The Agricultural Experiment Station
OF THE
Colorado Agricultural College

Growing Potatoes in Colorado

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Published by the Experiment Station
Fort Collins, Colorado
1910
Trueness to Type

Potatoes for seed purposes should be true to the type of the variety, even if that type be not ideal. Take the Pearl, for instance, its stem end is deeply recessed. This seems to be a part of the impulse given to the Pearl when it was originated—a tendency to round out in growth and to project out about the stem. From the housekeeper's point of view, the stem end is better flush and smooth, but for a Pearl to be smooth at the stem is a sure sign of the loss of its inherited vigor and type. For all potatoes, points at either end, especially at the seed end, are signs of degeneracy, and reversion to the old wild forms. An increase from the typical number of eyes is an equally sure sign of running out.

Growing Potatoes in Colorado

One of the largest authentic yields of potatoes grown in the United States was produced in Southwestern Colorado, at Del Norte—847 1/2 bushels from a measured acre. The land was measured, the potatoes dug and weighed under the supervision of Governor Adams and Former Governor Routt. The altitude of Del Norte is 7,868 feet. The average yields of potatoes in large fields in this section is from 150 to 300 bushels per acre.

The high altitude of the mountain valleys of Colorado, the cool summers, soil rich in mineral matter, 320 days with sunshine in a year, and irrigation by which the plants may be supplied with just the right amount of water, at just the time needed, produces a large yield of fine flavored potatoes.

The potatoes used on the dining cars of the New York Central and Lake Shore railroads are grown in a mountain valley in Western Colorado. They are used because
the chefs of these railroads found them to have the choicest flavor of any they could find. The regular markets for Colorado potatoes extend over half the United States and include the highest priced markets of the country—Texas, New Mexico, Oklahoma and the southern states, within close reach.

Not one of the potato growing states of the East where artificial fertilizers and repeated sprayings are necessary, has so many natural advantages for producing a heavy yield of high quality of potatoes at a minimum cost as Colorado; and the profits from raising this crop are large.

Colorado produces annually about ten million bushels of potatoes. Prof. E. R. Bennett, of the Colorado Agricultural College and Experiment Station, estimates that there is a sufficient area of land in Colorado adapted to growing potatoes to produce over eighty million bushels annually, and to do this in rotation with other crops.
What is a Good Eating Potato?

The housekeepers create the demand for potatoes. They ask three things of the potato which they buy and cook for their tables—good flavor, mealiness and the least possible waste in preparing for the table.

The amount of waste in preparing a potato for the table is determined by the shape and smoothness of the potato, the depth and number of eyes and the condition of the skin. Potatoes smooth and regular in form, and either round, oval, or oblong in shape, show the least waste in paring. Every roughness of skin and irregularity in shape, such as knobs or cracks, increases the waste and makes the potato of less value.

The size of potatoes demanded by the trade is set by several things. Medium sized potatoes are more easily handled, pared, cooked, and served. The quality is better than of large ones as a rule, because of the larger proportion of cortical. For the fanciest cafe, dining car, and city trade, the size is set by the needs for individual service on abundantly supplied tables. In general the best size for this trade is 6 to 8 ounces, while 5 to 10 ounces is a fancy run. For general use 2 1/2 to 16 ounces are the limits, although Denver markets and Texas buyers like still larger potatoes.

When housekeepers and public eating places over the country are getting potatoes of fine table quality and appearance, smooth and easy to pare, the demand is great and the price relatively high. When the market is glutted with potatoes, poor either in quality or economy of preparation, housekeepers turn to rice and to other vegetables as a substitute for potatoes, and the price becomes relatively low. To produce potatoes of finest quality is in every way desirable.

And then good potatoes should be properly cooked. When boiled, as most potatoes
are, they should be covered with boiling water, and not be allowed to stand in cold water. *To start a bushel of potatoes in cold water loses, by dissolving and in the paring, as much protein as is contained in a pound of sirloin steak. When soup is wanted you use cold water, when the meat is to be saved you start with hot water. The same principle is applicable to the cooking of potatoes.

