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## EC148 Seed Treatment for Cereals

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# Seed Treatment for Cereals

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Extension Service of the University of Nebraska College of Agriculture  
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W. H. Brokaw, Director, Agricultural Extension Service  
Lincoln, Nebraska

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# Seed Treatment for Cereals

J. E. LIVINGSTON and D. L. GROSS

**T**HE TREATMENT of seed is a recommended practice for the control of certain smuts and other diseases of cereal crops. There are three general types of smut, distinguished by the manner in which they infect the plant.

## Types of Smut

**Seed infection.**—In this type of smut the spores adhere to the surface of the seed, germinate when the seed does, and infect the young seedling. Covered smut of wheat (Fig. 1), the smuts of oats (Fig. 2), covered smut of barley (Fig. 3), and the kernel smuts of sorghum (Fig. 4) are of this type. They are all readily controlled by chemical seed treatments.

**Flower infection.**—Smuts of this type infect the flowers of the plant on which they lodge. The spores fall on the open flowers at pollination time and grow into the developing seed. The infected seed appears normal but when it is planted and germinates, the fungus also begins to develop and grows up within the plant, causing a black, smutty mass in place of the head of grain. Loose smut of wheat (Fig. 5) and barley (Fig. 6) are of this type and cannot be controlled by chemical seed treatments.

**Shoot infection.**—The spores of this kind of smut live from one season to another in the field. They blow about, falling on the host plant, where they germinate and infect the tissues. Corn smut (Fig. 7) is of this type. Since the spores are not carried on the seed, seed disinfection is of no value. Crop rotation and destruction of infected material will help to reduce the infection from this type of smut.

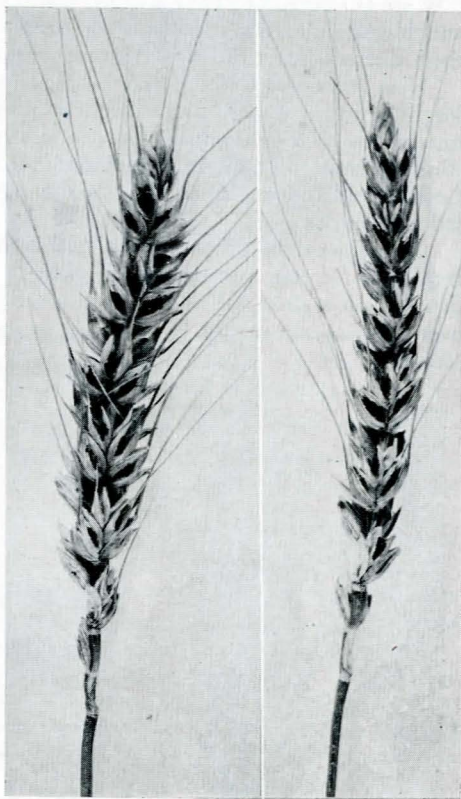


FIG. 1.—Covered or stinking smut of wheat.

## Value of Seed Treatment

Losses from certain seedling diseases, such as scab and blight of wheat and barley and certain diseases of corn that result from infection carried on

the seed, may be reduced by seed treatment. Some of these diseases are also carried from one year to the next on infected plant parts that are left lying in the field, and seed treatment will not prevent reinfection from this source. However, the improvement in stand and vigor of plants due to the control of the seed-borne organisms generally obtained following seed treatment makes it advisable to treat, especially if the seed is discolored and of inferior quality. This is truer with barley than with the other cereals since barley is usually more severely attacked by scab and blight.

Even though seed treatments are highly effective against certain diseases, they are not cure-alls. They will not control any of the rust diseases, head scab and blight, mildews, corn smut or head smut of corn and sorghum, since these diseases infect the plant by other means than through the seed.

New Improved Ceresan may be used for treating wheat, oats, barley, and sorghum and is used in preference to copper carbonate by growers who desire to treat the seed of several crops. Copper carbonate is recommended only for stinking smut or bunt of wheat and the kernel smuts of sorghum. Both Ceresan and copper carbonate are poisonous, and treated grain should not be fed to livestock.

Care should be taken not to inhale the dust when treating with New Improved Ceresan and copper carbonate. The work should be done out of doors or in a draft, or, if this is impractical, wear a dry cloth or respirator over the nose and mouth.

FIG. 2.—Smut of oats.





