Factsheets – Wheat
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High Plains Virus on Wheat and Corn

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http://www.plantpath.ksu.edu/pages/factsheet

An apparently new virus was discovered in corn and wheat in Kansas and several other states in the summer and fall of 1993. Strangely, it turned up in Texas, Colorado, Kansas, and Idaho in the same year. It's possible that it has been around for a while and was coincidentally discovered in several places at about the same time. Virus particles looked similar to those in the tenuivirus group. Therefore the virus was tentatively named the High Plains Tenuivirus (HPTV). However, the virus morphology is still in question, and it is likely that it is not a tenuivirus. Therefore, we are going to call it High Plains Virus (HPV) for now.

SYMPTOMS

Symptoms on corn are severe stunting, yellowing, and a strong mosaic. These symptoms are somewhat similar to those of corn lethal necrosis. However, corn plants with HPV often have distinctive longitudinal red stripes on the leaves. Affected plants typically occur next to wheat fields. Fortunately, only a few corn hybrids seem to be affected. Interestingly, all corn plants with HPV were also infected with wheat streak mosaic virus (WSMV). However, symptoms were much more severe than with WSMV alone, so it was realized that there was an additional component.

On wheat, HPV usually occurs along with WSMV just as it does on corn. Plants with HPV and WSMV typically occur next to volunteer wheat. Symptoms of doubly-infected plants are severe chlorosis, strong mosaic, severe stunting, and rapid plant death. The rapid death of infected plants was a serious hindrance to work on the virus. Occasionally, singly-infected plants have been found. Symptoms of pure HPV infection are quite variable. Some leaves have green and yellow stripes at the leaf tips similar to wheat streak mosaic. Others have yellow spots. Still others have green islands on a light green background and look similar to soilborne mosaic. All of these types of leaves can occur on the same plant. Due to the confusing symptoms, HPV can only be reliably diagnosed by ELISA test. We haven't yet found any differences between varieties in symptom expression.

LIFE CYCLE

Drs. Dallas Seifers and Tom Harvey recently discovered that HPV was transmitted by the wheat curl mite, the same vector that carries wheat streak mosaic virus. There is no other known vector. Therefore it appears that the life cycle of HPV is similar to WSMV. That is why the two viruses often occur together. However, WSMV seems to be much more common that HPV at this time.

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Typically, the source of both curl mites and the two viruses is volunteer wheat. The most severe infection is found where volunteer wheat provides a "green bridge" through the summer between successive wheat crops. The worst case scenario is when wheat gets hailed just before maturity. This leads to an early crop of

volunteer, and mites move onto it very readily from the old crop. A cool, wet summer allows maximum survival of the volunteer wheat and the mites. Then a long, warm fall allows plenty of time for mites to move onto the newly seeded wheat and begin reproduction. A hot, dry spring is the final blow because infected plants have poor roots and are more susceptible to drought.

Wheat, barley, some varieties of oats, some varieties of corn, downy brome, green foxtail, and yellow foxtail are confirmed hosts of HPV. Curl mites can multiply on all of these hosts, so some of these could possibly be a source of HPV. However, we rarely see a significant problem with anything except volunteer wheat.

Mites depend on the wind to carry them to new plants. That is why infestations are worst northeast of volunteer fields (direction of prevailing wind is northeast). When they land on a plant, they move to the youngest unfurling leaf and begin feeding. The next generation takes only 7 to 10 days to produce. They seem unaffected by cold winter temperatures and may even multiply during winter months. There are no chemicals which are effective or labelled for curl mite control. Their major weakness is their need for fresh plant material. In the absence of living leaves, they can only survive a few days.

CONTROL

We don't yet have good data on losses due to HPV. In the KSU Plant Diagnostic Lab in 1994, 113 samples were diagnosed with WSMV only, 3 samples with HPTV only, and 9 samples with both viruses. Therefore, HPTV is apparently much less important than WSMV in Kansas. Since both viruses are probably controlled by late planting and volunteer control, no special additional recommendations are likely necessary for HPTV. This may change as new sources of high resistance to WSMV are incorporated into new cultivars.

The first and most important control is to break the bridge created by volunteer wheat. See "Be a Good Neighbor: Control Your Volunteer Wheat," KSU Extension publication number MF-1004. Volunteer should be killed at least 2-3 weeks prior to the emergence of the new crop. It may be killed by cultivation or by herbicides, but it must be a thorough job because just a few plants can harbor a lot of mites. Since mites travel in the wind, volunteer must be killed within 1/4 to 1/2 mile of the new field. Coordination of volunteer control is a community effort which requires good cooperation between neighbors.

The second control is to avoid early planting. Early planting allows the mites plenty of time to move into the field, reproduce, and spread. Waiting until after the "fly-free" date is recommended for wheat streak mosaic control.

There are no known wheat varieties with resistance to HPV.

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For more information about wheat, visit the Kansas State University Wheat Page

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