Flavor depends on ripeness and upon the variety. Mealiness can be partially controlled by soil conditions and water supply. A loose soil, dry about the tubers, and not over-watered, especially not watered too late, will give a dryer potato than the reverse conditions.

The eyes should be few and shallow. From 9 to 11 only are found in the best market potatoes, while poor potatoes frequently have from 20 to 35 eyes in each potato. Deep eyes cause a large waste in paring.

A smooth, thin, tough skin goes with little waste. Cut a thin slice from the potato across its center and hold the slice up to the light. You will see a white, dense ring next to the skin, while the center appears less solid and more watery. The white part next to the skin is much more valuable for food than the center portion of the potato and in order to save the most of this rich part, the potato must be smooth and even with shallow eyes so that the parings will be very thin. This outer portion is the part that sparkles on boiled potatoes when served whole.

Most markets prefer a potato with a white skin. A few markets like a red skinned potato. No large market wants a potato with a blue skin. The inside of the potato should be white with no streaks or yellowish tinge.

A school girl in Phillips County was

*Prof. Harry Snyder, University of Minnesota.*
paring some rough potatoes. We weighed some potatoes before and after she pared them and found that for every ten pounds of pared potatoes that she took out of the sack, she put only five pounds of pared potatoes into the pot to be cooked. Her family paid the groceryman one dollar a hundred for the potatoes in the sack. She wasted half, so that the part of the potatoes that was actually cooked cost two dollars a hundred raw, and most of the rich part next to the skin was lost. Find how much you lose. In a test made at the Albany hotel, it was found that potatoes carefully grown in Carbondale could be pared to lose only five pounds out of one hundred.

The Variety to Grow

Nearly all known varieties of potatoes have been tried in Colorado and most of them have been rejected. Most new varieties tried by the Experiment Station yield only one-half to two-thirds as much as the standard sorts. The chief potato growing sections confine themselves to a very few kinds and have made the value of these varieties known in almost every state in the union.

About 80 per cent. of the potatoes grown in the Greeley District are Pearls and as this District ships more potatoes than all the rest of the state, more than half of the potatoes shipped out of Colorado are Pearls.

The potato which has made the Carbondale District famous is the Perfect Peach Blow. The Peach Blow grown in Carbondale is particularly appreciated in the East and on the Pacific Coast.

The Uncompahgre District, of which Montrose is the center, makes a specialty of Rural New Yorker No. 2. Nearly one-fifth of the Greeley potatoes are also of this variety.

The largest yields in the San Luis Valley are made from Pearl potatoes although many Monroe County Prize and Rural New Yorker
No. 2 are grown. The record yield was made with the "Barclay's Prolific," a variety now discarded.

On the Plains and in most other sections where early potatoes are wanted some strain of the Early Ohio is grown. This variety has suffered severely in recent years from internal rot in the tubers and it may be that some other variety will take its place.

The advantage in growing these standard varieties is, that there is a ready market for them, buyers all over the country knowing the qualities of each sort. A farmer may prefer some other variety and his favorite kind may give a better yield on his farm than one of the four standard sorts, but buyers will not pay as much for unknown varieties because they do not have a demand for them, and because straight cars of one variety only are wanted. Buyers discriminate against other than standard sorts, partly because they want to run them out of the country—a practice parallel to the treatment accorded to a steer with the least Jersey blood by buyers in a beef cattle country.

A Typical Pearl
The Pearl

Other names—Wisconsin Peerless, White Victor.

Maturity—Early among late varieties.
Color—White, slight brownish cast. When ripe, netted, especially below, with brown. Sprouts tipped with pink.
Color of Flesh—The whitest.
Yield—The highest.
Reliability—The best.
Smoothness—Good on mellow soils; poor to very poor on flat, hard, overwatered soils.
Vines—Vigorous, green, drooping.
Set—Close and shallow.
Quality—Excellent if ripe. Keeps and ships well.

