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Treatment of Smuts and Rusts

D.A. Saunders
South Dakota Agricultural College

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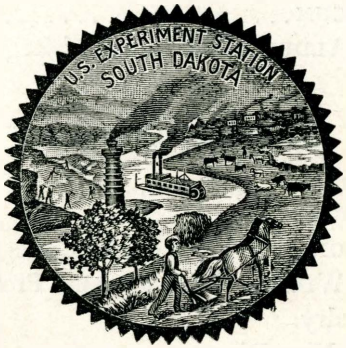

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SMUTS AND RUSTS.

Department of Botany.

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TREATMENT OF SMUTS AND RUSTS.

D. A. SAUNDERS.

Many inquiries have recently been received with reference to the treatment of seed-grains for Smut and Rust. The most recent treatments are given with a few notes on the microscopic structure and the method of growth.

SMUT.

Smut is a disease transmitted from one generation of plants to another by means of minute spores. At threshing time the smut, which consists of myriads of spores, is scattered through the grain, the spore germinating the following spring along with the young wheat plant and, penetrating the young seedling, lives in the interior of the plant until it heads. At this time the Smut enters the seed, absorbs its contents and developes a mass of spores. The most effective, cheapest and handiest methods of treating the seed wheat are the Jensen Hot Water treatment and the Formaldehyde treatment.

The Jensen or Hot Water Treatment for Oat and Wheat Smut.—This method, discovered by J. L. Jensen, of Denmark, in 1887, consists in immersing the seed which is supposed to be infected with Smut for a few minutes in hot water. The temperature must be such as to kill the Smut spores, and the immersion must not be prolonged so that the heat would injure the germinative power of the seed. If the water is at a temperature of 132½ degrees F., the spores will be killed, and yet the immersion, if not continued beyond fifteen minutes, will not in the least injure the seed. The temperature must be allowed to vary but

little from 132½ degrees, in no case rising higher than 135 degrees, or falling below 130 degrees. To insure these conditions when treating large quantities of seed, the following suggestions are offered:

"Provide two large vessels—as two kettles over a fire, or boilers on a cook-stove, the first containing hot water, (132½ degrees).

"The first is for the purpose of warming the seed preparatory to dipping it into the second. Unless this precaution is taken it will be difficult to keep the water in the second vessel at the proper temperature.

"The seed which is to be treated must be placed, a half bushel or more at a time, in a closed vessel that will allow free entrance and exit of water on all sides. For this purpose a bushel basket made of heavy wire could be used, within which spread wire netting, say twelve meshes to the inch, or an iron frame could be made at a trifling cost, over which the wire netting could be stretched. This would allow the water to pass freely and yet prevent the passage of the seed. A sack made of loosely woven mat rial (as gunny sack) could perhaps be used instead of the wire basket. A perforated tin vessel is in some respects preferable to any of the above

"Now dip the basket of seed in the first vessel; after a moment lift it, and, when the water has for the most part escaped, plunge it into the water again repeating the operation several times. The object of the lifting and plunging, to which should be added also a rotary motion, is to bring every grain in contact with the hot water. Less than a minute is required for this preparatory treatment, after which plunge the basket of seed into the second vessel. If the thermometer indicates that the temperature of the water is falling, pour in hot water until it is elevated to 132½ degrees. If it should rise higher than 132 degrees, add small quantities of cold water. This will doubtless be the most simple method of keeping the proper temperature and requires only the

addition of two small vessels, one for cold and one for boiling water.

(Steam, conducted into the second vessel by a pipe provided with a stop cock, answers even better, both for heating the water and elevating the temperature from time to time.)

"The basket of seed should, very shortly after its immersion, be lifted and then plunged and agitated in the manner described above; and the operation should be repeated eight or ten times during the immersion, which should be continued fifteen minutes. In this way every portion of the seed will be subjected to the action of the hot water. Immediately after its removal dash cold water over it or plunge it into a vessel of cold water and then spread out to dry. Another portion can be treated similarly, and so on until all the seed has been disinfected. Before thoroughly dry the seed can be sown; but it may be thoroughly dried and stored if desired.

"The important precautions to be taken are as follows: (1.) Maintain the proper temperature of the water (132½ degrees F.), in no case allowing it to rise higher than 135 degrees or to fall below 130 degrees. This will not be difficult to do if a reliable thermometer is used and hot or cold water may be dipped into the vessel as the falling or rising temperature demands. Immersion fifteen minutes will not then injure the seed. (2.) See that the volume of hot water is much greater (at least six or eight times) than that of the seed treated at any one time. (3.) Never fill the basket or sack containing the seed entirely full, but always leave room for the grain to move about freely. (4.) Leave the seed in the second vessel of water fifteen minutes."

The Hot Water Treatment for Oats.—"The foregoing method is applicable to both wheat and oats. With oats the following slight modifications are probably advantageous: (1.) Have the water in the second vessel 143½ degrees F. and immerse the seed five minutes, cooling with cold water afterwards. Where large amounts of seed are to

be treated this will prove the most speedy form of the treatment, but great care must be taken to see that every grain is thoroughly wetted. (2.) Have the water in the second vessel at 132½ degrees F.; immerse the seed ten minutes and do not cool with cold water, but spread out at once to dry. This last is no doubt the best form of the Jensen treatment for oats, since it requires a shorter time than the regular method and the warmth of the grain aids materially in drying. Moreover, experiments have shown that seed treated in this way yields the most grain and straw. Neither of these modifications can be recommended for wheat without more data than we now possess.

Formaldehyde Treatment.—Two methods of applying the Formaldehyde are in general use, *Sprinkling and Dipping*, both of which have their advantages, but the former is to be preferred

Sprinkling.—Windrows or piles of a bushel of seed are thoroughly saturated with a solution made at the rate of one pound Formaldehyde to fifty gallons of water. A common garden sprinkler may be very satisfactorily used or even a broom, though a small hand force pump is to be preferred. The grain should be shoveled over and thoroughly wet for at least two hours.

Dipping.—A bushel or more of grain is placed in a gunny sack and is dipped into a solution of Formaldehyde, the same strength as that given above. Care should be exercised that the grain is thoroughly saturated.

RUSTS.

The spores that continue this disease from one season to another live over the winter in the straw and stubble, and, consequently, any treatment applied to the seed would be useless.

Treatment.—Many different remedies have been tried but, so far none have been found that are effective. The straw

should be burned soon after threshing and where possible the stubble. Some varieties of wheat are more resistant to rust than others. These varieties should be chosen for seed.

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*Formaln or Formalose may be obtained of any druggist at $1.00 per pound.