

MAGR  
GOVS  
MN 2000  
FSPP-21 (1973)

PLANT PATHOLOGY NO. 21-1973  
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## Ergot of Cereals and Grasses

A disease of cereals and grasses known as ergot, described in Germany in 1582, is caused by the fungus Claviceps purpurea, which attacks cereals and grasses all over the world. Its medicinal applications and animal poisoning characteristics were noticed first.

Ergot occurs to some extent every year on the cereal and grass crops (figure 1). It is more prevalent on rye than on any other cereal, but significant losses have also been reported on spring wheat, durum, barley, and other small grains. Although the crop loss caused by this disease is important, the effects of the ergot toxin, Ergotine, on man and animals is of much greater significance.



Figure 1

The occurrence of the ergot bodies (sclerotia) in sufficient quantity in livestock feed makes the feed unsafe for animals and for humans. In man, ergot poisoning can cause disorders ranging from circulatory failures and gangrene, to death. The amount of ergot necessary to cause disease symptoms in livestock depends on both the race of the fungus and the strain of livestock involved.

### Symptoms and Signs

The most common sign of ergot is the dark purple-to black-colored sclerotia found in the head of cereals and grasses just prior to harvest (figure 2). These sclerotia may be large ( $\frac{1}{2}$  inch long) as on rye, or small ( $\frac{1}{16}$  inch or less in diameter) as on timothy. Earlier in the growing season the fungus develops a stage commonly referred to as Honey Dew. The Honey Dew is the conidial stage which consists of a sticky, yellowish, sugary excretion of the fungus that oozes out of the infected florets as droplets.



Figure 2

### Life Cycle

The initial infection of the host plant occurs through the open flower. The spores which cause the first infection are produced on small heads (stromata) that develop from the sclerotia which remained in the field from the previous crop. The stromata are exposed above the soil surface by the growth of a stipe from the sclerotia (figure 3). Several mushroom-like stromata may develop from each sclerotium. The sexual spores (ascospores) are formed in this structure. These ascospores are shot into the air and may be carried by the wind to open flowers. Here the spores germinate and the mycelium invades the ovary tissue. Following infection, the first indication of the disease is the appearance of a yellowish-white sticky substance exuding from the infected floret, previously referred to as the Honey Dew stage. This sugary exudate contains large numbers of asexual spores called conidia. The Honey Dew may attract more than 40 species of insects, any of which may become externally contaminated with conidia when visiting the infected florets. The contaminated insects can disseminate spores to other healthy flowers, thereby spreading the disease. The process of spore formation, excretion of Honey Dew, and spore dissemination by insects continues as long as host plants are in blossom.

The fungus, once established in the floret, grows throughout the ovary, eventually forming the dark sclerotia. These sclerotia are vegetative structures which permit the fungus to over-winter.



Figure 3

### Economic Importance

Ergot can cause a direct loss of yield. As much as 5 percent loss has been reported in durum wheat, while losses in rye of 5 percent are common.

In the commercial grain trade, grain is classed as "ergoty" when it contains more than 0.3 percent by weight of the ergot sclerotia. Most of the sclerotia can be removed from ergoty grain with modern cleaning machinery. However, it is costly and quite often difficult to remove enough sclerotia to meet the legal standards.

The occurrence of ergot sclerotia in pasture grass or in feed is possibly of greatest economic importance. The sclerotia contain several alkaloid poisons which, if eaten by livestock, may cause sickness, abortion, or death. The total effect on livestock depends on the breed of animal and the specific type of ergot ingested.

The ergot bodies have a limited market value for use in the pharmaceutical industry where the ergot "toxins" are used in obstetrics and surgical practice.

### Host Range

Rye, wheat, barley, oats, quack grass, crested wheat grass, brome grass, foxtail, rye grass, orchard grass, timothy, wild rye, wild rice, and other grasses can all harbor ergot sclerotia.

### Control

The ergot sclerotia usually do not live over in the soil for more than one year. Therefore, crop rotation with a noncereal for at least one year will help reduce the disease.

No commercial varieties of barley, rye, wheat, or cultivated grasses, resistant to ergot, have been developed.

Plant only clean seed. Do not continue the disease cycle by planting seed contaminated with ergot sclerotia.

Deep-plow fields which have severe ergot infestation, this will bury the sclerotia.

Mow wild grass before flowering. Eradicate, or prevent grasses from heading in fields, headland, and fence rows.

### References

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