Shape—Somewhat flattened, round to oval; when large somewhat squared oval. Medium depth eyes. Stem end recessed quite deeply. Seen end toward upper side, stem end slightly toward lower side. Sometimes a potato central in hill and extending down is cylindrical.

Strong Points—Yield, reliability, white flesh, good quality, matures well.
Weak Points—Knots, misshapen in hard soils; vines fall in ditch. Tubers often too large unless closely planted and hill selected for good set.
Rural New Yorker No. 2

Related Varieties Selling as Rurals—Banners, Vulcans, Sir. W. Raleigh, Windsor Castle, Carmen III, etc.
Maturity—Late, often do not get ripe.
Color of Skin—"White," yellow brown cast.
Color of Flesh—Yellowish white. Carmen III nearly white.
Yield—Next to Pearls. About Montrose better than Pearls.
Reliability—Less sure than Pearls.
Adapted to deep soils with long season.
Vines—Purplish green, erect.
Set—Deep and scattering.
Keeps—Fine and ships well.
Quality—Often poor because unripe and yellow. Ripe Carmens III are seldom excelled.
Shape—Flattened, long oval to oval. Sometimes flattened pear shape. Ideal specimens are in shape alike at each end. Stem end flush, sometimes teated. Eyes medium in depth and number, to few and smooth.
Strong Points—Fine appearance, smoothness and keeping qualities.
Weak Points—Lateness, yellow flesh, more subject to disease than Pearls. Large tubers hollow with projecting eyebrows.
More Rurals are raised in the United States, it is said, than of any other variety.

The Peachblow

Other Strain—White Peachblow, called also "McClures."
Maturity—Late.
Color—Pink to red, netted with lighter tint.
Color of Flesh—Yellowish to very white.
Yield—Good, but less than Pearl by 15 per cent.
Reliability—Poor, except at Carbondale, and in similar conditions.
Smoothness—Unexcelled.
Vines—Very large.
Set—Heavy and widely scattered.
Keeps—Fine and ships well.
Table Quality—Fair to choice.
Shape—Like Pearl except more round
and with rolled in seed end. Recessed stem
end. Few and shallow eyes.
Strong Points—Beauty and smoothness.
Fine keeper and shipper.
Weak Points—Cracks, coarse ones hol­
low, dark flesh under some conditions.

A Good Late Ohio

Early Ohio

Related Strains—Acme, White Ohio, Late Ohio.
Color—Pink to red.
Flesh—Close to Pearl in whiteness.
Maturity—Early to very early.
Yield—Good among early sorts.
Reliability—Good for drylanders, but
very subject to disease rots and scabs.
Smoothness—Good to extra in mellow
soil. Very poor, knotted, cracked in hard
soils.
Vines—Small to medium, purplish stems.
Set—Light. (Plant closely).
Keeps—Very poorly.

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Quality—Among the best.
Shape—Oblong with round cross section. Many, but rather shallow eye, well distributed. Stem end flush or slightly recessed, seed end nearly on end, stem on end.
Strong Points—Earliness and fine table quality.
Weak Points—in hard soils cracked, knotty and rough. Some years under irriga-

A Bad Early Ohio

tion 50 per cent. hollow. Most subject of our sorts to scab, blights and rots.
We recommend for trial in small quantities, where Ohios are diseased, “Irish Cobblers.” Early Ohios are grown more extensively throughout the United States than any other early variety.

Select Seed From the Best Hills
A potato tends to produce a crop like the hill from which it came. A potato selected for seed may be smooth, of good size and shape, but if there also grew in the hill from which it came small, rough and irregular potatoes, the crop is likely to be a mixture of different sizes and shapes like the original hill.
A small potato may be used for seed, but if the hill of which it was a part con-
tained several large potatoes it is probable that the crop will contain an assortment of differing potatoes, like the original hill.

Under proper conditions, seed from a large yielding hill is likely to produce a large crop; while seed from a small yielding hill is likely to produce a small crop.

