



STINKING SMUT OR COMMON BUNT OF WHEAT

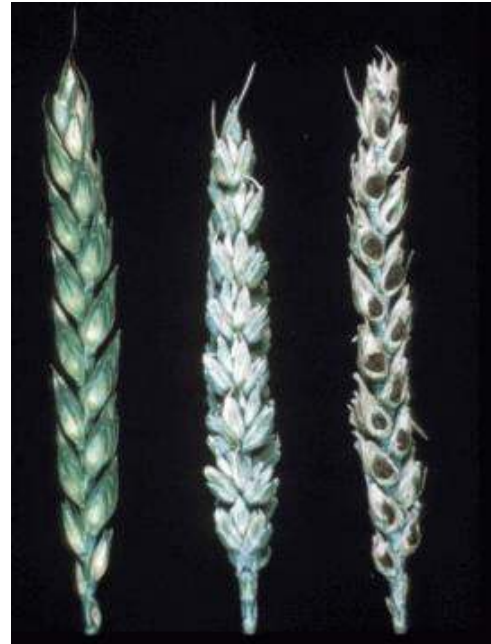
Stinking smut or bunt is caused by three closely related species of fungi, *Tilletia foetida*, *T. caries* and *T. contraversa*. Only *Tilletia foetida* and *T. caries* occur in the Midwest. Both fungi have similar life cycles and may even occur together in a plant. Serious losses from these smut fungi have probably occurred since wheat was first cultivated by man. Stinking smut causes reduced wheat yields and grain quality by imparting a foul, fishy odor to the grain—making it unfit for milling. However, smut-infected wheat may be fed to all classes of livestock—including poultry—without ill effects. The two fungi also occasionally infect rye, wild barleys (*Hordeum* species), goatgrasses (*Aegilops* spp), wheatgrasses (*Agropyron* spp), and ryegrasses (*Lolium* spp).

Stinking smut is generally distributed wherever wheat is grown in the world. In the United States it is most severe in the Pacific Northwest. In Illinois, data for 33 consecutive years show an average annual loss of approximately 3 percent caused by stinking smut of wheat. Losses of nearly 50 percent of the wheat heads to stinking smut have occurred in years favorable to infection. The prevalence of stinking smut varies greatly from year to year, depending on soil moisture and temperature conditions at the time the wheat seed is germinating and on whether the seed has been treated with a fungicide before sowing. Common bunt is less frequent and is usually less damaging in spring wheat than in winter wheat.

The characteristic odor or the presence of 14 or more “smut balls” in 250 grams of seed results in severe dockage and a drastically reduced price for wheat graded as “smutty.” Most elevators refuse to take wheat that shows obvious smut or has a strong, fishy smell—indicating a severe infection. Furthermore, bunt spores released during threshing are combustible. Minor explosions have resulted from their ignition by sparks from stationary threshing equipment or in elevators during handling.

SYMPTOMS

The symptoms of stinking smut or common bunt are not as apparent as those of loose smut. Although stinking smut is not easily identified until the time the wheat heads, infected plants may be slightly to severely stunted. Smut-infected heads have a bluish-green cast, in contrast to the green color of healthy heads. At maturity, diseased heads appear to be plumper than normal heads because of the wide-spreading open chaff (Figure 1). Infected plants are also more susceptible to certain other diseases and to winter



injury. The root systems of infected plants are usually poorly developed.

During the development of the head, the kernel is replaced by a smut ball that is a dull, gray-brown color, short, and plump. The smut ball consists of a mass of oily, foul-smelling, dark-brown spores. Smut balls look much like normal kernels, but can be easily crushed (Figure 2). Smutted heads generally stand more erect and remain green for a longer time than healthy heads. Dark clouds of spores are released by the action of a combine in severely diseased fields.

Stinking smut differs from loose smut in that only the kernel tissues within the pericarp are replaced by smut spores, rather than the whole head. Bunted plants are weaker than normal ones, and are often more susceptible to seedling blights and winter injury.



Figure 2. A mixture of normal wheat kernels and fragile smut balls. Some of the smut balls have been crushed to expose the mass of spores they contain.

DISEASE CYCLE

Stinking smut is primarily a seed-borne disease in Illinois. During harvesting or later handling, the smut balls are crushed. The smut spores (teliospores) are dispersed by air currents, fall to the ground, or adhere to the wheat kernels. Teliospores that fall to the ground during harvest live in the soil for 20 to 50 days, but apparently cannot survive in Illinois until the fall growing season. Seed-borne smut spores are trapped, usually at the brush end of the kernel or in the groove. When soil temperatures are between 41° and 59°F (5° to 15°C) and moisture conditions are favorable, the wheat seed and smut teliospores on or near seed in soil germinate.

Bunt spores germinate to form a basidium (or promycelium) on which 8 to 16 basidiospores (primary sporidia) develop. The basidiospores fuse near their middle in compatible pairs to form H-shaped structures (Figure 3). They then germinate to form short hyphae on which sickle-shaped secondary sporidia are borne. Upon germination the secondary sporidia penetrate seedling wheat plants and cause infection.

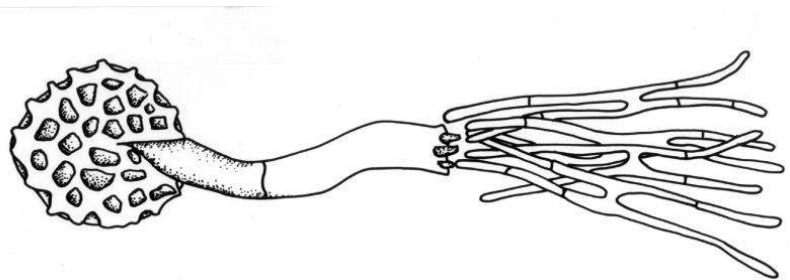


Figure 3. Germinated teliospores of *Tilletia caries* a stinking smut fungus. Note the tubelike basidium with eight basidiospores (primary sporidia) at the tip which have fused in pairs to form H-shaped structures.

The smut fungus enters the seedling coleoptile before it emerges and progresses undetected into the developing terminal point of the wheat plant. The smut mycelium invades the developing head and displaces all kernel tissues within the pericarp. Eventually teliospores are formed within the kernel tissues. A single smut ball may contain up to 8 million teliospores. The disease cycle is repeated during the following season, when new wheat seed becomes contaminated with a new generation of smut teliospores.

CONTROL

1. Plant certified wheat seed that is disease-free and cleaned to remove any broken kernels and as many smut spores on the seed as possible. The seed should then be treated with a recommended seed-treatment fungicide.
2. Plant winter wheat after the Hessian fly-free date. Doing this will reduce losses from wheat streak mosaic, soil-borne mosaic, barley yellow dwarf, Septoria leaf and glume blotch, and powdery mildew.
3. No wheat varieties adapted to Illinois are resistant to stinking smut.