

South Dakota State University

Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange

SDSU Extension Special Circulars

SDSU Extension

2-1-1935

Smuts of Small Grain and Their Control

B. R. Fenn

William J. Leary

Follow this and additional works at: https://openprairie.sdstate.edu/extension_special-circ

Recommended Citation

Fenn, B. R. and Leary, William J., "Smuts of Small Grain and Their Control" (1935). *SDSU Extension Special Circulars*. 34.

https://openprairie.sdstate.edu/extension_special-circ/34

This Other is brought to you for free and open access by the SDSU Extension at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in SDSU Extension Special Circulars by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



For current policies and practices, contact SDSU Extension

Website: extension.sdstate.edu

Phone: 605-688-4792

Email: sdsu.extension@sdstate.edu

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture.

THIS BOOK DOES
NOT CIRCULATE

Special Extension
Circular No. 44

February 1935

SMUTS OF SMALL GRAIN AND THEIR CONTROL
B. R. Fenn and William J. Leary

There are diseases of small grain in South Dakota which under normal crop conditions cause serious losses. The losses occur not only from reduced yields but also from production of low quality grain.

Some of the diseases of small grain can be easily controlled while others cannot. It is the purpose of this circular to discuss the smuts and barley stripe and their control. These can be controlled by seed treatment.

This year much seed is being shipped into the state. More seed treatment will have to be done if smut and diseases are to be prevented from further spreading over the state. An extensive seed treatment program now will check the spread and result in benefits not only to the current crop but will prove an economy by preventing establishment of the diseases which later would be very costly to eradicate.

Smut Causes Losses

On South Dakota grain shipments to market, losses due to smut have been heavy. Discounts have ranged from five cents a bushel where a trace of smut was present to as much as fifteen cents a bushel on abnormal amounts. Smut has cost South Dakota farmers dollars that could be saved by proper seed treatment. These losses are on the quality of grain alone but consideration should also be given to loss in yield. Due to the difficulty in determining reduced yields, such losses are often overlooked. This is particularly true for barley and oats which normally are feed or crops. However, tests have shown that losses from reduced yield are often greater than losses from production of low quality grain due to diseases. Because of these facts annual seed treatment is advisable.

Smuts of Wheat

1. Stinking Smut or Blunt: This disease of wheat occurs both in the spring and winter wheats. It may easily be found in the seed grain, if present, by the grayish brown smut balls which when broken open reveal a black powder. Another test is the decayed odor of the grain resembling that of dead fish. Discount for stinking smut is quite heavy because flour made from such wheat is tainted.

THIS BOOK DOES
NOT CIRCULATE

Cooperative Extension Work, U. S. Department of Agriculture and South Dakota State College cooperating. Distributed in furtherance of Acts of Congress of May 8 and June 30, 1914. A. M. Eberle, Director.

630.732
S 87.18
44

S.D.S.C. LIBRARY

Stinking smut is a disease of the grain head and can easily be found in fields before harvest. The diseased heads have a dull green color and the outer sheaf or glume tends to open more than on the normal head. Upon examination one finds the smut ball instead of a kernel of grain. Stinking smut is controlled by thorough cleaning of the grain, taking out the smut balls, and treating the seed with a recommended treatment.

2. Loose Smut of Wheat: Loose smut of wheat appears about harvest time or before. As the grain ripens the little spores of smut shatter and infect other grain heads, leaving only a bare stalk at harvest time. The little spores develop at once on the newly infected grain and live in a dormant stage over winter in the seed grain. As the grain develops the following spring the smut develops also, again replacing the normal grain of the head. This particular kind of smut is controlled only by the hot water method.

Smuts of Oats

Covered and loose smut in oats are the two kinds generally present, but for all practical purposes they are much the same. The degree of damage is dependent on the amount of infection carried on the seed and the condition of the soil as to temperature and moisture at seeding time. With low temperatures and moist soil one may expect heavier infection of the kernels by the smut parasite. The smut must be on the seed in order that the disease can continue from one year to the next. The smut appears in the field before harvest, ripens and is scattered to the uninfected heads by the wind. Only a bare stem is often found at harvest time. The smuts of oats are easily controlled by seed treatment.

Smuts and Stripe of Barley

1. Covered Smut: In barley we have covered smut as in other grains. It is perhaps first noticed in the field by the brown or blackish heads which contain smut kernels instead of grain, each kernel or ball of smut having a thin grayish covering. This covered smut is not easily scattered by wind. The greatest infection of good seed comes at threshing time when the smut balls are broken and spread through the grain. In threshed grain if this smut is present it can readily be detected by the presence of smut balls. Covered smut of barley is easily controlled by seed treatment.