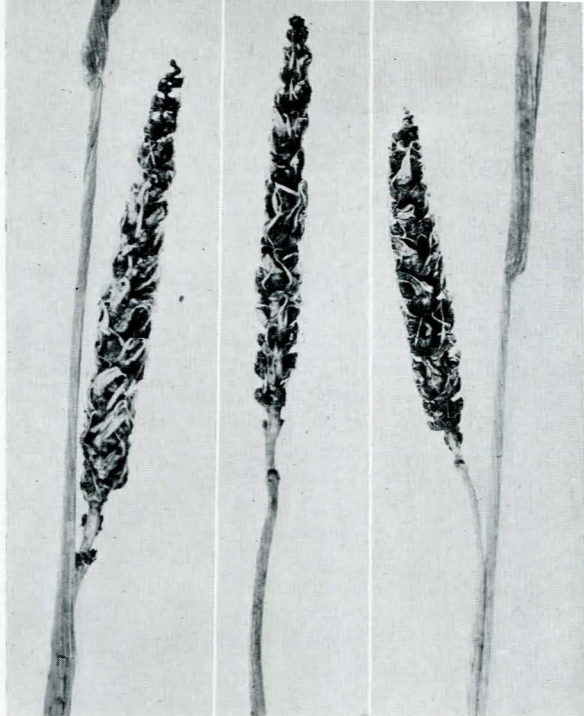


FIG. 3.—Covered smut of barley.

Either formaldehyde or New Improved Ceresan may be used for the control of the smuts of oats. Both treatments give satisfactory results. Formaldehyde-treated oats may be fed to livestock after being thoroughly aired.

#### **New Improved Ceresan**

*For stinking smut or bunt of wheat, loose and covered smuts of oats, covered smut of barley, loose and covered kernel smuts of sorghum, scab or blight of wheat or barley, stripe disease of barley.*

New Improved Ceresan should be applied at the rate of  $\frac{1}{2}$  ounce per bushel of seed. It is best applied with a treating machine. Commercial machines suitable for treating large quantities of grain by mills and elevators are available. For farmers with small acreages a barrel mixer is satisfactory. A 30- to 50-gallon barrel is mounted diagonally on a shaft (Fig. 10).

The barrel should not be more than one-fourth full of grain. Scatter the proper amount of dust uniformly over the surface of the grain, then slowly revolve the treater 30 times or more to insure thorough coating of the seed. After removal from the treater, the grain should be stored in sacks or in an uncovered pile or wagon box for 10 hours before it is sown.

A gravity-type seed treater (Fig. 8) in which the grain and dust flow together over a series of baffle plates, may be used also for treating with New Improved Ceresan. It works faster than the barrel treater but may not coat the seed so well.

In using the gravity treater spread out one bushel of grain in the proportioning trough and then sprinkle evenly the required amount of dust disinfectant over the surface of the grain. Next add a second bushel of grain and a second dose of the treating material. The grain and disinfectant are then dumped through the mixing chute by raising the free end of the trough.

The grain should be caught in bags to keep as much of the dust as possible from getting into the air.

The shovel method can also be used with New Improved Ceresan. It is a good plan first to build a pile of grain and dust by spreading a bushel of grain on the floor and scattering uniformly over it the proper amount of dust. Then add another bushel of grain and another  $\frac{1}{2}$  ounce of Ceresan until a large pile has been prepared. The grain and dust are then shoveled over several times until there are no streaks of Ceresan dust visible in the grain. After treatment by this method, the grain should be sacked or left in a pile and covered for about 24 hours.

It is very important that New Improved Ceresan be used according to the directions on the can, *namely  $\frac{1}{2}$  ounce per bushel*. More than  $\frac{1}{2}$  ounce is wasteful and may injure the seed, especially if the seed is stored for several months. It is advisable to plant seed treated with New Improved Ceresan within 30 days following treatment, although when the directions for treating are followed carefully, it is not likely that injury will occur when the seed is stored for a longer period.

FIG. 4.—Kernel smut of sorghum.

