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report on
PLANT
DISEASE

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SCALD OF CEREALS AND FORAGE GRASSES

Scald is an important fungus disease of barley, rye, smooth bromegrass, and orchardgrass worldwide in cool, humid, largely temperate climates. Other grasses that may become infected in Illinois are Canada and southern wildrye, reed canarygrass, redtop, *Hordeum distichon*, quackgrass, and cheat.

Severe attacks of scald have caused yield losses as high as 20 percent in cultivated crops. Attacks at the late boot or early heading stage reduce the size of the grain and the number of kernels formed per head.

Damage is most severe in prolonged cool, damp weather in the early spring and late autumn when the temperatures are 39° to 82°F (4° to 28°C). A soil temperature of 60°F (16°C) is optimum for seedling infection of barley. Infection decreases sharply at 68°F (20°C), and is absent at 71°F (22°C).

Hot, dry weather checks the spread of scald. The disease damages grass and cereal plants by destroying the leaf tissues, thus reducing the food-making ability of the plant.

Figure 1. Barley scald. Many of the lesions have fused.

Scald is caused by two widely distributed fungi in the genus *Rhynchosporium (R. secalis* and *R. orthosporum*). Each species is subdivided into a number of highly specialized races. Each one of these is restricted to a single or closely related grass or cereal species.

SYMPTOMS

Scald is easily identified from the oval to lens-shaped or elongated spots (lesions) which develop mostly on the leaves and leaf sheaths. At first, the lesions are water-soaked, with a dark bluish green to pale grayish green color. Later they dry out, the centers become light tan or straw brown to grayish white, and are surrounded by prominent, dark brown to reddish brown borders (straw-colored on rye) that are often wavy.

With time the lesions enlarge (ranging from 1/2 to 2 inch or more long), merge, and form elongated, irregular blotches of various shapes and sizes that girdle the leaves. The tip of the leaf beyond the lesions collapses and dies (Figures 1 and 2). Sometimes older lesions have a "zoned" appearance. The lower leaves often have a "scalded" look and die prematurely. The scald symptoms are strikingly similar on all cereals and forage grasses.

Under severe conditions, inconspicuous, medium brown lesions occasionally appear on the awns and tips of barley glumes. Lens-shaped lesions, which are dark blue to pale grayish green, may appear at the base of the kernels.

Figure 2. Scald of barley leaves caused by Rhynchosporium secalis. Courtesy G.H. Boewe).

DISEASE CYCLE

The *Rhynchosporium* fungi overseason as mycelia on dead or living leaves of infected plants and on other crop debris. During prolonged periods of cool, moist weather in the spring, the scald fungi resume growth on fall-infected tissues and produce large numbers of colorless, two-celled, microscopic spores called conidia (Figure 3), which develop in a thin layer of slime on the surface of the lesions from a stroma of spore-producing mycelia. The conidia are carried by splashing rains and air currents to new growth, where the leaves, leaf sheaths, and seedlings become infected.

Spore production and infection occur repeatedly during cool, moist, humid periods that last at least 12 hours in the spring and early summer, and continue until the crop ripens. Scald is checked during hot, dry, summer weather. New infections occur in the fall when cool, damp weather returns. The scald fungi are **not** carried within seed, but can be carried **on** the seed. Large numbers of conidia are produced on the seed and may infect seedlings when the soil temperature is around 60°F (16°C). The *Rhynchosporium* fungi can survive on grass and cereal stubble for up to a year.

Scald lesions provide suitable sites for the growth of the variety of facultative or saprophytic fungi.

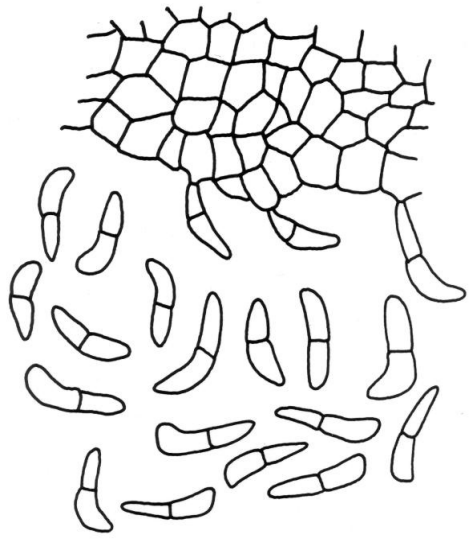

Figure 3. Rhynchosporium secalis, one of the two causes of scald of cereals and grasses, as it appears under a high-power microscope. Note the two-celled, colorless conidia borne on a stroma at the surface of a lesion (drawing L. Gray).

CONTROL

1. Sow only certified, disease-free seed of improved, well-adapted varieties of cereal grains and grasses recommended by University of Illinois Extension Agronomists and your nearest Extension adviser. Refer to the Illinois Agronomy Handbook and Illinois Extension Circular 1231, Condensed Plant Disease Management Guide for Field Crops. Both publications are revised annually.

2 Grow scald-resistant varieties of barley and smooth bromegrass when they are available and are recommended. If scald becomes serious enough, it should be possible to develop resistant varieties of other cereals and forage grasses. Physiologic races of each species of *Rhynchosporium* must be considered in the development of resistant varieties.

3. Treat the seed, where feasible, with a suggested seed-treatment fungicide.

4. Plow under cover crops, severely infected stands, volunteer rye or barley, and plant debris. Where practical, seed a mixture of forage species. Do **not** grow pure, dense stands of a single grass variety.

5. Follow recommended mowing and grazing practices. **Cut early** and **remove** from the field any hay crop that becomes heavily infected. This practice reduces losses in hay quality and removes inoculum that may threaten future cuttings. Do not leave a heavy mat of hay on the grass during cool, damp weather. Leaf-blighting diseases, such as scald, are seldom destructive in frequently cut or closely grazed pastures.

6. Keep down weed grasses by cultural or chemical means. Follow suggestions of University of Illinois Extension Agronomists.

7. A carefully controlled burning of dead grass in the early spring may be warranted if pastures are severely affected. This ancient practice destroys organic matter, but kills leaf-blighting fungi and bacteria on over-wintering leaves and other crop residues.