

Plant Pathology Fact Sheet

Wheat Spindle Streak Mosaic

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IMPORTANCE

Wheat spindle streak mosaic (WSSM), also known as wheat yellow mosaic, is a common virus disease that affects only wheat. In most years, WSSM has little to no impact on crops grown in Kentucky. However, significant yield damage can occur in highly susceptible varieties when conditions favor infection and subsequent disease development.

SYMPTOMS

It is common for WSSM symptoms to be initially uniformly distributed across fields, but fade as temperatures warm in mid-spring. During cool springs, however, symptoms may persist throughout the season, in which case significant yield damage is possible.

WSSMV symptoms are highly variable, depending on the wheat variety and growing conditions. At crop “green-up” (typically, mid- to late March) random yellow to light green dashes running parallel to the leaf veins occur on foliage (FIGURE 1). With age, some dashes will be pointed at one or both ends and may have an island of green tissue in their center (FIGURE 2). These classic “spindle”-shaped lesions give the disease its



FIGURE 1. SYMPTOMS OF WHEAT SPINDLE STREAK VIRUS.

name. Diseased plants are slow to green-up in early spring compared to healthy fields. When symptoms persist, affected plants may be stunted and thin.

Some varieties have a more severe reaction to WSSMV than is “typical” of susceptible varieties. For instance, McNair 1003 develops lesions with necrotic (dead) areas resembling lesions caused by speckled leaf blotch or bacterial streak. The variety Saluda develops an extreme yellow leaf reaction which is usually noted in the crop throughout the season, even when yield is not seriously impacted.

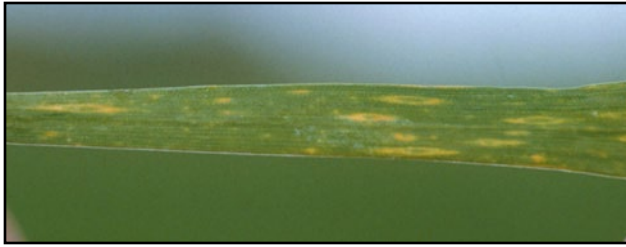


FIGURE 2. TYPICAL SPINDLE-SHAPED LESIONS OF WSSMV.

CAUSE AND DISEASE DEVELOPMENT

Wheat spindle streak mosaic virus (WSSMV) is transmitted to wheat by the soil-borne fungus-like organism, *Polymyxa graminis*. This vector, which is present in a large number of agricultural soils in Kentucky, is capable of overwintering for many years with or without host tissue. The virus is introduced into susceptible plants when motile *P. graminis* spores (zoospores) carrying the virus are released into saturated soils and then penetrate root tissues (FIGURE 3). While infection can also take place in winter or early spring, it primarily occurs in the fall; however, symptoms do not develop until the following spring.

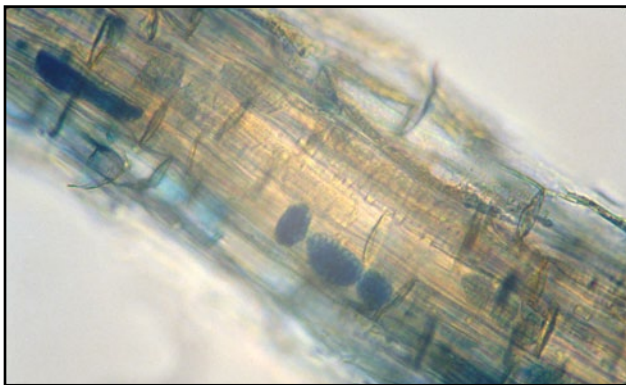


FIGURE 3. MICROSCOPIC VIEW OF *POLYMYXA GRAMINIS* IN WHEAT ROOT TISSUE.

The onset and degree of symptom expression can be highly variable in a field from one year to the next, even though *P. graminis* and the virus are present at relatively constant levels. This is related to the time of year wheat becomes infected and the range and consistency of winter and early spring temperatures. This disease is favored by

wet soils, although excessive moisture is not required for severe disease to occur.

Plants with WSSMV tend to be evenly distributed throughout the field because of the uniform distribution *P. graminis*, the vector. Symptoms are most severe in springs following a consistently cold winter; they are less intense following winters and early springs where numerous mild days were experienced at regular intervals. In most years, infections become symptomless as temperatures warm in the spring. In these cases, yield reductions associated with WSSMV infection will be minimal. However, when symptoms continue to be visible as the plants move into the boot stage or later, yield reductions of up to 25% may be experienced.

DISEASE MANAGEMENT

Once plants are infected in the fall, nothing can be done to moderate the effects of the disease the following spring. This disease cannot be controlled with fungicides. The following management practices are recommended for fields with a history of WSSM.

- Plant resistant varieties.
- Postpone fall planting operations past the Hessian fly-free date, until mid-October or later. This delay in planting means that wheat seedlings will emerge in cooler soils that are less favorable to *P. graminis* activity and, thus, conditions will be less favorable for infection by WSSMV.
- Improve internal and surface drainage of fields where problems exist.
- Avoid crop production practices that encourage soil compaction.

ADDITIONAL RESOURCES

- Kentucky Integrated Crop Management Manual for Small Grains, IPM-4 (2009)
<http://www.uky.edu/Ag/IPM/manuals/ipm4smgr.pdf>

- Comprehensive Guide to Wheat Management in Kentucky: Disease Management (Section 7), ID-125 (2009)
<http://www.ca.uky.edu/agc/pubs/id/id125/07.pdf>
- Kentucky Integrated Crop Management Manual for Small Grains, IPM-4 (2009)
<http://www.uky.edu/Ag/IPM/manuals/ipm4smgr.pdf>

- Kentucky Plant Disease Management Guide for Small Grains, PPA-10c (1993)
<http://www.ca.uky.edu/agc/pubs/ppa/ppa10c/ppa10c.pdf>

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Photos by Donald Hershman, University of Kentucky

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