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## G74-202 Wheat Soil-Borne Mosaic Disease (Revised October 2001)

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## Wheat Soil-Borne Mosaic Disease

Host range, symptoms, disease cycle, and control options for wheat soil-borne mosaic disease are discussed.

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*John E. Watkins, Extension Plant Pathologist*

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Wheat soil-borne mosaic virus affects wheat (*Triticum aestivum* L.) growing primarily in central, eastern and west central Nebraska. This disease occurs annually; however, its effect on crop production in Nebraska varies from year to year due to variety selection, cropping practices and environmental conditions favoring disease development. In years when spring temperatures remain cool for extended periods, the virus remains active in infected plants, enhancing symptom development and increasing yield loss. The virus reduces tillering and affects kernel weights and test weights.

### Host Range

Wheat soil-borne mosaic virus infects wheat, rye and barley with winter wheat being the primary host.

### Symptoms

The virus-induced symptoms range from none to a yellow/pale green mosaic mottling and streaking of individual leaves (*Figure 1*). Affected plants are stunted; however, the degree of stunting varies with the variety's susceptibility. Leaf symptoms first appear in early spring, persist until warmer weather, and then diminish. The youngest leaf shows the truest mosaic pattern. Symptom expression is favored by temperatures below 65°F. Infected plants may be stunted with roots sometimes being more severely stunted than shoots. In the field, the disease appears as irregular patches of yellow or pale green wheat (*Figure 2*). The pattern often conforms to low, wet areas or drainage paths and areas around old building sites. Sometimes the pattern is generally distributed across a field.



**Figure 1. Mosaic leaf symptom of wheat soil-borne mosaic.**

### Disease Cycle

Wheat soil-borne mosaic survives in the soil in association with a zoosporic protozoan, *Polymyxa graminis* Led. (an obligate parasite of roots). The virus particles are apparently inside the special spores of the fungus (zoospores and resting spores). The resting spores of this protozoan germinate to form mobile zoospores which swim in the films of moisture in the soil. They infect the root hairs of the host plant and become colonized in the root cortex. The wheat soil-borne mosaic virus infects the plant after the zoospores penetrate the root. *Polymyxa* itself does not cause serious root rot problems; however, the virus is capable of long-term survival in the soil, apparently equally able to survive long periods in its protozoan vector. This is probably one reason crop rotation has not been an effective control for wheat soil-borne mosaic.

Infections occurring in the fall are the most important for disease development. Soil temperatures of 50°F to 60°F favor infection of the roots by *P. graminis*. Air temperatures of less than 65°F and short day lengths favor multiplication and systemic spread of the virus in the wheat host which enhances symptom development. Temperatures above 75°F subdue virus multiplication and symptom expression. This virus survives in the soil from season to season, protected by the protozoan vector. Once the soil becomes infested, the virus and the vector persist for many years. The disease is associated with cool, wet soils and is usually found in the low-lying areas of a field, but is not confined to these areas. Symptoms seldom appear in the fall, but are expressed as a light green color in infected plants in early spring. The virus and its vector spread from field to field in soil on equipment and probably also with wind blown dust particles. The virus is not seed borne.

## Control

Growing resistant or tolerant varieties is the best method of control. Consult the current "Nebraska Seed Book for Fall Planted Crops"\* for a list of wheat varieties recommended for Nebraska. This booklet is published annually by the Nebraska Crop Improvement Association and lists characteristics of winter wheat varieties and ratings of their reactions (resistance or susceptibility) to wheat soil-borne mosaic as well as other diseases.

Planting winter wheat at the optimum date for a given geographic area is a good cultural practice that not only reduces the risk for wheat soil-borne mosaic, but also the risk for wheat streak mosaic, barley yellow dwarf, wheat yellow mosaic and crown and root rot. These dates range from early September in the Panhandle to early October in southeast Nebraska. If winter wheat is planted too early in the fall, the wheat soil-borne mosaic has a longer incubation period which increases crop loss.

Although crop rotation effectively reduces the threat of some diseases such as Fusarium head blight, it has limited value in managing wheat soil-borne mosaic. This is also true for the wheat-fallow-wheat cropping system practiced in western Nebraska.

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\*Annual editions of the "Nebraska Seed Book for Fall Planted Crops" are available from the University of Nebraska-Lincoln, Nebraska Crop Improvement Association, 267 Plant Sciences Hall, P.O. Box 830911, Lincoln, NE 68583-0911.

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### ***File G202 under PLANT DISEASES***

#### ***C-10, Field Crops***

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