To increase the yielding power of the potato it is then necessary to select seed from large yielding hills; and to improve the quality it is necessary to select seed from hills where all the potatoes in the hill have the desired quality. Proper methods in raising the crop and favorable climatic conditions must follow the right selection of seed.

Mr. H. L. Edgerton, Carbondale, Colo., under the advice of Prof. E. R. Bennett, tested this method of seed selection to increase the yield of a strain of Peachblow potatoes that was already giving high yields. He saved separately for seed the potatoes from every hill that had not less than twelve good sized, smooth, choice potatoes with no rough or small potatoes in the hill. In a thirty acre field he found barely enough seed of this kind to plant a small patch. Most of the potatoes grown on this patch grew true to the seed, the hills having a large number of choice potatoes and no poor ones. Some hills did not breed true but contained some poor potatoes. Such hills were rejected for seed.

The potatoes from the choice hills in this patch were used to plant part of a 30-acre field. The other part of the field was planted with the best shaped potatoes that could be selected from a bin of choice eating potatoes. When this crop was harvested, it was found that on the land where seed was used from choice hills there was one sack of cull potatoes for each two hundred sacks of marketable potatoes. Where good potatoes from the bin were used for seed there was one sack of cull potatoes for each twenty sacks of marketable potatoes. The potatoes selected from the
bin were themselves very good, but many came from inferior hills. Mr. Edgerton has been quoted as saying that the increase in profits the next season from using seed from the highest yielding hills was $100.00 an acre. An unusually high price was a factor in this profit, but much of the returns must still be credited to hill selection of seed.

This method of increasing the yield by selecting seed from the most productive hills succeeds only where the conditions of soil and climate and culture are favorable to potato growing. Unfavorable conditions, such as land too flat for best irrigation, hot days in summer or shallow and heavy soils will overcome the beneficial effects from seed selection. It is impractical to attempt to raise seed on most soils at Greeley for more than one year, with the same stock.

Where conditions are most favorable for potato growing, the yield will sometimes be increased one half in a single season by selecting seed from the most fruitful hills.

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**Running Out**

Colorado is one of the native homes of the potato, wild potatoes have been found in mountain sections near La Veta, Trinidad and Durango, showing that our conditions are particularly adapted by nature to the growth of this crop.

The original potato was simply a thickened part of a root stalk in which the plant stored up food to supply the baby plant the next season, until the roots had grown enough to take food from the soil.

Out ancestors, and before them the Incas in the Andes, took the wild potato of South America, a tuber mostly of skin and eyes, with a little heart, and by gradual unplanned selection, greatly increased the size and thickness, reduced the number of eyes, improved the flavor and finally secured such perfected tubers as we find in the best Pearl, the Rural
Progressive Change in Form, Showing Running Out

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and Peachblow potatoes, with their high yields.

As with all artificial growths the constant tendency of inheritance is for our improved potato to drop back to the original form and yield. This going back is called by the farmers "running out."

Running out in good potatoes first shows by tubers becoming longer than the true type or by one end of some of the larger potatoes becoming slightly pointed. If seed is used from hills where one or more of the potatoes is slightly pointed, the crop from this seed will have more pointed potatoes. Experiments at Greeley have shown that a tendency to points is the quickest fault to be transmitted. The number of eyes is usually increased. The yield is less. Where farmers continue from year to year to select seed from potatoes that are running out, the bulk of the crop soon becomes pointed, the eyes more numerous even to such numbers as 18 to 35 on one potato, and the yield inversely low. The yield suffers less on rich, deep soils but finally under the best of conditions the smallness of the crop forces even the most careless farmer to get new seed.

If one potato in a hill shows this disposition to run out, it is not safe to use any of the potatoes in that hill for seed, as no matter how good the other potatoes in the hill may be, they have inherited the tendency to run out, both in type and yield.

