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THE LOOSE SMUT TEST for Barley Seed

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CIRCULAR A- 346

NOVEMBER 1965

Loose smut is a serious barley disease in eastern North Dakota, especially in the Red River Valley. The embryo test is used to discard heavily smut-infected seed lots.

Growers should be sure their barley seed comes from seed lots with little or no smut. Loose smut infected seed produces plants but no kernels. The result is direct yield loss. An embryo test is a practical and reliable method of avoiding seed infected with loose smut.

Standard Seed Treatment Does Not Control Loose Smut

The standard seed treatment will control diseases carried on the outside of the seed, such as barley covered smut. Loose smut is a fungus carried inside the seed and external seed treatment will not control or eradicate this disease.

All barley seed should be treated with a regular seed treatment (seed treatment circular, NDSU, Extension Service, No. A-447), in addition to being given the loose smut test.

Hot water treatments and the anaerobic water methods will control loose smut, but these are not practical except for small lots of seed. For loose smut, the most practical control is an embryo test which allows the grower to select seed with a very low percentage of infection.

How Loose Smut Develops

The loose smut fungus overwinters in the embryo of the seed. In the spring the fungus grows inside the developing plant. Smutted heads usually appear a day or two earlier than the healthy heads. At the time of heading, it will be found that the smut fungus has replaced the kernels with masses of smut spores.

Infection occurs when the wind blows the spores from smutted heads to healthy heads. Infection takes place through the barley flowers and results in infected embryos of the new seed. If smut-free seed is planted, there can be no smutted heads in the crop. For this reason, it is important to plant seed having a very low percentage of loose smut.

A single smutted head produces many thousands of fungus spores which can be blown about. Therefore, it is possible for just one smutted head to cause a great many seeds to become infected. A field with only 1 per cent smutted heads may result in 10 to 20 per cent smut in seed harvested from that field. This is especially likely when the weather is cool and damp at the time of pollination. On the other hand, hot dry weather at pollination time often results in very low seed infection, even if the percentage of smutted heads is high. For these reasons, field smut counts are of little value in estimating the smut potential in next year's crop, since it is mainly the weather that determines how much smut the seed will carry in each year.

The diagram of the life cycle of loose smut disease shown in figure 1 may help to make clear how loose smut spreads.

Embryo Tests Are Reliable

In 1960, 300 samples of seed with known embryo tests were planted in the field, and head counts were compared with the results of the embryo test. One hundred of these samples had high smut (10 to 35 per cent), 100 had medium smut (3 to 10 per cent) and 100 had little or no smut infections (0 to 1 per cent). In all cases, embryo tests gave a reliable indication of the percentages of smutted heads that appeared in the field. Averages for each of the smut groups and for all of the groups combined are shown in table 1.

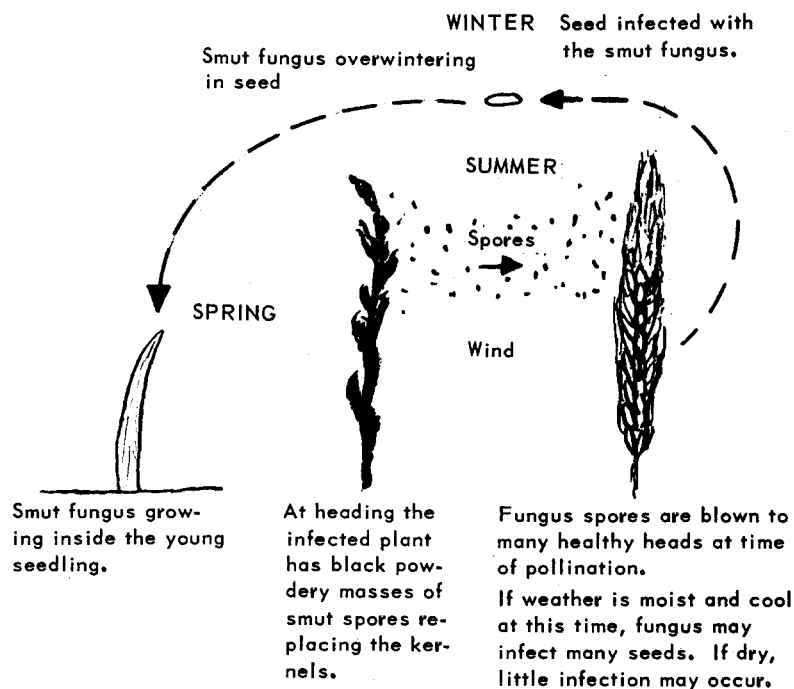


Figure 1. A diagram showing the life cycle of the loose smut fungus.

Table 1. Embryo and field test comparisons of average per cent loose smut in barley with high, medium and low levels of infection.

Smut content	No. samples	Embryo test	Growing test
		%	%
High smut (10-35%)	100	14.3	14.7
Medium smut (3-10%)	100	5.0	5.2
Low smut (0-3%)	100	0.5	0.7
Total (0-35%)	300	6.6	6.7

This information, as well as information from growers who had seed tested for smut, proved the embryo test to be reliable in identifying seed lots having a high incidence of loose smut.

It is recommended that all barley growers have their barley seed tested, or use seed known to have little or no loose smut.

Interpreting Embryo Test Results

Yield loss from loose smut of barley generally will be in direct proportion to the percentage

of infected seed planted. A seed lot showing a 10 per cent infection will result in about a 10 per cent yield loss.

If your barley seed carries over a 4 or 5 per cent infection of loose smut, it will pay you to buy new seed. Buy seed with as little loose smut infection as possible.

Getting A Loose Smut Barley Seed Test Made

To get your barley seed tested for loose smut, send an 8-ounce sample to the State Seed Laboratory, State University Station, Fargo, North Dakota.

Use a grain probe to collect from at least 5 different areas of each bin.

Send the seed sample to the laboratory for testing as soon as possible after harvest, to avoid last minute delays in spring planting.