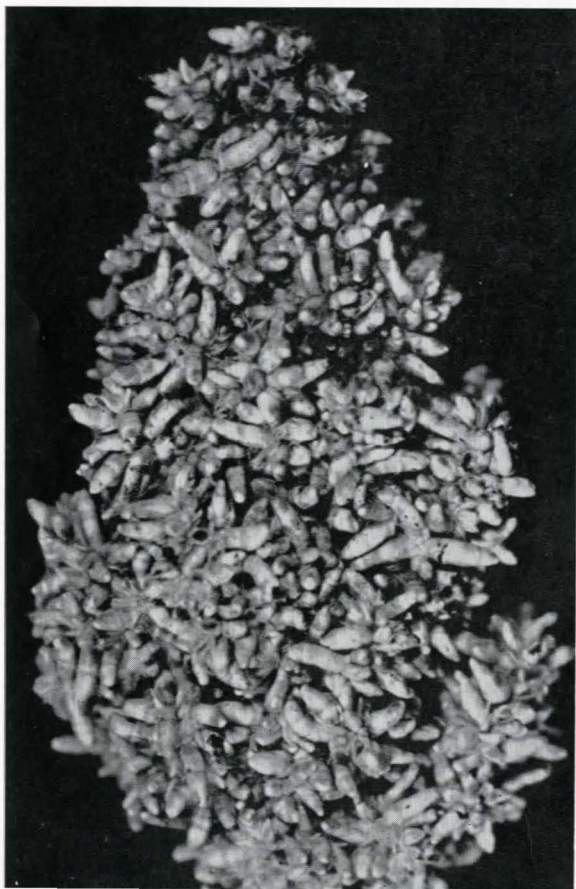




FIG. 5.—Loose smut of wheat.

No trouble has been experienced with drill cylinders sticking when Ceresan-treated grain has stood overnight in the drill hoppers.

The cost of material for treating with New Improved Ceresan is about 2 cents per bushel.

### Copper Carbonate

*For stinking smut or bunt of wheat and loose and covered kernel smuts of sorghums.*

Use 2 ounces of copper carbonate for each bushel of wheat and 2 ounces per bushel of sorghum seed. Use finely divided material made specifically for seed treatment purposes. Either the 50-per-cent or the 20-per-cent grade is satisfactory. It is necessary that a good job of mixing be done so that the dust is actually rubbed into the seed coat. Most commercial treating machines, concrete mixers, or the barrel mixer described for treating with New Improved Ceresan may be used. All mixing machines should be closed tightly while in operation to prevent escape of the powder. Certain gravity mixers, such as shown in Figure 8, are also satisfactory. A good job of coating the seed cannot be done with a shovel; thus this method should not be used when treating seed with copper carbonate.



Grain treated with copper carbonate may be stored in a dry place for several months without harm. Treated grain is regarded as poisonous and should not be fed to livestock; however, a few grains accidentally scattered about where chickens will get them will cause no harm.

Drills which have stood for a few hours, or overnight, after having been used to plant wheat treated with copper carbonate, should be examined carefully before being used to see whether or not the cylinders are stuck. Such precaution may prevent breakage. The cost of material for treating with copper carbonate is slightly greater than for New Improved Ceresan.

### **Formaldehyde Spray Treatment**

*For loose and covered smuts of oats.*

A quart-size spray gun, such as is used for fly spray, and ordinary commercial formaldehyde (38 per cent formalin), which may be purchased at the drug store, are needed.

Mix 1 pint of formaldehyde with 1 pint of water and apply at the rate of 1 quart of solution to 50 bushels of oats. This can best be done by two men, one shoveling the grain while the other shoots two or three strokes of for-

FIG. 6.—Loose smut of barley.

