

## Recognizing and Controlling Cephalosporium Stripe

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Cephalosporium stripe is a soilborne disease of cereal grains caused by the fungus *Cephalosporium gramineum*. Incidence of this disease is highest when farmers crop winter wheat annually, using a tillage system that leaves infected grain residues from the previous crop on or near the soil surface.

Early planting, mild falls, and cold winters also enhance infection of wheat by this disease organism because of their combined influence on root growth.

Cephalosporium stripe is a potentially devastating disease. *It is not controllable through use of fungicides.* Growers using reduced tillage need to be aware of this disease and of the cultural practices required to control it.

### The organism

*Cephalosporium gramineum* (also called *Hymenula cerealis*) is the only fungal disease of wheat that grows in the plant's vascular (food- and water-conducting) system. It limits movement of water and nutrients along the main stem and within leaves. The organism also produces a toxin that reduces plant growth and inhibits development.

Yield losses result from reduced head size, head sterility, reduced seed set, and shriveled kernels. Yield reductions of 80 percent or more are possible in severely infested fields.

Most winter cereals and several grasses (*Bromus*, *Dactylis*, and *Poa* species) are susceptible, but winter wheat is the major economic host. Spring grains and annual grasses are also susceptible, but they escape infection as they are not subject to freeze damage and root wounding.

### Disease symptoms

Diseased plants may be randomly distributed throughout a field, or they may be found in patches. Infected plants can show stunting during early growth. Distinct disease symptoms are readily apparent when the plants are in the jointing or heading stage.

During these stages, one to two (rarely three) sharp, bright yellow, lengthwise stripes with a narrow brown center stripe appear on leaves. These stripes run down the leaf and onto and through sheath and stem tissues.

Striping may not be present on all stems of an infected plant. Stripes appear first on older leaves but are often most visible on younger leaves.

Leaf tissue that bears stripes eventually becomes dead and dry. As the season progresses, lower nodes darken and streaks develop on stem tissue. Stems showing these later symptoms are stunted and prematurely ripe; they produce a white (sterile) head that may become colonized by mold fungi and then turn black.

### Disease cycle

Cephalosporium stripe is favored by freezing and thawing of the upper 2 to 3 inches of soil and by repeated growth of susceptible winter cereals or grasses in a field. The fungus survives in association with host residues on or near the soil surface.

Spores produced during the winter and early spring on infested residue are responsible for infections. Root infection is through damaged, broken, and frozen roots; the fungus does not readily enter undamaged roots.

Root wounds can be caused by frost heaving of soil, direct damage from ice formation in roots, or by other mechanical means. The fungus invades the vascular system of host plants during the growing season and then survives in plant residues until a new crop is planted. The fungus can survive in infested residues for 2 to 3 years. Fungal viability declines rapidly, then more slowly, over this period.

### Control

Cephalosporium stripe cannot be controlled with fungicides. Control depends on crop rotation, residue management, and other production practices. Winter wheat is rarely damaged when grown in rotations with spring cereals, with nonhost crops such as legumes or corn, or with a weed-free fallow. Ideally, fields should be rotated out of winter wheat for at least 2 years.

Where such rotation is not possible (or economically desirable), residue management is essential. Remove infested straw and stubble (bale or burn) and/or plow it to depths below 3 inches.

Because a large root system on a plant that is well tillered in the fall has a larger number of potential sites for injury and infection, use production practices that minimize fall tillering and root growth. Plant late and limit the amount of starter fertilizers.

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Some wheat cultivars appear to tolerate or escape the disease, but none are known to have a high level of genetic resistance. The resistance exhibited may be caused by varietal differences in root growth patterns or structure, and it seems to relate directly to winterhardiness.

The level of resistance is known to vary with the environment and the cultural practices used. For example, anhydrous nitrogen applied in the spring in fallow years tends to intensify cephalosporium stripe infection, more so than fall-applied anhydrous nitrogen, on all wheat cultivars.

### Specific recommendations

1. *Rotate to a spring cereal or a nonhost crop* such as field or winter peas, alfalfa, clover, or corn. Clean fallow is also effective in reducing the amount of fungus present. A 2- or 3-year rotation out of winter wheat is best for controlling cephalosporium stripe.

2. *If you must grow winter wheat:*

a. *Use one or several residue management practices.* Burn or bail to remove straw from severely infected fields. This will reduce the amount of fungus returned to the soil. In fields where erosion can be a problem, delay burning until spring. If you burn, be sure to spread the residues evenly so that the burn is uniform. Alternately, use tillage operations that will minimize the amount of stubble at or near the soil surface. The mold-board plow is the

most effective implement for residue burial. If you must leave some residue on the soil surface to control erosion, use an offset disk in place of the plow.

Be sure to consider the effect of any disease control residue management strategy on your conservation compliance plan (if you are required to have one).

b. *Select a variety that has shown tolerance to cephalosporium stripe infection*—but remember that cultivar performance is likely to vary, depending on other cultural practices used and environmental conditions. None of the currently grown Pacific Northwest varieties have good genetic resistance. Some are tolerant—they show lower levels of infestation. Better varieties include Basin, Cashup, Eltan, Hill 81, Kmor, Lewjain and Rohde. Consult a current variety guide (Special Report No. 775, available from county Extension offices) for disease ratings on other varieties.

c. *Plant as late as possible;* however, remember that late planting may reduce yield potential and may increase the risk caused by winter kill, herbicide damage, and erosion.

d. *Adjust fertilization practices* when possible to minimize fall root growth and to encourage deep rooting (use deep banding of fertilizer where practical). Shallow-rooted plants are more likely to be exposed to injurious freeze-thaw phenomena.

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