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**Rotation and Plowing**

One reason for the success of potato farming is that the crop demands a regular rotation, and this rotation insures fertility and success for all the crops. A standard rotation is: Grain one or two years, alfalfa three, potatoes one, potatoes or beets the last year. In rare cases the third crop of potatoes is raised. Some clover, pea crop or legume is always required preceding potatoes,
because they consume even more nitrogen than corn, while our soils contain less nitrogen by far than the soils in the corn states.

Mellow soil or loose stubble may be fall plowed after irrigating, and allowed to lie rough over winter. Heavy or drifting soils are best plowed late in the spring for potatoes, after irrigating, if possible. Plowing should be done not less than eight inches deep and the new two way plows, which leave no back furrows, dead furrows or turning ground are the best. Harrowing must follow the plow twice a day and after heavy rains. The disc is often of use on heavy soils, if hard. All the system is planned to secure moisture conservation beneath, with mellow soil about the tubers. A float should be used early in the preparation of the seed bed, followed by the harrow. With the two way plow and a skilful plowman, potato ground may be floated before plowing and not need it afterward.

The mulching given by potato harvest makes the grain crops following potatoes better than after other crops, and without plowing.

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**Planting**

Planting is best done by a planting machine; as planters open the furrow, drop the seed on moist soil and cover at once, leaving a good ridge to follow with the cultivator. The seed potato has some moisture within itself, but it will not grow if it dries out or if moisture is not close for the little roots to use. On the other hand, it is not desirable to have the potatoes grown deep in the ground because the quality is apt to be not so good and the skins scabby. Hence the rule to plant shallow but deep enough for the seed to be in moist dirt, and to plant deeper in loose soil that dries out quickly on top. To plant more than five inches deep is a damage to the yield.
Potatoes must be cultivated deep and close for the first time at least. Run the shovels down eight or ten inches deep and throw all the dirt you can. Two big horses can do this for a while, but four horses and a heavy cultivator are needed for large fields. This is to let the air into the soil and keep the soil loose around the potatoes and is easiest done before the potatoes are up. A loose condition of soil must be secured or disease will prevent the formation of tubers of any size, even though the tops grow large and vigorous. Harrow twice a day as you cultivate, and afterwards until it damages the potato vines. Do not try to raise potatoes in the garden unless your soil is very loose and open, because you cannot cultivate well there. At Greeley they get few potatoes unless they cultivate deep and so do not try to raise them in the garden. Later cultivations may be shallower and should not tear the roots. After the first cultivation on unirrigated land, shallow cultivation is usually the thing, unless heavy setting rains come, on heavy soil. Under irrigation very loose soils, and those with much slope do not need as deep cultivation, except the once, because the water is apt to stay too low down in the row to do good.

The condition desired is always looseness and air about the tubers and enough moisture about the roots. Irrigating should be managed with this desired condition in mind. The water from below is the best and so it is desirable to irrigate before plowing in order to delay summer irrigation. How often to irrigate depends upon soil and weather and is told by seeing if the soil under the hill among the roots is damp enough. On deep soil in good condition irrigation may well be put off until the tubers are set. On shallow soils do not let the soil get too dry before starting, and on no soil
after starting. Always begin by irrigating every other row, all through, then the other row quite soon, and after that both rows. Ditching should be done with a V that will lift the dirt up onto the hill for frost protection. With plenty of slope a shallow ditch is wanted; on flat land a large deep ditch.

**Harvesting**

Harvesting should be done with a four horse digger, and a sorter should be used in the field to remove dirt and small potatoes. The season for digging potatoes is short, because there is very little time between maturity and the average time of frost sufficient to reach tubers in the ground. Hence potato harvest should be pushed with all haste, and any reasonable wages paid for the longest possible hours in the field.

**Storage of Potatoes**

Potatoes should be stored cold. A cellar set into the ground and well insulated above with straw and earth can be held at almost as steady a temperature as a cold storage house. By opening in the cool of the morning, and closing to shut out cold or warmth, it can be kept at 32° to 35° F., all winter and around 40° Fahrenheit late into the spring. Thermometers should be tested when bought, by putting them into slush of water and snow or fine ice, in which they should register 32° F. Every grower should have a thermometer out doors and one in the cellar, and observe both twice daily.

