1-1949

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Jan. 1949 E.C. 1809

THE WHYS AND HOWS OF CEREAL SEED TREATMENT

COOPERATIVE EXTENSION WORK IN AGRICULTURAL AND HOME ECONOMICS. UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE, AND THE UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING, H. G. GOULD, ACTING DIRECTOR, LINCOLN.

THE WHYS AND HOWS OF CEREAL SEED TREATMENT

A. F. Sherf
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Successful farmers have learned that cleaning and treating wheat, barley, and oats pays dividends each year in the form of better stands, reduction of weeds, and most important, in disease control. Cleaning removes cracked and shrivelled grain and weed seeds which often amount to 5 to 30 per cent of a seed lot and should never be used for seed. Treating grain with chemicals reduces seed-borne diseases. By cleaning and treating all seed wheat, oats, and barley a farmer will be getting his crops off to the best possible start.

Most smuts of Nebraska small grains are carried on the surface of the seed (Fig. 1), and therefore may be killed by application of chemicals to the seed before planting. These chemicals kill fungus spores on the seed surface and also provide some protection against soil fungi which may attack the seed in the ground.

Remember an ounce of fungicide may be worth many bushels of grain.

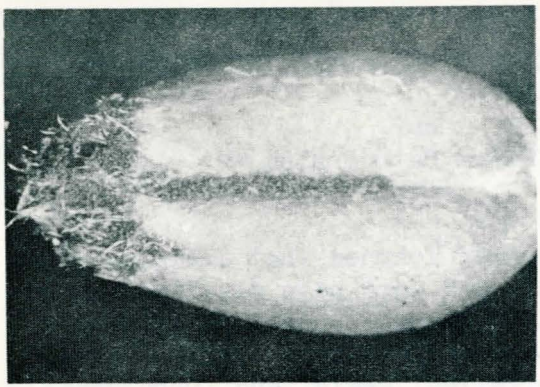

Fig. 1
Bunt spores in brush and crease of wheat kernel (enlarged).

WILL CHEMICAL SEED TREATMENT KILL ALL SMUTS?

Another type of smut is loose smut of wheat and barley (figures 2, 3) which lives from one season to the next inside the "germ" or embryo of the seed and cannot be controlled by chemical treatment. Infection occurs when spores from the smutty head blow onto the flowers while the grain is blooming. Here the spores germinate and produce tiny infection "threads" that grow into the very young kernel beyond the reach of chemicals. When such seed is planted the smut starts to grow as the kernel sprouts and continues to advance upward into the young plant. Later when heads are formed they are composed of masses of smut spores which soon blow again to healthy grain flowers to complete the cycle. Smuts of this type may be controlled

Fig. 2
Loose smut of wheat. Left, healthy. Others loose smut.

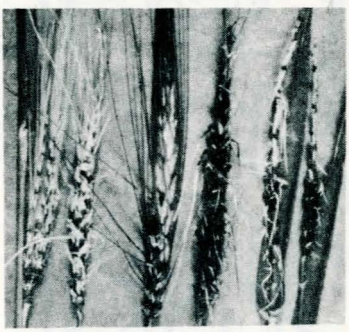

Fig. 3
Loose and covered smuts of barley. Left, three heads, covered. Right, three heads loose smut.

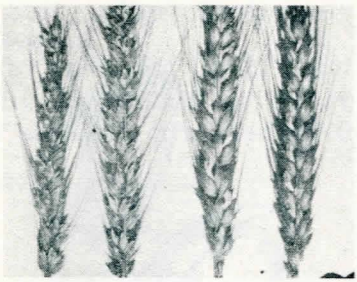

Fig. 4
Bunt, covered smut, or stinking smut of wheat.

Fig. 5
Oat Smuts. Left, two heads covered smut. Center, two heads loose smut. Right, healthy head.

by a hot water dip at 126° to 128° F., but such treatment is not recommended for general use because of danger to germination. Such treatment is practical only for small seed lots of special value. The planting of resistant varieties offers the best method of controlling this loose smut.

Life History of Smuts Controlled by Chemical Seed Treatment

The life cycle of bunt (stinking smut) of wheat (Fig. 4), loose and covered smuts of oats (Fig. 5), and covered smut of barley (Fig. 3) is illustrated on the following pages.

Why Seed Treatment?

Controlling the smut is easiest and most economically done by killing the spores on the seed with chemicals. Large amounts of seed grain can be treated in a short time at a cost of 2 to 3 cents a bushel.

Each year Nebraska grain farmers lose thousands of dollars from smutty grain from reduced yields as well as reduced quality.

Yield

Experiments have shown that if 10 per cent of the wheat heads are smutted the yield is reduced by 10 per cent, which means on a 50-bushel crop a loss of 5 bushels an acre.

Quality

When smutty grain reaches the market, it may be discounted from $20 to $100 or more per car depending

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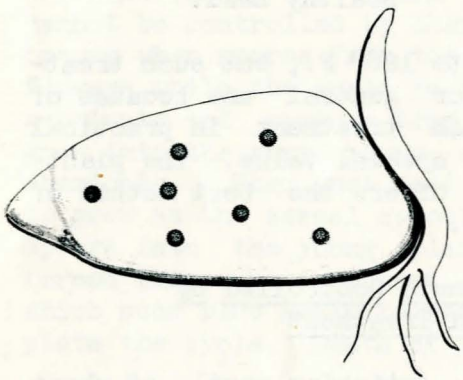
Smut is carried on the seed.

