



SEED TREATMENT FOR SMALL GRAIN CROPS

Seed treatments for the control of plant diseases are of two types: Type I—those used mainly to kill disease-producing organisms present on the outside of the seed; and Type II—those used mainly to kill disease-producing organisms present within the seed. In either type, the fundamental requirement of a good treatment is that it must destroy the organisms but cause no injury to the seed itself. To obtain the best results from any treatment, the seed should first be thoroughly cleaned to get rid of broken seed, bits of straw and chaff, and as many as possible of the smut balls, or spore masses, that may be present among the seed.

TYPE I TREATMENTS

This type of treatment involves the application of a fungicide, either as a dust or in solution, to the seed. Some fungicides, such as the organic mercury dusts (Ceresan, Half-ounce Leytosan, etc.) not only disinfect the seed surface but also give the seed, when sown, considerable protection against the attack of soil-inhabiting organisms that may rot the seed or cause seedling blight.

Diseases Controlled

The chief diseases of small grain crops in Canada that can be effectively or largely controlled by seed treatments of Type I are, by crops, as follows:

Wheat—Bunt (stinking smut), seedling blight, seed rots.

Oats—Covered smut, loose smut, seedling blight, seed rots.

Barley—Covered smut, false loose (intermediate) smut, stripe, seedling blight, seed rots.

Rye—Seedling blight, seed rots.

Millet—Smut of fox-tail millets, smut of Panicum millets, seedling blight, seed rots.

Sorghum—Kernel smuts, seedling blight, seed rots.

Flax—Seedling blight, seed rots.

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Certain other diseases, such as leaf blotch of oats, spot blotch and net blotch of barley, stem smut of rye, and pasmo and browning of flax are partially controlled by treatment of this type.

Approved Treatments

No. 1—Ceresan Dust.—For small grain crops other than flax, the rate of application is one-half ounce per bushel of seed; for flax, the rate is one and one-half ounces per bushel (for seed to be sown in heavy soils) and one ounce per bushel (for seed to be sown in lighter soils). After treatment, the seed should stand uncovered or in sacks for 24 hours before it is sown. Seed may be treated two to three weeks in advance of sowing. The dust may be applied by means of an automatic machine or a home-made treater, or by the shovel method. Thorough mixing is necessary to ensure uniform coverage of all seeds.

No. 2—Half-ounce Leytosan Dust.—Rates and methods of application as in No. 1.

No. 3—Formaldehyde Sprinkle.—Mix one pound of formaldehyde with 30 gallons (or one pint with 40 gallons) of water. Thirty gallons of solution will treat between 30 and 40 bushels of seed. Spread the seed on a clean floor, sprinkle evenly, and shovel over. Re-sprinkle, and re-shovel until all the seed is uniformly moistened. Cover seed for at least four hours, or overnight, with clean sacks or canvas, and sow as soon as it will run freely through the drill. If sowing is delayed, shovel over seed once or twice a day, and sow as soon as possible. If seed is swollen, increase seeding rate proportionately. Do not allow moist seed to freeze, as the freezing will injure germination.

The above-mentioned solution may be applied by means of a pickling or an immersion machine.

No. 4—Ceresan Sprinkle.—The proportion of Ceresan dust to water is 8 ounces to 40 gallons. First mix the dust with a small quantity of warm water to form a paste, add the paste to the required amount of water, and stir thoroughly. The procedure then is as in the formaldehyde sprinkle method (see No. 3), except that the seed need not be covered after treatment.

No. 5—Half-ounce Leytosan Sprinkle.—Proportions, preparations, and direction as in No. 4.

No. 6—Arasan Dust.—Apply at the rate of 2 ounces per bushel by means of an automatic machine or home-made treater, or by the shovel method. Thorough mixing of seed and dust is essential.

Suitability of Treatments

Treatments of Type I differ in their suitability for use on seed of small grain crops. Some are more effective in controlling disease than others; some cause more seed injury than others; some are more easily applied than others. This is true of the six approved treatments mentioned above. Not all of them are suitable for certain crops. In Table 1 are listed, by crops and in the order of their suitability the treatments which have given the best results experimentally.

TABLE 1.—SUITABILITY OF APPROVED SEED TREATMENTS FOR INDIVIDUAL SMALL GRAIN CROPS

Crop	Order of suitability			
	1	2	3	4
Wheat.....	No. 1	No. 2	No. 4	No. 5
Oats.....	" 1	" 3	" 4	—
Barley.....	" 1	" 2	" 4	" 3
Rye.....	" 1	" 2	" 4	" 5
Millet.....	" 1	" 2	" 4	" 5
Sorghum.....	" 1	" 2	" 6	" 3
Flax.....	" 1	" 2	" 6	—

Proper Precautions Necessary

Most fungicides are poisonous, the organic mercury dusts (Ceresan, Half-ounce Leytosan, etc.) particularly so. The precautions given on the label of the fungicide container should be strictly observed. Persons treating grain with an organic mercury dust should wear a tight-fitting mask over the nose and mouth, and gloves on the hands—especially if cuts or other skin injuries are present on them. The treatment should be done out-of-doors, or between two open doors in a granary or shed. Seed treated with an organic mercury dust (or a solution of it) should not be sold for commercial purposes or fed to livestock.

TYPE II TREATMENTS

This type of treatment involves the raising of the temperature of the seed—usually by means of a hot-water bath—to a point sufficiently high to kill organisms within the seed but not high enough to injure the seed. The temperature range for treatment is therefore very narrow. Ordinarily, it is not advisable to treat large quantities of seed. About 5 bushels of grain will be sufficient to sow a good-sized seed plot, from which seed can be obtained for the following year. The hot-water treatment is of this type, and is used to control loose smut of wheat and loose smut of barley.

The Hot-water Treatment

Equipment Required.—(1) Three tanks—one for soaking the seed, one for warming it at 125° F., and one for the final bath. If only a few pounds of seed are to be treated, ordinary wash boilers will serve the purpose. Galvanized watering tanks are suitable for treating larger quantities at creameries or other places where steam is available. (2) Burlap sacks or loosely woven bags of any kind. (3) A reliable thermometer. A dairy thermometer will do, but it should first be compared with some standard thermometer. This might be done by your local doctor, or by your nearest University or Laboratory of Plant Pathology.

Treatment Procedure.—(1) Place seed—not more than one-quarter bushel—in each sack, and tie sacks at the top, leaving plenty of room to provide for swelling of seed. (2) Soak the sacks of seed in water at ordinary room temperature for four hours. Then remove sacks and allow them to drain. (3) Dip each sack for two minutes in water kept at 125° F. Then remove and dip

immediately in the final bath for 10 minutes: (a) For wheat, final bath temperature is 129° F. (limits: 128° to 130° F.); (b) for barley, it is 128° F. (limits: 127° to 129° F.). (4) Remove sack from final bath and dip for a minute in cold water. (5) Spread seed out in a thin layer to dry, and sow as soon as it will run through the drill. Increase seeding rate in proportion to the amount of swelling. If sowing is delayed, spread seed out to dry. Do not allow wet seed to freeze as the freezing will injure germination.

Seed Treatment Profitable

The treatment of seed grain should be regarded as a form of crop insurance that is available at a very low premium. A large proportion of the seed grain sown in Canada carries disease-producing organisms, or is damaged by threshing or weathering, in sufficient amount to make seed treatment necessary. The sowing of untreated diseased or damaged seed results in reduced stands and in waste not only of seed but also of labour and fertilizer. Compared with this loss the cost of treatment is trifling. Unless seed is known to be healthy and undamaged, treatment is recommended.

*Prepared by the Division of Botany and Plant Pathology,
Science Service, Dominion Department of Agriculture*

For further information on seed treatment, write to your nearest Dominion Laboratory of Plant Pathology, or to the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa.

The Hot-water Treatment

Equipment Required.—(1) Three tanks—one for soaking the seed, one for washing it at 125° F., and one for the final bath. If only a few pounds of seed are to be treated, ordinary wash boilers will serve the purpose. Commercial watering tanks are suitable for treating larger quantities in treatment or other places where means is available. (2) Burlap sacks or loosely woven bags of any kind. (3) A reliable thermometer. A daily thermometer will do, but it should first be compared with some standard thermometer. This might be done by your local doctor, or by your nearest University or Laboratory of Plant Pathology.

Treatment Procedure.—(1) Place seed—not more than one-quarter bushel—in each sack, and tie sacks at the top, leaving plenty of room to provide for swelling of seed. (2) Soak the sacks of seed in water at ordinary room temperature for four hours. Then remove sacks and allow them to drain.