Scab of Wheat

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Scab, sometimes known as Gibberella or Fusarium blight, is a fungus disease that is best known on the cereals as a head blight. It is prevalent in moist, warm seasons from heading time onward. Seedling blight also is a destructive phase of the disease that causes financial losses to grain growers in the state.

The severity of scab infection varies greatly from year to year and is closely associated with the prevailing weather conditions after the heads emerge. In some years, such as 1982, 1990 and 1991, scab infections were widespread and caused losses ranging from 10 to 90 percent. Yet in years that are dry after heading begins, only a trace of scab can be found. Fortunately, latter conditions are more prevalent in Missouri.

Grain infected with scab is usually light and chaffy. This condition reduces its feeding value and consequently its market value. Scabby kernels contain toxic substances (vomitoxin) that can be harmful in the diets of humans, hogs and other animals with similar digestive systems. Grain containing 10 percent or more scabby kernels fed to hogs may cause vomiting. The same condition is found in scab-infected wheat as when Gibberella-infected corn is fed to hogs.

Cause

Scab is caused by the fungus Gibberella zeae (Fusarium graminearum). The scab fungus attacks wheat, barley, oats, rye, corn and a number of other grasses including cheat, wild rye, foxtail, quackgrass, crabgrass and bluegrass. It may also attack clover, alfalfa, pokeweed, and some plants in the parsley family. However, it is most prevalent on wheat, barley, rye and corn.

The scab fungus is a destructive parasite on living plants, but also survives as a saprophyte on dead plant material on or in the soil. As a parasite on wheat it produces seedling blight, root rot, crown rot, stem blight and scab or head blight. It is one of the common fungi that cause stalk rots and ear rots in corn. Therefore, potential for the disease is very great.

Appearance

In its most conspicuous form, scab found on wheat is a head blight. The infection can be recognized by the premature ripening or bleaching of one or more spikelets of a head any time after flowering. When wheat is in the dough stage, the light yellow color of diseased head spikelets contrast sharply with the healthy green of the rest of the head.
On closer examination, a light pink or salmon color may be observed at the bases of infected spikelets and along the edges of the glumes. This color (plus isolation of sickle-shaped summer spores) is an unfailing diagnostic characteristic. Kernels of severely affected spikelets have a grayish-white, salmon or reddish color, are badly shrunken or wrinkled, and have a noticeably rough, flaky seed coat-known as "tombstone" in the grain trade.

Scab usually attacks one or several of the spikelets on a head, but not the entire head. Sometimes the fungus girdles the spike or rachis of a head, killing it at the point of attack and causing the death of the head outward. The result is poorly filled heads or shriveled kernels that are lost in threshing.

Seedling blight, caused by the scab fungus, is first noticeable when the infected plants appear stunted. Later these plants turn yellow and die. The roots of diseased seedlings are rotted, reddish-brown in color, and may be covered with a mass of grayish or pink mold. Poor stooling or only single stems may result, with the formation of small heads.

Poor stands may result from sowing seed affected by scab. Some diseased seeds are dead before being sown, while others, though they may germinate, are too weak to send their young plants to the surface. Some plants may survive for a time but lack vigor. Premature ripening or dying may result if root rot or crown rot occur as the plants approach maturity. If infections occur earlier, the dead plants have a bleached appearance. Plants occasionally may have infections at the joints or leaf sheaths, and sometimes stems may be girdled at a joint, causing death of the plant.

**Disease cycle**

The Fusarium scab epidemics of 1990 and 1991 appeared to be dependent on three preconditions: large acreages of susceptible wheat, abundant inoculum air-borne spores from corn stalks and ears or from former wheat residues, and wet weather conditions at the time of anthesis — intermittent rains or heavy dews.

The life history of the scab fungus is neither simple nor well understood. The fungus is able to exist either as a parasite on living plants or as a saprophyte on dead plant material. It produces two types of spores — the so-called winter spores and summer spores. The blue-black spore-bearing bodies (perithecia) appear in abundance in the fall on wheat straw or stubble, or in the spring on corn stalks left in the field.

When they are mature, these fruiting bodies, whether produced on growing plants or on dead plant material, contain small sac-like structures. Each of these structures has eight spores, called ascospores. These winter spores are discharged during rain or during continued moist spring weather. If they fall upon suitable crop residues, they germinate and soon produce a large number of summer spores.
Summer and winter spores both can produce infections if they fall upon a head of wheat during the blossoming period. In a week or a little longer, pink masses of summer spores may be found at the bases of infected spikelets. These spores are caught up by the wind and are carried to other wheat heads, causing new infections. The process repeats itself so long as favorable weather persists and spikelets are susceptible. The fungus may live through the winter in plant residues or on or in the seed. In the spring, the cycle starts over.

Seedling blight is caused by fungus spores carried in the seed, by spores adhering to healthy seed, or by the actively growing fungus living in decaying crop residues in the soil. Head infections take place independently of seedling blight, since the fungus is not able to grow for any distance within the plants.

**Control**

Sanitation is the first important consideration in controlling scab. It requires thorough plowing under or burning of infected stubble, straw, corn stalks, rotten ears, and weed grasses or other crop residues that perpetuate and spread the fungus. Manure containing infected straw or cornstalks should not be used as topdressing. Under conservation tillage where residues are left on the surface, there is greater potential for infection. However, this is a trade-off that must be considered because of benefits from soil conservation.

A crop rotation system in which wheat, oats, rye or barley do not follow corn will reduce the degree of infection. Small grains should be planted as far as possible from old corn fields.

Seed should be thoroughly fanned to remove all light shriveled grains, then treated with an approved seed treatment fungicide to destroy the spores on the surface of the seed. Seed treatment fungicides such as captan, maneb, mancozeb, terraclor, thiobendazole or thiram will control Fusarium scab.

Delaying sowing until soil temperature is 60 degrees or cooler reduces the severity of fungus attacks on seedlings.

Wheat varieties vary greatly in susceptibility. However, no highly resistant wheats are known. Resistant or tolerant varieties of wheat that are adapted to the locality should be selected whenever possible.