



Extension FactSheet

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Loose Smut of Wheat, Spelt and Barley

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Loose smut occurs wherever wheat, spelt and barley are grown. The name loose smut describes the characteristic symptoms of the diseased heads as they extend from the boot in late spring. The kernels and glumes (chaff) are converted into black fungal spores which blow away, leaving only a sooty appearing rachis or spike.

Loose smut reduces yield in proportion to the percentage of smutted heads in the field. To estimate the loss per acre, several hundred heads must be examined randomly in the field to determine the percent which are smutted. The net loss can be calculated by multiplying the following: percentage of smutted heads by a factor of 0.8 (if less than 5 percent smut) or 1.0 (if greater than 5 percent smut) by the yield per acre in bushels by the current selling price of wheat. For example:

$$4\% \text{ smut} \times 0.8 \times 48 \text{ bu/A} \times \$4.00 = \$6.14 \text{ loss per acre.}$$

In seed fields this loss is continued into the next year's crop because some of the harvested grain will contain the loose smut fungus. If 1 percent of the heads in a seed field are smutted, 10 percent or more of the seed may be infected. The expected loss in the next crop would be a minimum of \$19.20 per acre ($10\% \times 1.0 \times 48 \text{ bu/A} \times \$4.00 = \$19.20$) assuming one seed produces only one smutted head, but usually more are smutted. Losses are high as 40 percent have been reported.

Loose smut is caused by *Ustilago tritici*. Many strains or races of the fungus are known. Due to the development of resistant varieties and systemic seed treatment fungicides, the disease is seen only infrequently in Ohio except when growers plant bin-run seed that has not been treated. Spelt and barley are very susceptible to loose smut and smut is common in fields where seed treatments are not used.

Symptoms

The most obvious symptom is seen at heading time as the diseased heads emerge from the boot. The kernels and glumes

have been converted to masses of black spores. These spores are soon blown away, leaving the rachis of the head bare.

Heads of infected plants usually emerge from the boot slightly earlier than normal. Prior to heading infected plants may have dark green, erect leaves, sometimes with chlorotic streaks. All of the floral parts of the head, except for the rachis and pericarp membrane, are invaded by mycelium of the fungus and converted into loose aggregates of smut spores (teliospores).

Disease Cycle

Wheat plants are infected only during flowering by wind blown spores from nearby smutted heads. Rain and insects may also disseminate the spores. Dispersal of spores at flowering is critical to the perpetuation of loose smut because infection usually takes place during the two days after flowering. Plants become resistant to infection one week after flowering.



Figure 1. Loose smut of wheat. Note that the glumes and kernels are converted to smut spores.

Once the spores have been deposited in open flowers, they soon germinate and the mycelium grows through the ovary wall into the embryo of the developing seed. Light rains or heavy dew and moderate temperature, 60 to 71 degrees F favor infection. After establishing in the embryo of the kernel, the mycelium of the fungus becomes dormant. Infected kernels do not appear different from healthy ones. When infected kernels are planted and germinate, the fungus becomes active again. The fungus keeps pace with the developing plant by growing systemically into the growing point. At heading time the entire contents of the head, except the rachis and the pericarp membrane, become transformed into a mass of black teliospores. The pericarp membrane holds the spore mass together until the head emerges from the boot. This membrane quickly tears away and the masses of spores are released in the wind, leaving the rachis barren.

Control

1. The soft red winter wheat varieties grown in Ohio have fair to good resistance to the prevalent races of loose smut. However, none of these varieties are resistant to all of the races of the fungus. New races are present in Ohio, but we do not know how widespread they have become. Spelt is very susceptible to loose smut. The varieties of barley presently grown in Ohio are also susceptible to loose smut. Resistance

to loose smut can be due to many factors, but some varieties owe their resistance to the closed nature of their florets during flowering.

2. Plant clean, disease-free seed. This means seed for planting must come from disease-free fields or, if this cannot be established, the seed should be treated with an effective fungicide. Certified seed is not guaranteed to be free of loose smut or other seed borne diseases. Seed production fields should be inspected at early heading for the presence of the conspicuous diseased heads as they emerge from the boot. If loose smut is present in the field, the seed should be treated with a fungicide prior to planting.
3. Seed treatment is a very effective and inexpensive way to control loose smut. A seed disinfectant fungicide with systemic action is necessary to eliminate the fungus in the embryo of the seed. Several systemic fungicides are now available for use on small grain crops. Control of loose smut is dependent on the rate of active ingredient applied to the seed surface. Be sure to read the label and apply the proper amount of fungicide to the seed. Seed treated to control loose smut should also be treated with a broad spectrum fungicide to control seedling blight diseases. For more information on loose smut and seed treatment fungicides obtain a copy of OSU Extension bulletin 639 "Seed Treatment for Agronomic Crops."

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