do not attempt to operate the microwave oven with the door open. A microwave oven is provided with several interlocks to ensure that the door cannot be opened while microwave power is on.
- Do not allow the door closure seals to accumulate soil, which can build up and produce gaps in the closure.
- Do not attempt to defeat the safety features of the oven by poking objects into the viewing screen, door seals or other openings. Similarly, no object should be allowed to protrude from any part of the oven during operation.
- Repairs should be done only by qualified personnel. Attempts to repair this oven by unqualified persons could result in damage or hazard.
- Register a microwave oven by sending your name, address, and model and serial numbers of the oven to the manufacturer. If you move, renew your registration.

What Noise Can Do To Your Health

Scientists have conducted numerous studies on the effects of noise on health.

World-renowned otolaryngologist Samuel Rosen, together with other hearing specialists, studied the Mabaan Tribe in the quiet plains of equatorial Africa and discovered that Mabaans in their eighties could hear almost as well as tribal boys. In Europe and the United States, however, aging almost invariably brings about significant hearing loss. The contrast, these scientists believe, results from the differences in noise levels between the societies.

In Stockholm, a report presented to an international environmental conference stated that noise was a factor in one out of three neuroses and one in five headaches. London researchers studied 124,000 persons living near Heathrow Airport who were subjected to 100-decibel jet noises. In this group, researchers found more admissions to mental hospitals than the average cross-section of Londoners.

Studies on animals have linked loud noise with increased susceptibility to virus infection, interference with kidney function and even with the development of tooth decay. As former U.S. Surgeon General William H. Stewart concludes, “Calling noise a nuisance is like calling smog an inconvenience. Noise must be considered a hazard to the health of people everywhere.”

The noisiest room in the American home is the kitchen. “The housewife ought to receive hazardous-duty pay,” says Byron C. Bloomfield, an architect professor who participated in a University of Wisconsin study on the effects of home noise. The chart below gives some common household items generally producing noise over an acceptable home level of 45 decibels.

<table>
<thead>
<tr>
<th>Product</th>
<th>Decibels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum cleaner (on bare floor)</td>
<td>88</td>
</tr>
<tr>
<td>Garbage disposal unit</td>
<td>88</td>
</tr>
<tr>
<td>Electric blender</td>
<td>87</td>
</tr>
<tr>
<td>Range vent fan</td>
<td>85</td>
</tr>
<tr>
<td>Electric knife sharpener</td>
<td>80</td>
</tr>
<tr>
<td>Electric toothbrush</td>
<td>80</td>
</tr>
<tr>
<td>Clothes washer</td>
<td>78</td>
</tr>
<tr>
<td>Power lawn mower</td>
<td>75</td>
</tr>
<tr>
<td>TV-audio</td>
<td>70</td>
</tr>
</tbody>
</table>

Preserving Gourds

At maturity, the thin-shelled gourd becomes lighter in weight and begins to harden its shell. It should be gathered after the vines are killed by frost. Before the gourd is fully mature, the top should be sawed off and the insides removed; after the gourd has been cleaned, the top is replaced. Thin-shelled gourds can be cured by hanging in a well-ventilated cool place for four to six months.

Gourds with a thick shell should be gathered before frost but after the rind has hardened and the stems have begun to shrivel. Handle the gourd carefully to prevent bruising. Wipe it with a soft cloth and apply a thin coat of ordinary floor wax or varnish to the skin.

Lasagne Rolls

Sauce: 1 1/2 lbs. lean ground beef
1/2 c. salad oil
1/2 c. finely chopped onion
1 1/2 large cloves garlic, minced
2 tsp. salt
1/2 tsp. pepper
2 whole cloves
1/2 dried bay leaf
2 (1 lb., 1/2 oz.) cans plum tomatoes, pressed through strainer
2 (6 oz.) cans tomato paste
1 1/4 c. water
1 tsp. oregano
2 tsp. sugar

Filling: 2 lbs. ricotta cheese
1/2 tsp. salt
1/2 tsp. pepper
1/2 tsp. ground nutmeg
1/4 lb. mozzarella cheese, shredded
4 tblsp. grated Parmesan cheese
1 tblsp. chopped parsley
1 (1 lb.) pkg. lasagne noodles

To make sauce, partially brown ground beef in oil. Add onion, garlic, salt, pepper, cloves and bay leaf. Continue to brown over medium heat about 10 minutes, until well browned. Stir in remaining sauce ingredients. Let come to a boil, then simmer gently, loosely covered, about one hour. Stir occasionally.

To make filling, whip ricotta cheese. Add seasonings, mozzarella cheese, grated cheese and parsley. Set aside.

Cook lasagne noodles according to package directions. Rinse with cold water; drain well. Lay noodles on clean towels. On each lasagne noodle spread 1/4 c. filling. Fold over one inch and continue to fold, making a slightly flat roll.

Place 1 c. meat sauce in each of two 2-qt. rectangular baking dishes. Place rolls, seamside down, in baking dishes. Add 1/2 c. hot water to each dish and enough meat sauce almost to cover rolls. Reserve rest of sauce.

Bake in oven at 350° F for 35 minutes or until sauce bubbles in center of dish. Serve with remainder of meat sauce and grated Parmesan or Romano cheese. Makes eight to nine servings.
Solar Energy

Solar energy can be trapped for food and grain drying, cooking, heating hot water and heating and cooling homes. It is free, gives off no wastes and is available without danger of shortage due to embargo. Furthermore, Colorado homeowners who install solar systems receive a property tax break.

The basic principle behind any solar-powered system is to collect or trap the sun's energy and put it to use. Passive systems, which take advantage of the sun's energy without special hardware, have been in use for many years. For example, south-facing windows absorb natural heat during the winter and closed draperies or curtains at night help retain this heat.

Active systems use flat plate collectors in conjunction with passive heating methods. The collectors, black metal surfaces covered by glass and placed on the roof or next to the house, trap solar energy in the form of heat. Water or air is pumped through the collector and heat is transferred to the house. If the house is already sufficiently warm, heat is stored in a water tank or rock bed until needed.

A solar heating system can be built into new homes or added to homes by connecting it to existing heating systems. The solar system requires no more maintenance than a conventional system (including changing filters and checking all parts annually) since rain and snow keep collecting surfaces clean.

The cost of a solar system includes the initial installation and the operational and maintenance costs over the life of the system. Because of their newness and lack of mass reproduction, the initial cost for solar heating systems currently is expensive compared with conventional systems. An additional limitation is that extended periods without sunshine may require dependency on an auxiliary system.

It is possible to adopt a solar system by degrees; this reduces cost and permits assessment of the system's limitations in a specific environment. Hot-water heaters are less expensive initially and they pay for themselves more quickly than a complete solar heating system.

Going Abroad?
Watch Those Souvenirs

English woolens, Dutch flower bulbs and Canadian meat have some things in common. They are all foreign agricultural products that are permitted into the United States. However, the U.S. Department of Agriculture restricts many other products, a fact which the wise traveler keeps in mind.

Some foreign agricultural items are prohibited by federal quarantines because they can carry destructive plant or animal insects and diseases. For this reason, passenger baggage is inspected at all U.S. ports of arrival, and pest-risk items are confiscated and destroyed by inspectors of USDA's Animal and Plant Health Inspection Service (APHI).

To find out what is and is not permitted, write for a free copy of APHI's booklet, Travelers' Tips, USDA, Washington, D.C. 20250.