

Loose Smut of Barley and Oats

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Loose smut of barley is caused by the fungus *Ustilago nuda* and occurs virtually everywhere barley is grown. Loose smut of oats is caused by the related pathogen *Ustilago avenae* and occurs virtually everywhere oats are grown. Other species of *Ustilago* attack wheat, corn, and other grasses. Infected seed kernels are converted into black spores that are visible on the seed heads, giving the disease the common name of loose smut. The pathogen is transmitted through infected seeds. Loose smut can be one of the most destructive diseases of barley and oats. While the use of seed treatments containing a fungicide has made the disease manageable, loose smut is still present and a threat. The disease has a

higher prevalence where seed treatments are not used and can be rather conspicuous in the field. As the seed is replaced by the fungus, yield loss is proportional to the percentage of smutted heads.

Biology

The loose smut fungus is seed-borne and survives from season to season within the embryo of the seed. As the seed germinates, the loose smut fungus activates and infects the developing seedling, where it continues to grow within the plant until flowers start to form. At that time, the loose smut fungus replaces the seed with black powdery spores. Heads



Smutted head in the field.
Photo by Steven B. Johnson.



Completely smutted heads at harvest.
Photo by Steven B. Johnson.

of small grains infected with the loose smut pathogen – in which the grain has been completely replaced by the smut fungus – generally emerge shortly before healthy heads. New infections occur only during flowering and are favored by cool (60°F to 70°F), wet weather. Spores of the loose smut fungus are wind-blown and travel to flowering heads of healthy plants, where they germinate and invade the female parts of the barley flowers, colonizing the embryo. After heading occurs, seed remaining in heads that are not totally black can be infected and carry the pathogen into the next disease cycle. The pathogen goes dormant when the infected seed matures. Infected seed appears normal and cannot be separated out. This seed serves as inoculum when planted.

Symptoms

Before heading, infected plants do not appear different from healthy plants. Loose smut symptoms (actually signs of the pathogen) appear as the diseased heads appear. The seed kernels are replaced with masses of black, powdery spores held in by a thin membrane that is easily ruptured, dispersing the spores. At harvest, only the rachises of the flower clusters may be visible on infected heads from which all the spores have dispersed.

Management

- Use certified seed, as infected seed is the source of inoculum.
- Ensure that all seed to be planted has been treated with a recommended systemic material registered for control of loose smut.



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