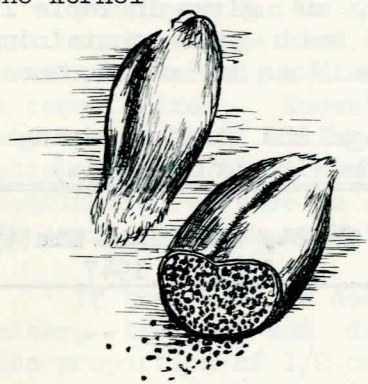
The smut plant lives inside the cereal plant.



Spores get on seed during harvest from wind or the combine. These live from season to season on the seed. After planting, the smut spores on the seed germinate with the seed and infect the young seedling. Seed treatment kills the smut here.

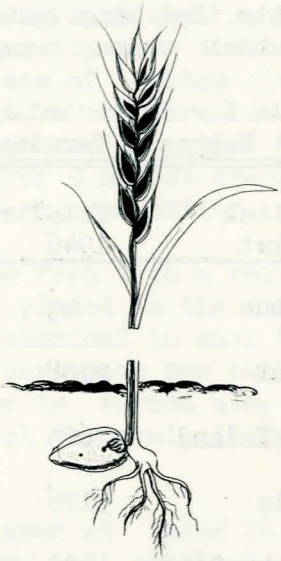
After the spores germinate, they grow inside the young seedling behind the advancing growing tip until kernels are formed.

The smut plant destroys the kernel



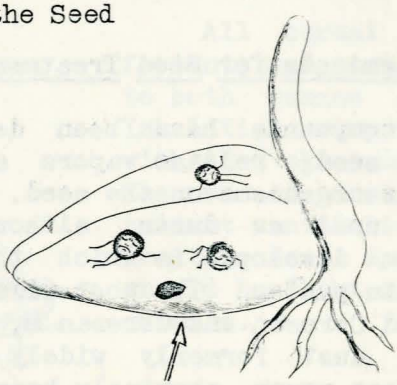
When grain kernels begin to form they are replaced by masses of smut balls. These balls contain millions of spores or seeds.

Each black kernel breaks during harvest



Millions of smut spores are set free by wind or by the combine and settle on healthy kernels and the life cycle has been completed.

Control Smut by Treating the Seed



Smut spores killed by chemical treatment.

upon the amount of smut and market conditions. The records from terminal markets, as given in Table I, indicate that many cars arrive each year containing smut which means considerable loss to our farmers.

Table I.- Inspected receipts of all wheat arriving at Nebraska Terminal Markets (in carload lots)

Terminal market	Total receipts 1946	Total receipts 1947	Smutty and light Smutty 1946	Smutty and light Smutty 1947
Columbus	43	90	--	--
Fremont	2208	2038	53	22
Grand Island	2625	3067	24	35
Lincoln	5176	5115	138	23
Nebraska City	1122	1193	32	4
Omaha	23,240	24,959	846	438
Total	36,414	36,462	1,093	523
Per cent smutty cars			2.9	1.4

Chemicals for Seed Treatment

Chemical compounds have been developed which, when applied to seed, release vapors and fumes which will kill fungus organisms on the seed. The chemicals are generally used as dusts, although recently a method has been developed in which the chemical is applied as a thin paste. The most widely used dusts are New Improved Ceresan and Ceresan M, Copper carbonate, a chemical dust formerly widely used, has been replaced by these newer chemicals because its use is limited to wheat for bunt control and treated seed may "freeze" the drill. It has no value on oats.

How and When to Apply Chemicals

Treatment can be accomplished rapidly on the farm but requires some kind of a mixing machine, such as a revolving barrel, a Minnesota gravity-type treater, or a cement mixer. Recently the use of custom cleaners and treaters in village elevators or portable units which come to the farm have become popular. This combination service is offered for a modest charge and is available in most Nebraska farm communities.

If treatment is done on the farm with a revolving mixer, the seed and dust are placed in the mixer in the proportion of 1/2 ounce of chemical to each bushel of seed (or 2 ounces of copper carbonate per bushel of wheat). The barrel or mixer is turned slowly for about 40 revolutions, after which the grain is removed and stored.

It is best to treat the seed at least 24 hours before planting in order to give the chemical fumes time to penetrate under the hulls of the kernels. Treatment one to three months in advance of seeding is satisfactory and will not reduce germination provided a good, dry, well-aerated storage is available and the correct amount of chemical is applied.

Precautions

All cereal seed disinfectants are toxic and poisonous to both humans and livestock. Inhalation or prolonged contact with the skin must be avoided. The use of dust masks and abundant ventilation is advised. Treated seed is poisonous and should be kept out of reach of animals.

Summary

1. Clean and treat all cereal seed for disease control.
2. Use the correct amount of chemical.
3. Treat early (at least 24 hours before seeding).
4. Store in well-aerated dry bins.
5. Avoid inhaling chemicals or feeding treated grain.

For additional information, see your County Agricultural Agent.

Remember - Seed cleaning and treating go hand in hand in disease control!