The Greeley potato growers have never had dry land seed potatoes grown from hill selected seed, or properly stored. It is hard to say how much they would pay for such seed, stored right. They must have dry land seed, and would pay an increased premium for better seed.

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Proper storage for eating potatoes differs from the storage of seed potatoes only in the matter of light. Seed potatoes are benefited by light. The skins become tough and green and much less liable to rot or disease, in fact no treatment with chemicals is equal, or is necessary in Colorado where seed potatoes are greened by light. On the other hand, eating potatoes need to be kept absolutely dark, as greening them injures the flavor. Great damage is often done potatoes in kitchens, and in groceries and markets by keeping them in open bins or even in the windows exposed to light. Customers should demand potatoes fresh from a dark cellar. The sacks in which potatoes are stored are not sufficient protection from the light.

Seed potatoes are best stored in crates or barrels or in shallow layers in the cellar. Toward spring they should be spread out thin and be exposed to light, if not before, but not to warmth, and should be shoveled over once a week to retard sprouting.

Most Desirable Sizes of Seed Potatoes

The planters in use and the practice of Colorado potato growers has set a standard for seed potatoes. The large potatoes are not wanted because the seed pieces are too big and because the cost per acre is too much. The smallest potatoes are not wanted because they do not provide food and moisture enough to start a vigorous plant and because these small potatoes come in larger percent from poor hills. The favorite size is 5 to 8 ounces, or 2 3-4 to 4 inches in longest dimension according to the type of the potato, round or long. Potatoes are used for seed up to about 10 ounces in weight, or 3 1-4 to 5 inches long according to variety. In dry land seed a small percentage is allowed to run as low in weight as 1 1-2 ounce each.
Use all the potatoes from the best hills for seed plots; but sell what the market wants. Seed potatoes should be sold in neat uniform two bushel sacks sewed with sack twine—not baling wire or binding twine.

Many experiments have proven that seed potatoes should be cut, if at all, into pieces about two ounces in size. Half potatoes on the average give a slightly larger yield; and whole potatoes still a little larger crop, but growers seldom care to invest the money necessary in using so much seed.

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**Dry Land and High Altitude Seed Potatoes**

In England seed potatoes are brought from Scotland; in the Eastern United States, seed potatoes are brought from Maine; in the Central United States, from the Red River Valley; in general from the colder, more northern region. In Colorado, seed potatoes usually though not always, do best when taken from high altitudes to lower, and from dry land to irrigated regions. The stimulus of change is usually the greatest the second year. The demand for dry land seed potatoes has never been filled; nor has it been developed by supplying good stock. Next to a home market there is no trade in potatoes equal to supplying dry land and high altitude seed stock to Greeley and other irrigated potato sections.

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**The Greeley District**

No where have the methods for potato growing under irrigation been so well worked out on so large a scale as at Greeley, Colo. There a large body of intelligent growers by means of the best methods of rotation, seed selection, cultivation, storage, and mar-
keting, produce annually 8,000 to 14,000 car loads of potatoes, selling on track for $2,000,000 to $3,500,000, and in competition with regions with better natural advantages for potato production.

Rocks on Which Potato Growing Breaks

First—Lack of rotation. Potatoes should follow potatoes only once, or possibly in rare instances the third time on very rich, mellow soil. Potatoes should not be planted in all more than two or three times on new ground until after some legume has been grown. Clover, alfalfa, bokhara, or field peas, are absolutely essential to permanence in potato growing. We have potato regions in Colorado—once producing potatoes by the train-load, that now produce none, because they could not or would not grow legumes.

Second—Poor storage. Table stock cannot be kept at its best, nor seed stock so it will grow without good storage; that is, air and cold without frost.

Third—Poor seed. Planting of culls, run outs, unknown grocery potatoes has had its day, and a long one; a better time is coming because it has too—a day of bred up strains; of pedigreed, hill dug, profitable seed potatoes, worth good money and selling for good money.