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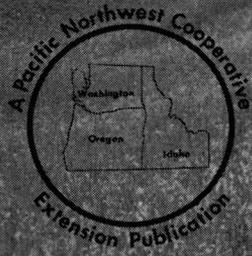
DOCUMENT
COLLECTION
OREGON
COLLECTION

Controlling

WHEAT SMUT



DISCARD



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CONTROLLING WHEAT SMUT

Thirty years ago American flour millers knew our Pacific Northwest as *the wheat smut center of the world*. As much as 50 per cent of all cars shipped graded smutty. Losses were high; millers and farmers alike demanded that something be done. Scientists and others interested in wheat went to work on the problem along with our farmers and millers.

In 1924 half our exported wheat was smutty. By 1942 testers found smut in only 2 per cent of all cars shipped. This was the all-time low point for smut damage. Since then smut has made a steady comeback in the Northwest. For the past six years, wheat inspectors have marked SMUT on more and more cars of Washington, Oregon, and Idaho wheat.

In 1948, 14 per cent of the cars graded smutty. *The wheat smut problem is back*. Farmers, scientists, and millers must once more go to work on it. Unless we do, losses will once more run high. We are still the potential wheat smut center.

Control pays

Smut control pays dividends in two ways. First, smut reduces wheat yields; thus a clean field produces more bushels of grain than a smutty field. Second, smutty wheat is subject to a weight discount or dockage at the elevator; so clean wheat is worth more per bushel than smutty wheat. FOR EXAMPLE: A field which should yield 25 bushels was found to yield only 22½ because 10 per cent of the heads were smutty.

	Price (\$2 per bushel)	
Loss in yield per acre (10%)	2½ bushels	\$5.00
Dockage at elevator (2%)	.45 bushel	.90
Cleaning charge (1% smut)		.68
		<hr/>
	<i>Total loss per acre</i>	\$6.58

The cost of seed treatment with dust or slurry would be about 10 cents an acre. *In this case, spending 10 cents would save \$6.48.*

How wheat plants grow

To understand smut and the way in which it lives on a wheat plant, we must first have an idea of how the wheat plant grows. When you plant a wheat grain in the fall, it begins to absorb moisture from the soil. Down in one end of the wheat kernel is a young wheat plant which we call the germ and which is ready to start growing. Most of the wheat grain is starch. In the layer of cells between the germ and the starch is a substance which we call an enzyme. As the wheat grain takes on water, it begins to make large amounts of this enzyme. The enzyme changes the starch to sugar, and the young plant uses this sugar to grow.

When the plant starts growing, it sends a main root down into the soil to get more water and mineral elements. At the same time a young sprout comes up above the soil. As soon as daylight strikes it, the sprout turns green and starts making more sugar. This process is rather complicated, but we know that if a plant can have sunlight, water from the soil, carbon dioxide from the air, together with green coloring matter in the leaves, it can manufacture sugar. As fast as it produces sugar, it uses this food to grow more leaves. Gradually the growing plant builds up a factory which turns out sugar.

The wheat plant goes through the winter and into the next spring in this stage. In the spring, the plant begins to grow. When this stem reaches its full height, the wheat plant's sugar factory is complete. It needs no more leaves and all the sugar it makes goes into the grain in the head. When these grains are full of starch made from the sugar sent to the head, growth is complete. After this, the factory is no longer needed. It turns yellow and, if not harvested, falls back to the ground.

The life cycle of the wheat plant is now complete.

How wheat smut grows

Smut is a plant, too, although it is a low form of plant life. It has no leaves, and it doesn't produce green coloring matter. A lazy plant, it allows the wheat to produce all its food.

Smut has a seed which we call a spore and which germinates at the same time as does the wheat seed. Instead of sending a root into the soil, smut goes into the wheat plant. Tiny white threads which correspond to roots draw moisture and sugar out of the wheat cells. Smut does not kill the wheat plant, and the two forms of plant life get along rather well together at this stage.

You can't tell by merely looking at the wheat plant whether there is a smut plant inside. When the wheat sends up its stem topped by a head, the smut goes along. It doesn't produce a stem of its own but uses the wheat stem.