2. Loose Smut: Loose smut of barley is of two kinds, namely, black and brown. Both make their first noticeable appearance about the time the grain is heading, displacing grains that would normally develop. These smut spores, that have displaced the grain are scattered by the wind to healthy flowers and infect the developing seed. The disease is then carried internally by these newly infected kernels and the next spring they grow with the plant and infect more healthy plants at flowering time. A plant that has spread these spores can readily be seen at harvest time for the spores that had displaced the head of grain have now been blown away and only the bare stem, or rachis, remains.

One distinguishing characteristic between the two kinds of loose smut is color. While it is difficult to tell the actual difference in color between brown or black loose smut, it is important that such a difference be noted. Black loose smut can be controlled by either formaldehyde or Ceresan while these treatments are not effective in controlling brown loose smut. The best control for brown loose smut is using seed from a disease-free field or seed plot. A disease-free seed plot may be maintained by using the "hot water treatment" mentioned later.

3. Barley Stripe: Stripe is often confused with blight. It appears as long, yellowish stripes on the leaves and stems of plants, which produce either badly shriveled heads or no grain at all. In advanced stages the diseased plants become dull with dark grayish stripes and occasionally the plants are so badly infected that they die, reducing the stand. Soil condition has considerable to do with the development of stripe in barley. When the soil is cold at germination time stripe develops more rapidly. However, it is not an important disease in South Dakota though it does appear in some parts of the state. This disease is prevented by treating seed with Ceresan.

Seedling Blights: A number of seedling blights are known to exist in this state. However, damage is relatively small from this disease. Blights are not completely controlled by seed treatment, but often the amount of infection is considerably reduced. A stronger stand and slight increase in yield usually results when blights are checked by seed treatment. Occasionally a field is found where loss is heavy due to seedling blight. Some sections of the state are affected and for that reason blights are mentioned here. Ceresan is the only treatment effective on seedling blights.

Seed Grain Treatments

Several seed treating disinfectants are on the market at the present time. In the past few years the U. S. Department of Agriculture and various state experiment stations have tested many disinfectants of seed grain. This information shows that three treating chemicals stand out above the rest in controlling many diseases and greatly reducing damage by others. Many other chemicals proved less satisfactory while several others are of no value. Three chemicals will be recommended in South Dakota because of the results obtained.

Formaldehyde

Formaldehyde has been a standard treatment for many years. Farmers are generally more familiar with this treatment than with some of the newer chemicals and it is used to a greater extent in South Dakota. However, formaldehyde is less desirable than dust treatments because of possible injury to seed germination even though the cost per bushel is much less. Formaldehyde is usually spoken of as a "wet" treatment although there is a formaldehyde dust that can be used. Formaldehyde dust is expensive, costing not only considerably more per bushel than formaldehyde for the "wet" treatment but also more than the other recommended dust treatments such as copper carbonate and Ceresan.

Formaldehyde "wet" treatment is applied in various ways. The sprinkle method is the common and recommended way. One pint (lb.) of formaldehyde is mixed with 40 gallons of water. The solution is sprinkled on well cleaned grain at the rate of about one gallon per bushel of grain. The grain is shoveled over and over while sprinkling. When thoroughly wet the grain should be covered from four to eight hours or over night to allow the fumes to destroy smut spores. Sow the seed while damp, preferably the following day, and in moist soil. Injury to seed germination will result if grain treated with formaldehyde is sown in dry soil.

The following are some of the more common mistakes made in treating with formaldehyde:

1. Farmers fail to remove all smut balls from seed grain before treating. Smut balls break open in later handling after treating and the seed becomes re-infected with smut spores. Seed should be well cleaned before treating.
2. Using too weak a solution of formaldehyde, thereby giving ineffective treatment.
3. Using too strong a solution of formaldehyde, thereby injuring germination.
4. Treating and then seeding immediately. No chance for formaldehyde to act.
5. Failure to use standard formaldehyde of commercial grade containing 37 to 40 per cent solution. Fresh chemical free from cloudiness is recommended.
6. Failure to cover grain after treating from four to eight hours, or over night, so that formaldehyde fumes have time to act on the smut.
7. Failure to increase seeding rate. Kernels swell considerably when using "wet" treatment. Drill should be opened accordingly.
8. Failure to seed treated grain within 24 hours after treatment. Unless seed grain is sown the day following treatment serious reductions in stands may result. Formaldehyde treated grain should be sown in moist soil where immediate germination will result.

Copper Carbonate for Wheat

Copper carbonate is recommended only for the control of stinking smut (bunt) of wheat.

Wheat may be treated any time during the winter or early spring and left until seeding time without any injury to the germination. The actual disinfection of the wheat comes after the grain is in the moist soil. Water from the soil unites with the copper carbonate, forming a film about the kernel of wheat, copper carbonate acting on the smut spores at this time.

The dust must be thoroughly mixed with seed by the use of either home-made or manufactured machines. Gas barrels, oil drums, old churns or large milk cans are some of the home-made machines that have been satisfactory. By bolting a paddle or baffle on the inside a much better job of mixing results. Factory built machines usually treat faster and more conveniently than home-made machines.

