The Stinking Smut of Wheat
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EAST LANSING

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STINKING SMUT VERSUS HEALTHY

THE STINKING SMUT OF WHEAT

Wheat in many sections of Michigan has been injured by Stinking Smut. This disease may make a field of fine promise produce only a low-grade, ill-smelling crop, which without expensive washing and scrubbing is unfit for human food. From an investigation into the actual condition in every county in the state, it is found that Stinking Smut wastes at least 5 percent of the wheat crop of Michigan. Fields with 10, 25, 30, and even 70 percent of the heads smutted are not uncommon. This circular tells the cause of this disease and how to fight it.

HOW TO KNOW THE DISEASE.

As his wheat ripens, the farmer notices certain heads which are of dark-green or slate-green color and which have a different shape from the normal grain. The kernels in these heads are light and puffy and are filled with a brown or black powder. Such diseased stalks are not so tall as the healthy ones and they may be markedly dwarfed,—"Low Stinking Smut." The smutted kernels have a vile odor, like that of a rotted fish. Sometimes a field is so smutty that one can smell it from the road. Threshing such a field is a job no one wants. Smut rises from the thresher in clouds endangering fields—for smut can persist in the soil until seeding time if not longer. It is evident that the thresher having handled smutty grain carries smut with it to the next batch of grain. Similarly the cleaner once loaded with smut becomes a source of contamination.

Although most of the smut balls which are formed in the heads in place of the kernels break in threshing, thus dusting the grain with the sooty, black powder, some persist and can be found in the threshed grain. The amount may vary from a trace to 1, 2, or 5 percent. The characteristic fishy odor can be detected in such grain. Badly smutted wheat is not bright red or golden color, but dull and oft-times sooty, especially at the "brush" end.

This is Stinking Smut or Bunt which every farmer rightly fears.

THE CAUSE OF THE DISEASE.

Stinking Smut of wheat is caused by a parasitic fungus which enters the grain at sprouting time and grows inside of the young plant, keeping pace with its growth, unseen and unsuspected until the wheat begins to head. Then the smut fungus enters the developing kernel and produces in place of the normal grain its own kind of fruit, the black smut powder already mentioned. Under the microscope this powder is seen to be made of minute, spherical grains, so small that one smutted kernel may contain 5,000,000 of them. These are the "seed" of the smut, which, dusted upon the wheat grow when the wheat germinates, bore into the tender sprout and thus start the smut on the next year's crop. This life story is repeated year after year and it is evident that with each crop the smut gets worse. A field with little smut one year may be heavily smutted the next so great is the power of this fungus to increase. It is also clear that the sprouting time is the danger time for the wheat. Poor growing conditions,—cold, wet seasons such as that of October, 1917—which cause the wheat to start slowly, give the smut a greater chance to get into the wheat sprouts.

THE CONTROL OF STINKING SMUT.

Stinking Smut control is based upon this fact, that the smut enters the wheat at sprouting time. In fighting smut, the attempt is made to kill the smut "seed" on the wheat before it gets into the sprout. For this purpose, a chemical treatment is employed, which when properly

applied does not injure the grain but kills the smut bodies. For years, plant pathologists have recommended soaking the grain in tubs of dilute formaldehyde, 1 pint to 40 gallons of water, skimming off the floating smut balls, covering the grain for 2 hours, drying and planting. Many farmers have taken advantage of this method and have protected their wheat crop. But we can not deny that the great majority of farmers have felt that this process took too much time and have neglected treatment. Millers and elevator men have stated that only a few men in a community were treating their grain.

It was found that fairly clean grain, carefully fanned, if sprinkled with Formaldehyde, diluted 1 pint to 40 gallons of water, covered 2 hours and then dried would give a crop practically free from smut. This is one of the methods recommended on page 4 of this circular. It is simple, cheap and easy.

APPLYING CONCENTRATED FORMALDEHYDE TO GRAIN

The farmers of Kent county put into practice a still simpler method for seed treatment of wheat. This is the concentrated treatment which has been almost universally adopted in this state for Oat Smut control.

Its great simplicity, however, has led some farmers to use the treatment carelessly with the consequence that damage to grain has resulted. The directions this year are hedged round with cautions in order to impress farmers—not with the danger of treatment—but with the necessity of strict adherence to the rules given for treatment. The world seems to full of people who always double the dose that the doctor orders, working on the principle that if a little is good, a whole lot is better. Both methods outlined are as strong as is advisable to use on wheat and safety lies in strict compliance.

FORMALDEHYDE.

The chemical as sold commercially by honest dealers is a clear, strong-smelling liquid which contains from 36 to 40 percent of formaldehyde gas. This gas has a marked affinity for water. It can not be driven out of solution by boiling. When sprayed upon grain it is largely deposited in the stable form and airs very slowly. Planting, if done immediately will take the place of airing, the soil taking up the chemical greedily. Formaldehyde shows a sort of cumulative action on grain. It is the persistence of Formaldehyde and the continued action which makes it unwise to hold grain any length of time after treatment. We have looked upon Formaldehyde as a gas which was hard to confine and which would air readily. We must rather look upon it as a compound which tends to become stable and which airs sluggishly under any but warm, dry conditions.

Formaldehyde is a powerful disinfectant and it is safe to predict that future experiments will lead to *lessening of the amounts to be used and to shortening of the time of covering* rather than to the reverse.

METHODS FOR THE CONTROL OF SMUT.

Secure clean grain of good variety.
Fan thoroughly to remove all light, shrivelled grains and smut balls.
Treat by one of the following methods and **plant at once.**
Do not treat more than you can plant in any one day.

DILUTE FORMALDEHYDE METHOD.

Sprinkle the grain until thoroughly wet with solution of 1 pint of Formaldehyde to 40 gallons of water.

Cover with blankets or sacks for 2 hours.

Spread out thinly to dry and sow within 12 hours.

Formaldehyde treatments are necessary for crop protection but they must be given carefully and with scrupulous attention to directions.

Allow for the swollen condition of the grain.

CONCENTRATED FORMALDEHYDE METHOD.

The convenience of this method is its chief advantage. Only those who will follow directions carefully should employ it since considerable loss resulted during the past season through improper handling.

Apply Formaldehyde, full strength, with hand sprayer while the grain is being shoveled over and over. Use at the rate of 1 pint to 50 bushels, ½ pint to 25 bushels, ⅕ pint to 10 bushels, etc. A dose is a dose—this is as strong as Formaldehyde can safely be used on wheat.

Cover the grain 4 hours—absolutely no longer. Then spread to air in a warm, dry place for an hour or two. It is unsafe to leave grain covered or sacked over night. Formaldehyde cannot be thoroughly aired out of grain. **Therefore plant at once.** Treat no more grain than can be sown the same day.

CAUTIONS.

Treat carefully, no stronger than is recommended.

Cover no longer than is indicated. Plant at once.

Prepared by G. H. Coons of the Botanical Department of the Michigan Agricultural College.