

## High Plains Virus--Virus of Corn and Other Cereals HPV

EPMS 006

### Quick Facts

- High Plains Disease is caused by a virus.
- The Wheat Curl eriophyid mite (*Aceria tosichella*) vectors High Plains Disease.
- Barley, maize, oats, rye and wheat are the primary host plants for HPV.
- HPV first occurred in Utah in 1994 on field and sweet corn.
- Once a host is infected, there are no curative measures for HPV.

ability to vector both viruses, it is common to find host plants infected with both HPV and WSMV. This dual infection often results in misdiagnosis of HPV infections. The wheat curl mite is extremely small and very difficult to observe even with a hand lens.

### Symptoms:

Symptom expression depends heavily on host crop and age at which infection is initiated. In general, the younger a plant is infected, the more severe the symptoms and impact on the plant. The primary host of concern to Utah agriculture is corn. Symptoms on field and sweet corn are stunting, yellowing (chlorosis) and mosaic foliar patterns. Young infected plants are stunted and the foliar symptoms become more severe as the plant ages (Figure 1). Initial mosaic symptoms occur along veins and may progress into streaking patterns that are parallel with the leaf veins (Figure 2). Streaks can be up to an inch wide and in later disease stages become necrotic.



Figure 1. Sweet corn field infected with HPV. Notice yellow and stunted appearance of the corn.

High plains disease (virus) was prevalent in the corn and cereal production areas in the United States during 1993; however, it was not identified in Utah until the following season, 1994. Since its initial discovery, the disease has been classified as a virus and is therefore known as High plains virus (HPV). Extension, research and other outreach publications may refer to this disease as high plains disease, but recent molecular research has placed the causal agent of this disease into an undescribed class of viruses.

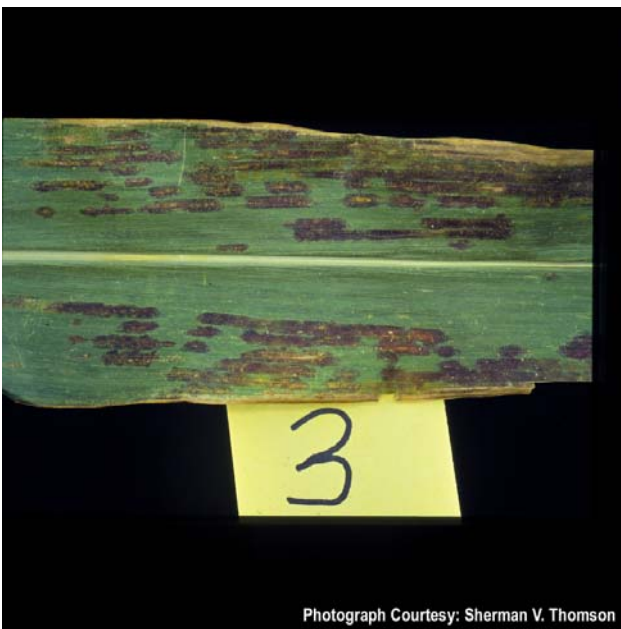
The eriophyid wheat curl mite (*Aceria tosichella*) is found throughout corn and cereal production fields in the United States and in addition to HPV, it is known to vector Wheat Streak Mosaic Virus (WSMV). Because of its

Necrotic streaks can vary from straw to purple in color and adjacent tissue will appear green and unaffected. Upon close examination, young infections have a concentric lesion (Figure 3) that will eventually coalesce with other lesions to form the characteristic foliar streaks.



Photograph Courtesy: Sherman V. Thomson

**Figure 2.** Characteristic yellow streaking of infected leaves. Notice infected (yellow) tissue adjacent to healthy green tissue, particularly on the center leaf in photograph.



Photograph Courtesy: Sherman V. Thomson

**Figure 3.** Young infections on field corn leaf. Notice concentric lesions along veins. Many lesions are coalescing to form larger streaks characteristic of HPV.

atypical viral structure hindered the initial identification of the High Plains Virus. The virus is transmitted via the seed but only at a very low incidence. It is not known whether the virus is persistent or non-persistent within the wheat curl mite.

Regardless of the persistent nature of the virus within the wheat curl mite, this mite is efficient at virus transmission. The wheat curl mite is an eriophyid mite and because of its small size it is difficult to view even with a 10X hand lens. They are cream colored and tear drop to cylindrical in shape. The wheat curl mite is wingless and relies upon wind currents for long distance dispersal. Without an adequate food source, these mites perish within 24 hours; therefore infestations normally occur along contiguous plantings of susceptible host plants. These mites feed on many alternate weed grass hosts, which are also reservoirs for HPV.

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### Control:

As with all other plant viruses, there are no post infection controls. Host resistance and cultural controls are effective at preventing or lessening the impact of HPV in many cases. Table 1 lists susceptibility of commonly grown corn varieties; unfortunately there are no known resistant varieties of wheat, barley, oats or rye.

Cultural control recommendations for the prevention of HPV infections center around disrupting the wheat curl mite life cycle. Since this mite is unable to survive more than 24 hours without a food source and miticides are not effective nor warranted, excellent control of grass-type weeds and volunteer grain crops is crucial. Delayed planting of winter wheat reduces the chance for the wheat curl mite to transmit the virus and prevents an overwintering reservoir for HPV. Early season planting of corn has been shown to reduce the effect of HPV infections by allowing the plants to mature before the wheat curl mite becomes active. In general, the more mature a plant is

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### Causal Agent:

HPV is caused by a complex viral particle unrelated to any other currently described plant virus. This complexity coupled with the

at the time of infection, the less impact an HPV infection will have on production.

**Table 1. Corn variety resistance ratings against HPV.**

Variety	Resistance rating
<i>Sweet corn varieties</i>	
Ambrosia	Susceptible
Challenger	Susceptible
Crisp’N Sweet	Susceptible
Del Monte DMC 20-3	Susceptible
Del Monte DMC 20-10	Susceptible
Double Gem	Susceptible
Extra Sweet	Susceptible
Honey and Pearl	Susceptible
How Sweet It Is	Susceptible
Native Gem	Susceptible
Phenominal	Susceptible
Shasta	Susceptible
Style Sweet	Susceptible
710	Susceptible
Delectable	Resistant/Tolerant
Empire	Resistant/Tolerant
Gemini	Resistant/Tolerant
Imaculata	Resistant/Tolerant
Incredible	Resistant/Tolerant
Platinum Lady	Resistant/Tolerant
Silver Queen	Resistant/Tolerant
711	Resistant/Tolerant
<i>Field Corn Hybrids (Dent Corn)</i>	
Golden Harvest 2544	Susceptible
Funks 4292	Susceptible
ICI 8310	Susceptible

List reproduced from University of Idaho College of Agriculture High Plains Disease Fact sheet #CIS 1038.

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## Information to obtain for High Plains Virus samples

### Grower Information

Name:

Address:

Farm Location:

### Crop Information:

Plant and Variety:

Planting Date:

Wheat Curl Mite population in field: yes/no

Source of irrigation water:

Irrigation type and frequency:

Soil type:

Fertilization and pesticide applications:

Fertilizer (units applied):

Insecticide applications:

Insecticide Name:

Target Pest(s):

Neighboring farms with wheat : yes/no

Does what show symptoms of wheat curl mite yes/ no

Are neighboring farms experiencing same disease: yes/no

Percent crop loss:

Recent environmental conditions experienced at affected location: