K-STATE Research and Extension

Barley Yellow Dwarf

Department of Plant Pathology | EP165 | Wheat Diseases

Barley yellow dwarf is a viral disease that attacks a wide range of grasses, including wheat, oats, and barley. Barley yellow dwarf is most frequently a serious problem in southeastern and central Kansas. The occurrence of barley yellow dwarf is sporadic in other areas of the state.

Symptoms

The primary symptoms of barley yellow dwarf are stunting and yellow or red discoloration of the leaf tips (Figure 1).

The color of the symptoms depends on the variety. In most cases, the discoloration of the leaf tips increases over time and eventually the entire leaf is discolored. The midrib of the leaf often remains green longer than the edges of the leaf.

Typically, there is no mosaic pattern on the leaf, but sometimes there is some striping at the border between the discolored leaf tip and the green leaf base. In addition, leaves affected with barley yellow dwarf often have small black spots or streaks randomly spaced over the discolored portion of the leaf tip. These are presumably opportunistic infections by bacteria.

The disease can be uniformly distributed in fields, but it is most commonly found in patches that are 1 to 5 feet in diameter (Figure 2). Stunting is typically most severe near the center of a patch. At harvest, the heads of the diseased plants may be darkly discolored and have shriveled grain.

Quick Facts

- Symptoms of barley yellow dwarf include stunting and yellow or red discoloration of the leaf tips. The discolored leaves often have dark flecks within the affected area. The disease usually occurs in patches that are 1 to 5 feet in diameter with stunting most severe near the center of the patch.
- Selecting wheat varieties with moderate levels of resistance to barley yellow dwarf is the most effective way to manage the disease.
- Aphids spread the virus that causes barley yellow dwarf, and control of the disease is strongly associated with the biology of these insects. Planting wheat after the Hessian fly free date or using systemic insecticide seed treatments can reduce the risk of severe barley yellow dwarf. These control strategies may produce inconsistent results when weather conditions remain conducive for aphid populations in the fall.

Barley yellow dwarf can be confused with other production problems such as wheat streak mosaic or nutrient deficiency. A lab test is often required to distinguish the disease from these other problems. Contact the K-State Plant Disease Diagnostic Lab

Figure 1. Yellow or purple leaf tips caused by barley yellow dwarf.

Figure 2. Barley yellow dwarf often occurs in 1- to 5-foot diameter patches.

(*www.plantpath.k-state.edu/extension/diagnostic-lab*) for more information about testing options.

Life Cycle

The virus that causes barley yellow dwarf has a broad host range within the grass family, including many perennial weeds and forage grasses. Therefore, the reservoir of virus is potentially large. The virus is carried to small grains by several species of aphids, including bird cherry-oat aphids, English grain aphids, and greenbugs. The source of aphids may be local, or aphids may migrate great distances from southern states. Infection may take place in the fall or the spring.

There are at least five described strains of the virus that cause barley yellow dwarf, and each is defined by preferences for different aphid species as vectors. The most common strain in Kansas, the PAV strain, does not have a specific vector.

Losses

The amount of yield loss caused by barley yellow dwarf depends on the percentage of plants showing symptoms and the timing of the infection relative to crop development. When infection takes place in the fall, the virus has more time to disrupt plant growth and losses can exceed 35 percent. If plants are infected after heading; however, the losses are usually minimal.

Control

The control of barley yellow dwarf is closely linked to control of the aphids that introduce the virus into the plants. One of the primary means of controlling barley yellow dwarf is to avoid early planting, which often increases the likelihood that aphids will infest a field in the fall. Planting after the Hessian fly-free date reduces the risk of aphid infestation and minimizes the risk of barley yellow dwarf infection. This management strategy is less effective when fall temperatures allow aphids to remain active longer than normal.

No wheat varieties have high levels of resistance to barley yellow dwarf, but some are more vulnerable than others. Under severe barley yellow dwarf pressure, a moderately resistant variety (rating 4 or 5) might have a loss around 15 percent while a susceptible variety (rating 8 or 9) could have more than a 35 percent loss. Wheat variety ratings can be found in *Wheat Variety Disease and Insect Ratings*, MF991.

Chemical control of the aphid vectors can suppress barley yellow dwarf. Unfortunately, spraying insecticides for aphid control has not proved practical. First, multiple applications would be required to achieve satisfactory control. Second, it is not possible to wait for obvious aphid populations before spraying because by the time they are detected, significant virus transmission would already have occurred. Therefore, applications would have to be made on a preventive schedule. Given the unpredictable nature of barley yellow dwarf epidemics, it is not economical to make several preventive sprays in the fall and early spring.

Seed treatments containing the systemic insecticides (e.g., Gaucho XT, CruiserMax Cereals) are labeled for aphid control. These products have shown fair to good suppression of barley yellow dwarf in university trials. The variability in effectiveness is probably due to the timing of aphid infestation. If aphids arrive after the 4- to 6-week period of protection provided by the chemical, then the insecticide will have minimal effect.

Erick De Wolf
Plant Pathologist
Department of Plant Pathology

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