Smut does have to do one thing for itself. Like the wheat plant, it must produce seeds or spores to carry it over the dormant period. These spores form what we know as smut balls on the head of the wheat where the grain should be.

SMUT SEEDS
WHERE WHEAT SEEDS
SHOULD BE.



SMUT PLANT INSIDE
WHEAT PLANT.



The red line indicates the path
of the smut up through the
wheat plant.

Smuffy Plant

When ripe, these smut balls break open to release a mass of black dust made up of smut seeds or spores which fall on the soil or fasten themselves to wheat kernels. When the wheat is planted again, these smut spores germinate with the wheat seeds, and their life cycle is complete.

Common or bunt smut

To control common smut we must attack the smut plant at the weakest point of its life cycle. We know that when the smut plant is inside the seedling, we cannot kill it unless we also kill the wheat seedling. We can't prevent the smut plant from going into the wheat head and taking the place of wheat kernels. But we can poison smut seeds on the grain before we plant it or before it germinates. That is why we treat our seed wheat. A coating of chemical on the seed either kills the smut seeds by contact or by a gaseous vapor that is poisonous to them.

You can control common smut by treating the seed with any one of several commercial products or chemicals. We use these materials to control common smut on the seed wheat:

<i>Fungicide</i>	<i>Amount per bushel to apply</i>
1. New Improved Ceresan	1/2 ounce*
2. Ceresan M	1/2 ounce*
3. Copper Carbonate (50%) ..	3 ounces for winter wheat 2 ounces for spring wheat
4. Basic Copper Sulfate	3 ounces for winter wheat 2 ounces for spring wheat

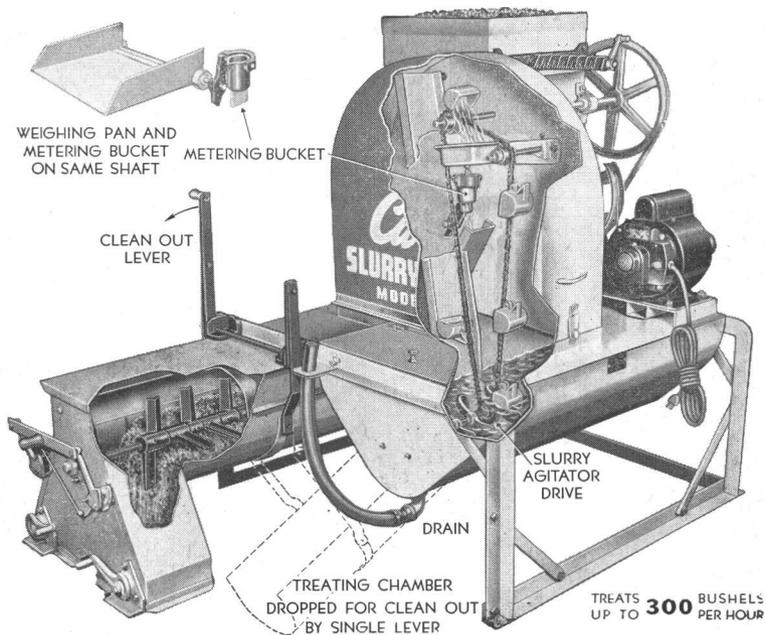
All of these are dust treatments. You can also use Ceresan M as a slurry or wet treatment. Manufacturers furnish complete instructions with the chemicals. Follow these directions carefully. Your crop may depend on them.

* In Oregon, one ounce per bushel is recommended when it is necessary to plant heavily smut-infested seed or susceptible varieties.

The Ceresan treatments act as both dusts and gases. So you can expect good control only by holding the treated seed in a covered pile or in sacks for at least 24 hours after you have applied Ceresan. This is not necessary when you treat with copper dust. You can plant the copper-treated seed immediately following treatment.

One bad feature of the dry-seed treatments is the poisonous effect the chemical dusts have on persons who apply them. These dusts may cause respiratory troubles, nausea, and skin irritations. Avoid respiratory troubles and nausea by wearing a mask. You can prevent skin irritation only by avoiding contact with the dust or its fumes. *Persons subject to this type of reaction should not do seed treating.*

Do not feed seed wheat to farm animals after you have treated it with Ceresan. No amount of diluting the treated wheat will make it safe for your livestock. Treat only enough



A slurry-treating machine.

seed for your use or sell it to a neighbor who needs treated seed. Do not sell any treated wheat without making sure that the buyer knows that it is treated.