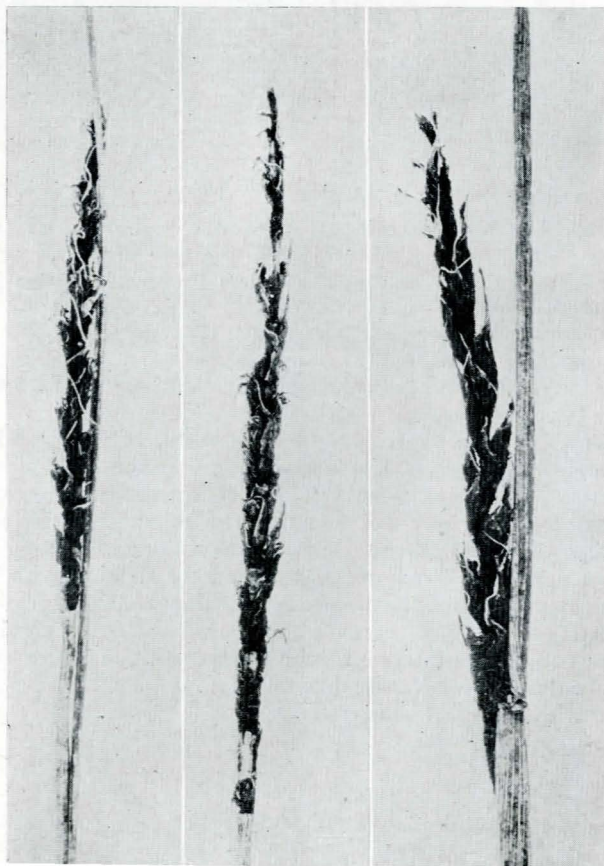




FIG. 7.—Corn smut.

maldehyde solution on each shovelful. The number of strokes of the spray gun will depend upon the sprayer and the size of the shovel. The treated grain should be shoveled over at least once and then sacked or covered for 5 hours, or overnight, before sowing. A common practice is to spray the oats as they are scooped into the wagon the night before it is planned to seed them. If it should become necessary to store the grain for several days, it should be spread out and aired. Oats treated with formaldehyde should be thoroughly aired if they are to be fed to animals. The cost of treating with formaldehyde is about  $\frac{1}{2}$  to  $\frac{2}{3}$  cent per bushel. Purchase formaldehyde in sealed containers only. Commercial formaldehyde loses its strength quickly when exposed to the air.

### **Formaldehyde Sprinkle Method**

*For loose and covered smuts of oats.*

Mix 1 pint of ordinary commercial formaldehyde with 5 gallons of water and apply to 40 bushels of oats. The solution may be sprinkled over the grain with a sprinkling can, using 1 pint to each bushel. The treated grain should be thoroughly mixed by shoveling, then sacked or piled and covered for 3 hours. It should then be planted or spread out in a thin layer and stirred occasionally to prevent seed injury.

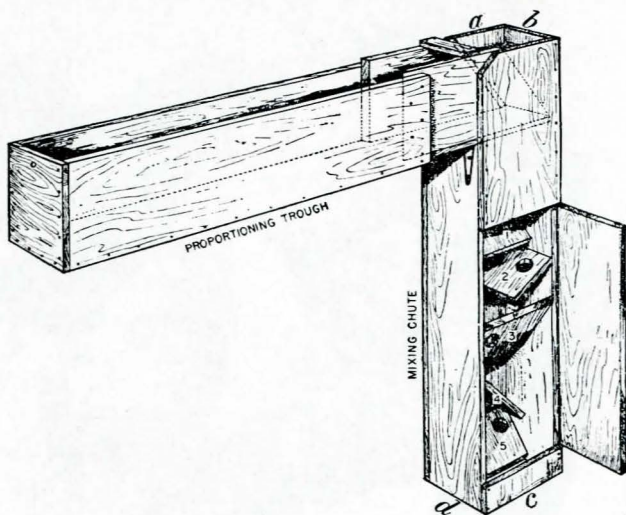
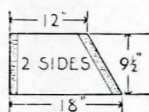
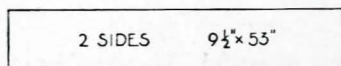
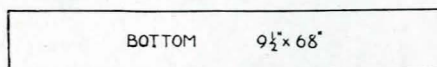


FIG. 8.—General view of gravity treater.  
(From Minn. Ext. Circ. 58, 1938.)

### PROPORTIONING TROUGH



### MIXING CHUTE

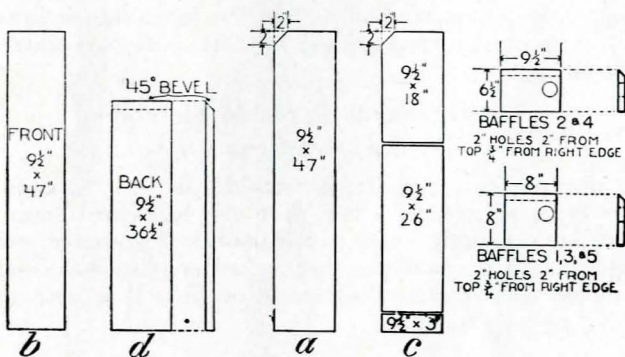


FIG. 9.—Parts for making the treater.  
(From Minn. Ext. Circ. 58, 1938.)



