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THE PREVENTION OF SMUT IN GRAIN BY SEED TREATMENT

By

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This brief circular is designed to carry specific information to the farmers of Colorado regarding the methods and materials for seed disinfection for the prevention of smut. The following smuts common in Colorado may be controlled by seed treatment:

Stinking smut of wheat, closed smut of barley, oat smuts, millet smuts, stem smut of rye, and closed smut of emmer.

CEREAL SMUTS

It is not necessary here to dwell upon the character or general appearances of the different grain smuts, as nearly every crop grower of any experience is already familiar with these. Furthermore, it is already known that smuts inflict annual losses varying from slight damage to very serious damage. We find in Colorado losses from 1 to 2 percent to 45 and 50 percent of the total crop. Losses of the latter percentage are, of course, exceptional and uncommon, yet they do occur. Naturally, it is the desire of every farmer, to not only eliminate this loss from his own grains, but to assist his neighbor in gaining the same end.

Fortunately smut, with a very few exceptions, is carried on the external surface of the seed. Hence, by the use of standard methods of seed disinfection, it is possible to render seed thoroughly free from these external pests.

One exception in the use of the seed treatment method is to be found in the case of corn smut. Infection of the corn plant comes originally from the soil, from smut boils that live over winter. The seed, therefore, does not carry the smut externally as in the case of the other cereals, hence, seed treatment is useless. Crop rotation for two or three years is the only practical method of control.

KIND OF SOLUTION

Formalin is undoubtedly the best disinfectant adopted for seed treating purposes. Altho copper sulfate was one of the earliest, it is not now considered the best disinfectant, chiefly on account of the obvious injury it causes to the grain and its
relatively higher expense. Therefore, use formalin. It is sold by all druggists at 50 to 70 cents per pint. It must be of 40 percent strength.

USE ONE OF THREE METHODS

There are in use at the present time three methods of carrying out the formalin seed treatment. They are as follows: (1) soaking, (2) sprinkling, and (3) spraying. Each method will be described, in order that the farmer may choose the one best suited to the conveniences at hand. The soaking and sprinkling methods have been in use as standard methods for about 20 years. The spraying method has been only recently introduced. Each method is easily performed and quite inexpensive, the total cost of treatment not exceeding 2 cents per bushel.

HOW TO USE THE SOAKING METHOD

1. Estimate the amount of seed to be treated and purchase formalin (40 percent strength) one pint for 40 bushels of grain.
2. Dilute the formalin to the required strength. See Table 1.
3. Put a sufficient amount of the solution into a barrel or tank to immerse one or more sacks of seed. Do not fill the sacks too full, allow room for agitation of the grain so that each grain will become thoroughly wetted.
4. Leave the seed in the solution according to specified time; see Table 1.
5. Remove the sacks and drain, allowing the excess solution to run back into the barrel or tank. Replenish the solution when it gets too low.
6. Pile the treated grain and cover with wet sacks or canvas for not less than 6 hours nor more than 12 hours.
7. Shovel the grain over and spread out in a thin layer to dry. Drying may be facilitated by frequent shoveling.

TABLE 1

Use formalin of commercial 40 percent strength.

<table>
<thead>
<tr>
<th>Grain</th>
<th>Kind of Smut</th>
<th>Proportion of Formalin to Water Mixed</th>
<th>How Long to Soak in Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>Bunt or Stinking Smut</td>
<td>1 pint to 40-45 gals.</td>
<td>10-20 minutes</td>
</tr>
<tr>
<td>Barley</td>
<td>Closed—Hidden</td>
<td>1 pint to 40-45 gals.</td>
<td>10-20 minutes</td>
</tr>
<tr>
<td>Oats</td>
<td>All Kinds</td>
<td>1 pint to 40 gals.</td>
<td>10-15 minutes</td>
</tr>
<tr>
<td>Millet</td>
<td>All Kinds</td>
<td>1 pint to 40-45 gals.</td>
<td>40-50 minutes</td>
</tr>
<tr>
<td>Rye</td>
<td>Stem Smut</td>
<td>1 pint to 40 gals.</td>
<td>10-15 minutes</td>
</tr>
<tr>
<td>Emmer</td>
<td>Closed</td>
<td>1 pint to 40 gals.</td>
<td>10-20 minutes</td>
</tr>
</tbody>
</table>
SPRINKLE METHOD

1. Use a clean floor or wagon-bed, or canvas in the open.
2. Spread out a few bushels of grain. Make the formalin solution according to Table 1 and sprinkle it over the grain as it is being shoveled around.
3. Sprinkle at the rate of 1 gallon of formalin solution to 1 bushel of grain. A garden sprinkling can may well be used.
4. After all the grain is treated, pile and cover it as directed under the soaking method.
5. Store in clean sacks or bins.

SPRAYING METHOD

The object of this method is to apply the solution in the form of a very fine spray, the gas being the active agent in killing the spores.

“As the seed is being shoveled from one pile to another each shovelful is sprayed with a solution consisting of one part of 40-percent formalin and one part of water. This solution is used at the rate of 1 quart to 50 bushels of seed.”

After all the grain is treated, it is piled and covered with wet sacks for five hours, after which it is spread out to dry or planted immediately.

CONSIDERATIONS

Increased yield is the ultimate object of seed treatment; it should therefore be performed thoroughly and in accordance with directions.

Different strengths of solutions are required for the various cereals. Likewise, different lengths of treatment are required.

Utensils such as sacks, seeders, etc., if likely to be contaminated with smut should be cleaned before being used.

Treated grain may be kept indefinitely so long as protected from further contamination.

If treatment is performed during the winter, care should be taken not to expose wetted grain to frost, as it may result in injury to germination.

If the seed contains noticeable amounts of foreign matter, such as chaff, or dirt, etc., it should be cleaned first by fanning. Less of the solution will be needed in treatment if this is done.

Formalin, while not poisonous, should be kept from the bare flesh and mucous membranes. If the sprinkle method is employed remember to spray close to the grain.