The slurry treatment is a recent development in seed-treating methods. It does away with dust so that you do not inhale the chemicals when treating. With this method you can apply the fungicide mixed with water without making the seed too wet to plant. But you'll need a specially designed machine and a wettable fungicide, such as Ceresan M. You can immediately sack or store treated seed in bins as it will not absorb enough moisture from the treatment to injure it. Hold all seed wheat at least 24 hours after you have treated it with a Ceresan M slurry. Do not plant it sooner than that after treating.

Remember, always treat the seed of a resistant variety as well as that of susceptible varieties. There are two reasons for this:

1. There are many varieties of smut, and no wheat variety is completely resistant to all of them.
2. We must prevent the development, increase, and spread of new types of smut which may grow out of older types at any time.

Consult your county extension agent. He can give you the names of elevators or local men who treat seed.

Dwarf smut (sucker smut or stubble smut)

Dwarf smut occurs only in winter wheat. It is found in Washington and Idaho, but is reported in only one section of Oregon. It stunts the wheat plant one-fourth to one-half. Wheat infected with dwarf smut is likely to stool out much more than healthy plants, especially in hard red winter varieties.

Spores of dwarf smut on the wheat seed will not germinate and infect the wheat seedling. Spores of this type of smut must remain in the soil for a year before they germinate and infect young wheat plants. *Seed treatment has no effect on dwarf smut. Dwarf smut is controlled only by growing resistant varieties or by shifting from winter to spring wheat where this is practical.*

Resistant varieties

Some wheat varieties are much less easily infected by smut than others. These varieties are said to be *resistant*. A few varieties are resistant to both common smut and dwarf smut. Others are resistant to one but not the other. There are known to be many different races or strains of common smut, and some wheat varieties are resistant to some of these races and susceptible, not resistant, to others.

The following list shows the wheat varieties now most commonly grown in the Northwest and indicates their resistance and susceptibility to both common smut and dwarf smut.

VARIETY	CLASS	REACTION TO	
		Common Smut	Dwarf Smut
Turkey	Hard Red Winter	Susceptible	Susceptible
Rio	Hard Red Winter	Resistant	Susceptible
Ridit	Hard Red Winter	Resistant	Susceptible
Wasatch	Hard Red Winter	Resistant	Resistant
Hymar	White Club	Resistant	Resistant
Elgin-Alicel	White Club	Susceptible	Susceptible
Triplet	Soft Red	Susceptible	Susceptible
Golden	Common White	Susceptible	Susceptible
Requa	Common White	Susceptible	Unknown
Rex	Common White	Resistant	Resistant
Fortyfold (Eichmeyer)	Common White	Susceptible	Susceptible
New Victory	Common White	Susceptible	Susceptible
Orfed (Fall-sown)	Common White	Resistant	Susceptible
Orfed (Spring-sown)	Common White	Resistant	Resistant
Federation (Fall-sown)	Common White	Susceptible	Susceptible
Federation (Spring-sown)	Common White	Susceptible	Resistant
Marfed (Fall-sown)	Common White	Resistant	Susceptible
Marfed (Spring-sown)	Common White	Resistant	Resistant
Idaed (Spring)	Common White	Susceptible	Resistant
Elmar	White Club	Resistant	Resistant
Brevor	Common White	Resistant	Susceptible

Other ways to control smut

Wheat smut grows best in temperatures of 40 to 50 degrees. If you seed when the temperature is either too high or too low for the smut to grow, you can reduce the amount of smut infection. The date you choose to seed can be important in controlling smut. This is especially true where smut seeds are already in the soil.

A SMUT CONTROL PROGRAM

1. Clean and treat all seed wheat.
2. Plant smut-resistant wheat varieties wherever such varieties with suitable milling quality are available.
3. Where soil is so contaminated with common smut that seed treatment alone is not sufficient, grow only resistant varieties.
4. Where dwarf smut is severe and a suitable resistant winter wheat variety cannot be obtained, grow spring wheat.

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