

WHEAT STREAK MOSAIC FAQs

By Uta McKelvy, Extension Pathologist, Montana State University and
Andrew Friskop, Extension Pathologist, North Dakota State University

Wheat streak mosaic is a common and economically important disease of small grains in the Great Plains States, including Montana and North Dakota. The disease tends to be most damaging in production areas where fall-sown small grains overlap with spring-sown small grains. This fact sheet answers commonly asked questions to help identify and manage wheat streak mosaic.

What are the causes of wheat streak mosaic?

Wheat streak mosaic is a viral disease caused by three viruses in North America: Wheat streak mosaic virus (WSMV), High Plains wheat mosaic virus, and Triticum mosaic virus. These viruses can occur in the same field and even in the same plant, and we refer to this as a virus complex. WSMV tends to be the most common of the viruses. All three viruses are transmitted by the wheat curl mite, which is a tiny (1/100 inch) wingless arthropod that overwinters in the crowns of host plants and effectively transmits the viruses between host plants (Figure 1).



Figure 1. Wheat curl mites transmit viruses of the wheat streak mosaic complex. Using a magnifying glass, mites can be observed in rolled-up leaves or near the leaf base. (Photo: Dai Ito)

How do I recognize wheat streak mosaic in the field?

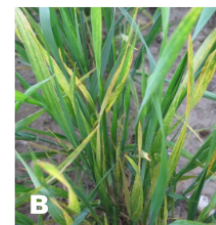
Yellow to pale green stripes creating a mosaic-like pattern on the foliage is a characteristic symptom of this disease (Figure 2). Severe infections will result in stunted plants, poor tiller development, and shriveled or no grain. Symptoms often appear first on the field edges or in pockets in the field where volunteer wheat and other hosts occur. Other plant diseases, environmental effects, and nutrient disorders can cause similar symptoms. Therefore, the best way to confirm wheat streak mosaic is to send a plant sample to a plant disease diagnostic lab.



Figure 2. A) Wheat streak mosaic infected winter wheat field showing stunted, yellow-looking plants. (Photo: Monica Brelsford)

Are all hosts equally susceptible to wheat streak mosaic?

There are many hosts for wheat streak mosaic, but they are not all equally susceptible. The most susceptible hosts support wheat curl mite populations and are susceptible to one or several of the viruses in the complex. Winter and spring wheat are very susceptible crop hosts. Barley, durum, rye, corn, and other cereal crops can also host the mites and viruses. Downy brome (cheatgrass) also hosts wheat curl mites and viruses and acts as a source of infection in the Northern Great Plains.



B) Close-up of wheat streak mosaic infected wheat plants with yellow streaks. (Photo: Mary Burrows)

How much yield loss can I expect?

Yield loss from wheat streak mosaic depends on the cultivar planted and the timing of infection. Yield losses will be most severe if plants become infected in the early stages of plant growth in the fall or before tillering, which can result in complete crop failure. Some winter wheat cultivars are resistant to wheat streak mosaic or tolerate the disease with little impact on grain yield. One example is the cultivar Brawl CL Plus which had consistently low WSMV incidence and only small yield losses in Montana field experiments. Spring infection of susceptible winter wheat cultivars (at the 3-4 leaf stage) resulted in grain yield losses as high as 50% in field experiments. There are no spring wheat cultivars with resistance to wheat streak mosaic available, and yield losses ranged between 30 and 80% in Montana field experiments.

What can I do to prevent the disease from infecting my crop?

There are no cures for wheat streak mosaic once a crop is infected. Therefore, preventing infection is the most effective strategy for managing the disease. An integrated strategy is strongly encouraged. The green bridge, which describes weeds and volunteer crop plants that harbor wheat curl mites and viruses between crops, perpetuates wheat streak mosaic disease from one cropping season to the next (Figure 3). Disrupting the green bridge is an effective strategy for managing wheat streak mosaic. For example, do not plant winter wheat when small grain volunteers are present. Instead, eliminate volunteer plants by tilling or spraying herbicides and wait at least two weeks after the plants are dead before planting winter wheat. Avoid early winter wheat planting, especially if you anticipate a warm, extended fall; this will reduce exposure of young winter wheat plants to dispersing wheat curl mites. If wheat streak mosaic risk is high, consider planting a winter wheat variety that is more tolerant to the disease or planting a non-host crop (i.e. broadleaf crops such as pulses or canola).

How can I assess wheat streak mosaic risk?

Montana State University has developed an online learning tool called AWaRe – Assessment of Wheat streak mosaic Risk that demonstrates the most important factors related to the disease risk in the Northern Great Plains. The tool is free and available at montana.edu/extension/plantpath/resources/.

HELPFUL RESOURCES ON WHEAT STREAK MOSAIC

MSU Schutter Diagnostic Lab
Montana State University
119 Plant BioScience Bldg
P.O. Box 173150
Bozeman, MT 59717-3150
montana.edu/extension/diagnostics/

NDSU Plant Diagnostic Lab
North Dakota State University
1402 Albrecht Blvd.
Walster Hall, 306
Fargo, ND 58102
www.ag.ndsu.edu/pdl

“AWaRe – Assessment of Wheat streak mosaic Risk in Montana” online tool
montana.edu/extension/plantpath/resources/index.html#plant-path-tools

“Cereal Viruses of Importance in Montana,” MSU Extension MontGuide (MT200911AG)
store.msueextension.org/Products/Cereal-Viruses-of-Importance-in-Montana-MT200911AG-MT200911AG.aspx

Grow Plant Health Exchange, Focus on wheat
planthealthexchange.org/wheat/Pages/default.aspx

“Managing Wheat Streak Mosaic,” UNL Nebraska Extension Publications
extensionpubs.unl.edu/publication/9000016365448/managing-wheat-streak-mosaic/



Figure 3. Wheat curl mites and wheat streak mosaic viruses may spread from volunteer wheat and grasses, that have not been managed or managed too late, into the new wheat crop and infect it with wheat streak mosaic. (Photo: Andrew Friskop)

Copyright © 2023 MSU Extension

We encourage the use of this document for nonprofit educational purposes. This document may be reprinted for nonprofit educational purposes if no endorsement of a commercial product, service or company is stated or implied, and if appropriate credit is given to the author and MSU Extension. To use these documents in electronic formats, permission must be sought from the Extension Communications Director, 135 Culbertson Hall, Montana State University, Bozeman MT 59717; E-mail: publications@montana.edu

The U.S. Department of Agriculture (USDA), Montana State University and Montana State University Extension prohibit discrimination in all of their programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital and family status. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Cody Stone, Director of Extension, Montana State University, Bozeman, MT 59717.