Two grades of copper carbonate are sold, containing 20 per cent metallic copper and the other 50 per cent. Both grades produce satisfactory results but with the former, three ounces per bushel are used while with the latter only two ounces per bushel are necessary.

In damp weather farmers experience some difficulty when using copper carbonate. The dust collects in the bottom of the drill and causes damage to the drill by "setting". To avoid any damage, a wrench should be used to loosen the feed shaft each time before sowing is begun. Occasionally the metal parts of the drill box become corroded. This can be prevented to some extent by emptying the drill box after seeding is completed and covering the metal parts of drill box with used crank case oil.

The following mistakes are made when treating with copper carbonate:

1. Failure to use gas mask when treating with this dust. If no mask is available treat in the open air or use a wet handkerchief.
2. Farmers frequently inhale dust while pouring grain into drill box. Keep from breathing dust if possible.
3. Failure to loosen feed shaft, thereby damaging the drill. Use wrench to loosen shaft before seeding is begun.
4. Failure to remove treated grain from drill box after seeding is completed. Copper carbonate is poison and there may be a loss of livestock and poultry.
5. Failure to use enough dust to cover each kernel. Ineffective treatment results.
6. Failure to thoroughly mix dust with grain. Each kernel must be well covered.

Ceresan

The New Improved Ceresan, a 5 per cent ethyl mercury phosphate dust, has recently been placed on the market. Tests prove it is an efficient treating chemical when used at the rate of one half ounce per bushel. Being a dust treatment there is no need to adjust seeding rate as is necessary with "wet" treatments that swell the grain.

When applied to the grain by a rotary method there is no disagreeable dust in the air. Several machines on the market do an excellent job of mixing Ceresan with the grain. It is not necessary to cover each kernel with the dust as is the case with copper carbonate but it is wise to mix the dust as well as possible.

Treating grain in the drill box cannot be satisfactory. When using new improved Ceresan, grain must be treated at least 10 hours before seeding and can be treated three or four weeks before seeding if desired. It must be kept in mind that the gaseous fumes really do the work of killing smut spores and other diseases. This reaction starts immediately following treatment and grain so treated should be stored in open sacks or piled in a bin and left uncovered. In order to get the best results, follow carefully the directions on the container, being sure not to use too much dust.

Seed treated with more than one half ounce Ceresan per bushel or seed which is stored for too long a time after treating may be injured by the chemical.

All smut balls must be removed before treating to obtain effective results. If not they break open in later handling and re-infect the grain.

Treated grain should not be used for feed.

Hot Water Treatment*

Hot water treatment is recommended only for loose smut of wheat and barley. These two kinds of smut are both seed borne diseases and the smut spores are usually beneath the kernel covering. For that reason ordinary seed treating chemicals do not affect the smut.

The "hot water treatment" requires very careful work and is a long, tedious process. It is recommended only for treating grain for seed plots. In this way grain free of loose smut can be obtained for the next year.

It consists of the following procedure: The wheat or barley is placed in sacks filled only half full and soaked five to seven hours in water at room temperature. Three vats of water are used. The second vat is maintained at a treating temperature of about 125 degrees with a possible range of 124-129 degrees. After the seed has soaked in the first vat five to seven hours it is transferred to the second vat, kept immersed and moving about for 13 minutes. At the end of this time the sack of grain is placed in the third vat of cold water to stop the action of heat. After a short time the grain is taken from the third vat and spread out to dry in order to regain its normal size; or it can be planted while damp, at an increased rate of seeding.

Care should be taken to avoid freezing of grain while damp, as germination will be injured.

*Note: The "hot water treatment" is not a recommended treatment for seed grain other than for seed plots. It is placed in this circular for the agent's in case questions arise concerning its use.

This treatment is not recommended when large amounts of grain are to be treated. It is suggested that grain free from loose smut be purchased or only enough to produce seed for the next year be treated.

RECOMMENDED TREATMENTS FOR SMALL GRAIN DISEASES

<u>WHEAT</u>	FORMALDEHYDE	COPPER CARBONATE	CERESAN
Stinking Smut (Bunt)	X	X	X
Seedling Blight			X
<u>OATS</u>			
Smuts	X		X
<u>BARLEY</u>			
Covered Smut	X		X
Black Loose Smut	X		X
Stripe			X

X Indicates the Recommended Treatment

At the recommended rate of application the approximate costs of treating chemical per bushel are as follows:

New Improved Ceresan $\frac{1}{2}$ ounce per bushel	-----	1.9¢
Copper carbonate (50%) 2 ounces per bushel	-----	2.2
Copper carbonate (20%) 3 ounces per bushel	-----	2.5
Formaldehyde 1 pint to 40 gallons of water treats 40-50 bushels of grain	-----	0.5

Correct these prices according to local quotations.