### Hot Water Treatment

*For loose smuts of wheat and barley.*

The hot-water treatment is the only effective method of disinfecting wheat and barley seed infected with loose smut. These smut organisms are found inside the seed rather than on the outside, as is the case with the covered smuts. The hot-water treatment requires that the temperatures be regulated carefully, and even then the germination of the seed is sometimes injured. Since this treatment is rather difficult, it is suggested that when a grower has a considerable amount of loose smut in his crop he either obtain new seed known to be relatively free of loose smut or treat a small amount for a seed plot.

For information regarding the details of the hot-water treatment, write to the Department of Plant Pathology, College of Agriculture, Lincoln.

### Seed Corn Treatment

The organism causing smut of corn is carried from season to season in galls in old corn stalks (Fig. 7) and spreads to growing plants. The disease is not carried on the seed; therefore, seed treatments will not control this disease. Treatment of seed corn with certain chemicals may improve stands when seed that is infested with other organisms is planted.

### Construction of Treater

First cut all the parts shown in Figure 9. Nail up the mixing chute as shown, leaving the placing of the baffle boards until last. The sides *a* and *c* and door must overlap the front and back, *b* and *d*. Accurate cutting and placing of the baffles is of the very greatest importance. The upper edges of these are beveled to 45 degrees to fit snugly inside the chute. A 2-inch hole is bored in each baffle, 2 inches from the top of the longer side and  $\frac{3}{4}$  inch from the right-hand edge as one faces the longer side.

Baffle 1 (Fig. 9) is placed with its beveled edge against side *a*, 17½ inches from the top of the chute, with the hole under the opening that will be made by raising the trough. Baffle 2 is placed against side *b*, 24 inches from the top of the chute; 3 against side *d*, 36 inches from the top; and 5 against side *a*, 41½ inches from the top.

When the mixing chute is complete, study the way the proportioning trough will fit into it and how the two will fit together (Fig. 8). Nail up the trough, being careful to overlap the boards as shown. The two long side boards overlap the bottom board, and the two short beveled side boards overlap the long ones and rest on top of the bottom board. Finally, put the trough and chute together, pushing the trough clear in to the front of the chute so that no opening is left in the chute unless the trough is raised. The trough holds 2½ bushels and was designed to treat 2 bushels of grain at a time.

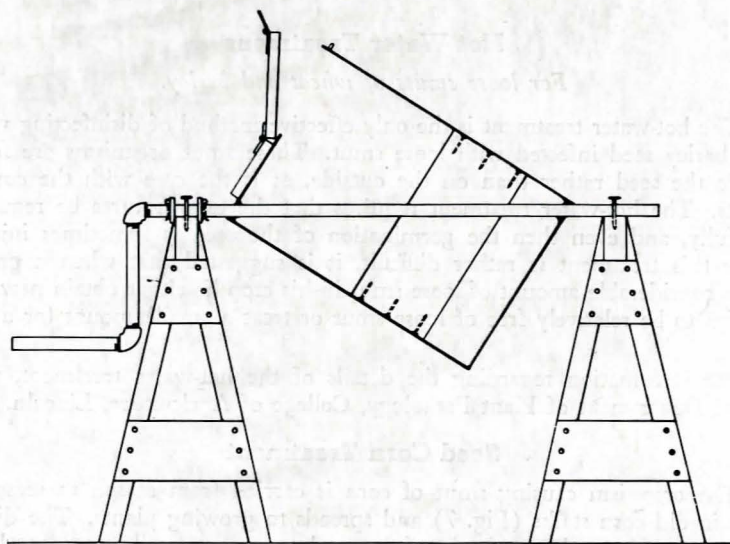


FIG. 10.—Oil-barrel treater.

### Seed Treatment of Cereals to Prevent Disease

<i>Crop</i>	<i>Disease</i>	<i>Treatment</i>
Wheat	Stinking smut or bunt	New Improved Ceresan Copper carbonate
	Loose smut	New seed preferable Hot water for the seed plot
	Scab and seedling blight	New Improved Ceresan
Oats	Covered and loose smuts	New Improved Ceresan Formaldehyde spray Formaldehyde sprinkle
	Covered smut	New Improved Ceresan
	Loose smut	New seed preferable Hot water for the seed plot
Barley	Scab and seedling blight	New Improved Ceresan
	Stripe disease	New Improved Ceresan
	Kernel smuts	New Improved Ceresan Copper carbonate