

AGRICULTURAL EXPERIMENT STATION
Oregon State Agricultural College
W. A. Schoenfeld, Director
Corvallis

Circular of Information No. 85

February, 1933

SEED TREATMENT OF SMALL GRAINS

D. D. Hill and H. P. Barss

All seed grains should be treated for the prevention of smut. There are two general classes of fungicides used for this purpose, the so-called wet treatment and the dry or dust treatment. In general, the wet treatments are more cumbersome to use and are more injurious to germination of the grain. Because of this, dust treatments for wheat, oats and barley have been developed which will eliminate the necessity for the wet treatment. The commonly used and effective treatments for the control of smut are given here and brief directions are given for their use.

1. Formaldehyde for wheat, oats, and barley

Formaldehyde may be used in a number of different ways. The following directions cover only the standard sprinkle and dip methods. The standard solution of formaldehyde is made by adding one pint of formaldehyde to 40 gallons of water. This quantity of solution is sufficient for 50 bushels. If the sprinkle method is to be used, spread the grain out on a clean floor or canvas and apply the solution with a sprinkling can while the grain is being shoveled from one pile to another. Turn until the grain is thoroughly wet, using about one gallon of solution to $1\frac{1}{4}$ bushels of seed. Shovel the grain into a pile and cover with canvas or sacks for at least two hours or overnight. If wheat is to be treated with formaldehyde, clean it to remove all smut balls first.

When the dip method is used, the oats should be put in sacks not over one-half full. Dip the grain into the solution until it is thoroughly wet, allow it to drain for a few minutes, and then place the grain where it can drain overnight and scw the next day. Regardless of whether the dip or sprinkle method is used, the grain should be spread out and thoroughly dried if it can not be scwed immediately, since grain left damp for even a few days may be severely injured.

2. Copper sulfate for wheat.

The copper sulfate or bluestone is an old method but is not effective enough for oats and barley. The standard solution is made by dissolving one pound of the copper sulfate in five gallons of water. This can be used as a sprinkle or as a dip, but is best used as a dip method. After dipping, allow the grain to drain for ten or fifteen minutes, then immerse in a solution of milk of lime, made by adding one pound of quick lime to ten gallons of water. This neutralizes the injurious effect of the copper in the solution and prevents the injury to germination which otherwise may follow even when wheat is promptly planted. Wheat should be thoroughly cleaned to remove all smut balls before treating as the solution does not kill smut in these masses.

3. Copper carbonate for wheat

This is the standard method of wheat treatment in all of the main wheat growing regions of the United States. The treatment is accomplished by mixing two

ounces of copper carbonate dust with one bushel of wheat. The wheat should be thoroughly cleaned before treatment as the copper carbonate dust will not penetrate into the smut contained in smut balls. Treatment of small quantities of wheat can be done by the use of homemade treating devices. Various devices are made by using old churns, gasoline drums, and the like with cleats or baffles fastened on the inside. Thorough mixing is essential for the success of any dust treatment. Each kernel of grain must be thoroughly coated with the dust. In the homemade machines, this is governed by the time of mixing, and in the continuous flow treating machines, the regular flow of copper carbonate into the machines is necessary.

When copper carbonate is used, the following precautions should be taken. Do not treat grain in a closed room. Treat the grain outdoors or in an open shed. Arrange outfit so that operator can stand to the windward. Copper is poisonous and the dust causes irritation, nausea and sickness if inhaled. It is often desirable to wear a mask over the nose and mouth when treating grain with copper carbonate dust. Grain treated with copper carbonate should not be fed to livestock as the copper is poisonous. Copper carbonate does not control smut effectively when used on oats and barley.

If wheat is known to come from a smutty crop or looks the least smutty, use copper carbonate of high strength (at least 50 per cent of copper). The low-strength copper carbonate (18 to 20 per cent copper) does not control smut as well under these conditions.

4. Organic mercury dust for oats, barley, and wheat.

This type of treatment is new and its effectiveness depends on the formation of a volatile gas which penetrates the hulls of oats and barley to kill the smut spores. Ceresan, a patented organic mercury compound, is the only dust of this kind now (1933) available commercially in Oregon. Investigations of various dust treatments for the control of smut in barley by the U. S. Department of Agriculture are reported in Technical Bulletin 207, which says that "...Ceresan, made in this country, gave satisfactory control of covered smut of barley without seed injury." Tests have also been made at the Oregon Experiment Station with equal results for both oats and barley. It can be used for wheat as well. Ceresan is applied in much the same manner as copper carbonate and the same precautions should be observed. Use about two ounces of the dust to one bushel of grain and mix in the treating machine until the dust is well distributed over the kernels. For those who prefer a dry treatment this method will give good results.

5. Formaldehyde-containing dusts for oats, barley, and wheat

Effective formaldehyde-containing dusts have been devised, but as far as we know, have not yet been marketed commercially in Oregon.

6. Soil Contamination

In semi-arid wheat-growing regions, summer fallowed ground often becomes badly contaminated with smut from threshing operations before planting. Although seed treatment helps by killing all the smut on the surface of the grain, it cannot destroy the soil-borne smut and a completely clean crop is not to be expected from fall planted wheat on such soil.