

Why Is a Green Bridge Bad?

By Meryl Rygg McKenna

Plant diseases can take a promising grain crop into an economic nose dive. The most common small grain viral disease in this part of the country is *wheat streak mosaic virus* (WSMV). This disease is transmitted by the wheat curl mite. The mite is very tiny and white, and can be mistaken for dirt on leaves until viewed with a hand lens. By itself, the mite causes curling of leaves; with the virus, it causes significantly more damage.

It is important to know that these mites can live and reproduce only in the green leaf tissue of plants. Mites and aphids (which transmit *barley yellow dwarf virus*) carry viruses from existing green leaves to new seedlings as they emerge, either in the same field or downwind of the infected field. Therefore, minimizing the number of green plants in a field during the time between crops can drastically reduce the viruses' chance for survival. Eliminate the "green bridge" and the mites cannot survive.

"Probably the most prevalent cultural issue for any of these diseases is controlling volunteer wheat two to three weeks prior to planting winter wheat, hence the term 'green bridge,'" said Keith Kennedy, Certified Crop Adviser in Laramie, Wyo., and a Board Member of the Rocky Mountain Certified Crop Advisers. "It is a particular issue when fields to be planted are adjacent to fields that received hail damage; this generally means that there are greater numbers of volunteer wheat plants that can serve as bridges both for vectors (carriers) such as wheat curl mite, and direct infection with stripe and leaf rusts."

Volunteer wheat may sprout after a hailstorm shatters seed heads, and mites will move from older infected plants to the young shoots, carrying a virus or fungus with them. And while rust (a fungus) doesn't over-winter, in a mild fall it can weaken winter wheat plants enough that they don't survive the stress of winter, Kennedy said.

Wheat streak mosaic

Wheat streak mosaic occurs in all wheat-growing regions of the world, in both winter and spring wheat. It also infects durum, barley, corn and many other grass species, including grassy weeds. In Montana, wheat streak mosaic was first observed in 1954. Four major outbreaks have occurred since then, with crop loss at more than 10 percent statewide each time. Losses in individual fields can reach 100 percent.

Symptoms can be confused, especially early in the spring, with nitrogen or sulfur deficiency, or injury from frost or herbicides. Yellowing of leaves can resemble the early stages of other diseases such as root rot, as well. Wheat plants infected early are stunted, discolored and may grow quite flat along the ground. They cannot take up water efficiently, and grow slowly or not at all. Heads that do form may not produce kernels. Infection at later growth stages allows grain production, but test weights are lower than normal.

Symptoms often show up first on the edges of fields, especially downwind from infected fields. Ditches can also harbor grassy weeds, which can act as a green bridge.

The mighty mite

The nearly microscopic wheat curl mite is responsible for transmitting the wheat streak mosaic virus. Early in its life, the mite acquires the virus from infected green leaf tissue. This is why destruction of the green bridge (eliminating green leaf tissue) is so important for stopping the disease.

To spread long distances, mites crawl to the tops of plants and the wind carries them to adjacent plants or fields. In cool and humid weather, mites can travel several miles. A quarter-mile of wind surfing is probably more typical.

Growers must pay attention to crops adjacent to infected fields. Avoid planting winter wheat next to or downwind from late-maturing spring wheat or corn, because both can harbor wheat streak mosaic virus and the wheat curl mite. If this cannot be avoided, plant later than the recommended planting date for your area so mite movement is inhibited by cold temperatures.

Spring wheat should not be planted near winter wheat that shows symptoms of wheat streak mosaic or was infested with wheat curl mites in the preceding fall, although sometimes spring wheat needs to be planted before symptoms are obvious. Spring wheat is highly susceptible to this virus.

When a wheat curl mite lands on a new host plant, it crawls to the youngest leaf to feed and reproduce. It takes only about 15 minutes for the mite to acquire the virus. Mites can infect new plants for most of their lives – at least two to four weeks.

It is best to eliminate the green bridge two to three weeks before planting a new crop so there is enough time for the mites and the virus to die off.

Pesticide control of wheat curl mites is not currently recommended, since no chemicals are registered for that purpose.

Examples of other wheat curl mite-carried viruses are *wheat mosaic virus*, which has been called *High Plains virus* (infecting barley and corn), and *triticum mosaic virus*. So far, these diseases are not common in Montana and Wyoming, although they do occur commonly in other wheat-growing states.

Mite reproduction stops with cool temperatures in the fall, but mites are capable of surviving cold winter temperatures tucked inside a plant's crown, with insulating snow cover. As winter wheat breaks dormancy in the spring, mites become active and spread the virus to healthy winter wheat plants or to emerging spring wheat.

Mite activity is highest just before and during harvest. High levels of mites are in the atmosphere during harvest, and any wheat planted during this time is at very high risk of being infested with wheat curl mites and infected with wheat streak mosaic virus.

Eliminating volunteer wheat can also benefit the grower by conserving soil moisture and minimizing other potential pest problems. Keep in mind that when volunteer wheat or cheatgrass is terminated with herbicide, mites sense their host is dying and will move, so avoid spraying volunteer wheat and grassy weeds upwind of susceptible wheat during cool, moist and windy weather. When the weather is hot and dry, it is less likely the mite will survive to find a new host.

Although it is not a cure-all, eliminating any green bridge is a good way to break the cycle of common viral and rust diseases.

For the complete text of source publications, photos of disease symptoms and helpful charts, see Montana State University Extension's bulletin, <http://store.msueextension.org/publications/AgandNaturalResources/MT200911AG.pdf>; University of Nebraska-Lincoln's Extension bulletin <http://ianrpubs.unl.edu/live/ec1871/build/ec1871.pdf>; and <http://extension.usu.edu/files/publications/factsheet/wheat-stripe-rust08.pdf>, from Utah State University Extension and Utah Plant Pest Diagnostic Laboratory. A plant virus survey from the Great Plains Diagnostic Network is summarized online at <https://www.apsnet.org/publications/apsnetfeatures/Documents/2009/WheatVirus.pdf>.

For more information on Certified Crop Advisers, or to find one near you, go to <http://www.certifiedcropadviser.org>.