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# Scab of Wheat and Barley

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Scab (head blight) is an important disease of wheat, barley, oats and other small grains. It has been a serious problem in parts of Canada and the United States for more than 50 years but has only recently been found to occur in southern Idaho. In 1982 and 1984, scab epidemics occurred in sprinkler-irrigated wheat and barley fields in southcentral and eastern Idaho causing estimated yield losses of up to 50 percent. The disease is caused by several species of the *Fusarium* fungus. Other diseases caused by some of these same species include seed decay, seedling blight and root and crown rot of wheat and barley, as well as stalk and ear rot of corn.

## Symptoms

The disease is characterized by the appearance of beige to tan or brown colored spikelets occurring before normal maturation (Fig. 1). Part or all of the head may be affected. Infected spikelets are usually sterile or only partially filled with seed. If grain is produced, it is typically small and shriveled, of low test weight and may have a dull, chalky, tombstone-like appearance. Lesions may occasionally form on the stem below the head (the "neck"), turning this area brown to black in color.

Salmon pink to orange patches may be seen on diseased heads and necks (Fig. 2). These colored patches are the spores and fungus threads (mycelium) of the causal agent and are diagnostic for scab.

Another important aspect of this disease is the potential for scab infected grain to contain a mycotoxin. Mycotoxins are poisons produced by fungi. The presence of scab, however, does not ensure that the mycotoxins have been produced. A laboratory analysis of harvested grain must be accomplished to determine the extent of mycotoxin contamination. Toxin production is dependent upon the strain of the fungus, the cereal variety and the weather conditions. Temperatures between 70° and 80°F (21° and 27°C) during disease development favor mycotoxin production.

**Fig. 1. (Left) Wheat scab is characterized by the appearance of beige to tan or brown colored spikelets in the soft dough stage of growth.**

**Fig. 2. (Right) Salmon pink fungus growth at the base of the spikelets is diagnostic for scab.**

*Fusarium* species are capable of producing two types of mycotoxins — vomitoxin and zearalenone. Vomitoxin causes vomiting and may be involved in "feed refusal factor" in swine and may cause other symptoms in other nonruminant animals. Zearalenone is an estrogenic mycotoxin and may cause infertility and other disease conditions in domestic animals. At high concentrations, these mycotoxins may also be toxic to humans.

## Disease Cycle

The disease causing agent overwinters in infested small grain cereal and corn residues as mycelium and spores. Spores are the primary inoculum. In the presence of moisture, they germinate and invade the flower parts and stalk of the head (i.e., rachis). Infection occurs most frequently and is most serious at flowering (anthesis) which occurs about 5 to 10 days after head emergence. Extended periods of wetness, humid conditions and cool temperatures (72°-78°F/22°-25°C), favor disease development. Symptoms may develop in 3 or 4 days under favorable conditions.

Only one disease cycle occurs annually. Spores produced on infected heads of the current crop are of little importance with respect to the head blight phase of the disease. However, they serve as an important inoculum source for seed decay and seedling-blight when the seed is replanted. The germination and vigor of infected seed may be considerably lower than that of healthy seed. *Fusarium* is returned to the soil at harvest with plant debris and infected light-weight grain which passes out of the back of the combine.

## Control

Control recommendations are limited and inadequate. No known resistant wheat or barley varieties are commercially adapted for this area, and no fungicides are registered for scab control. Several cultural practices, however, may be used to minimize the chances of a scab epidemic.

Crop rotation with a break of at least 1 year between small grain cereal and corn production is recommended. Since the pathogen proliferates on infected debris on the soil surface, plowing to bury crop residues is beneficial. This helps to decrease primary inoculum for the subsequent crops as well as removing the fungus from the immediate environment of the seedling. If cereal residues are not plowed under, new wheat and barley seedings should be located as far from these fields as possible. No-till wheat seeded in old corn residues greatly increases the chances of wheat scab.

Since infection requires moisture during flowering, the disease is more prevalent under sprinkler irrigation than under rill irrigation. Growers should try to avoid a sprinkler irrigation during the flowering period.

If a wheat or barley crop becomes infected, the percentage of shriveled, diseased kernels in the harvested grain may be reduced by increasing the combine airflow, thereby removing the low test weight and poor quality grain. The elimination of this grain not only lowers the percentage of scabby wheat but also reduces the chance of mycotoxin contamination. Storage of grain below 13 percent moisture helps to prevent deterioration of the grain and the chance of additional production of mycotoxin.

Grain from known or suspected scabby fields should not be used for seed. Although seed treatments will not prevent head blight, the use of seed treatments containing thiram (e.g., Vitavax 200) or TCMTB (e.g., Nusan) may help prevent seed decay and seedling blight caused by infection by *Fusarium* species.

## About the Authors

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