



High Plains Disease

A new disease attacking corn and other cereals in Idaho

In the summer of 1993, a previously unknown disease of corn was detected in Colorado, Kansas, and Texas, and in Gooding, Jerome, and Twin Falls counties in Idaho. The disease is called the High Plains Disease (HPD) or High Plains "Virus" Disease, based on its initial detection in the central United States. In Idaho, this disease affected about 750 acres of sweet corn, with yield losses exceeding 50 percent in several corn fields. Two circles under center pivot irrigation, totaling 195 acres, were abandoned because of the disease. In 1994, HPD was confirmed in several sweet corn fields in southwestern Idaho, where most of the United States' supply of sweet corn seed is produced.

Although HPD has affected only sweet corn in Idaho, it has affected sweet and/or



Figure 1. Stunted, yellow plant in the foreground has the high plains disease.

Figure 3. Plants with high plains disease often exhibit wide yellow streaks extending the length of the leaf.



field (dent) corn in other states, including Utah, which reported the disease in 1994. HPD is spread by the wheat curl mite (*Aceria tosichella*), but its cause has yet to be identified.

Symptoms

Primary symptoms of the disease include stunting, chlorosis (yellowing), and a mosaic pattern on leaves. The severity of these symptoms depends on variety, stage of growth when infection occurs, and sometimes other factors. Stunting and yellowing are very apparent when young plants are infected (Fig. 1). The mosaic pattern, which appears as light spots or short streaks scattered across a green surface (Fig. 2) or as green spots or streaks on a yellow surface, may be seen on the plant's leaves. In younger leaves, this pattern will appear near the whorl.

In advanced stages of HPD, chlorotic stripes an inch wide or more may form and run parallel to the leaf veins along the entire length of the leaf (Fig. 3), although the rest of the leaf may appear normal. These stripes seem to be concentrations of mosaic streaks. Later, the leaf tissue exhibiting the chlorotic stripes may die, although the rest of the leaf will remain viable (Fig. 4). In some cases, reddish-purple streaks extending the length of the leaf may occur in part or all of the band (Fig. 5).

HPD may also stunt and weaken plants' root systems. In 1993, plants in severely diseased fields had small, rotted

root systems, while adjacent healthy plants were firmly rooted. Although the cause of this root rot was not determined, its severity may well have been aggravated by the new disease.



Figure 2. Corn leaf with mosaic symptom of green spots on yellow tissue.

Disease Spread

Researchers discovered in 1994 that HPD was spread by the wheat curl mite vector, which also spreads wheat streak mosaic virus (WSMV) and the wheat spot mosaic agent. Mixed infections of WSMV and the HPD agent frequently occur, since the vector is the same for both diseases. The mite, so small it can only be seen with 10X magnification or more, is cream colored, cylindrical, and wingless (Fig. 6). Wheat curl mites depend on air movements for dispersal. Since these mites cannot survive more than about a day without a liv-

ing host plant, they must move over a “green bridge” from one living host to another within a short time. In at least one case in Idaho, corn growing near a wheat field had a high incidence of disease near the wheat field, but that incidence diminished as the distance from the wheat field increased.



Figure 4. In advanced stages of the high plains disease, leaf tissue with chlorotic streaks may die and turn brown.



Figure 5. In some cases, red-dish purple streaks appear in plants with the high plains disease.

Hosts

Information about the reaction of corn varieties to HPD is limited. Many popular varieties are susceptible (Table 1).

Host Range

In addition to sweet corn and field (dent) corn, wheat, barley, and several grasses (yellow foxtail, green foxtail, barnyard grass, prairie cup grass, and knot root bristle grass) are hosts

Table 1.

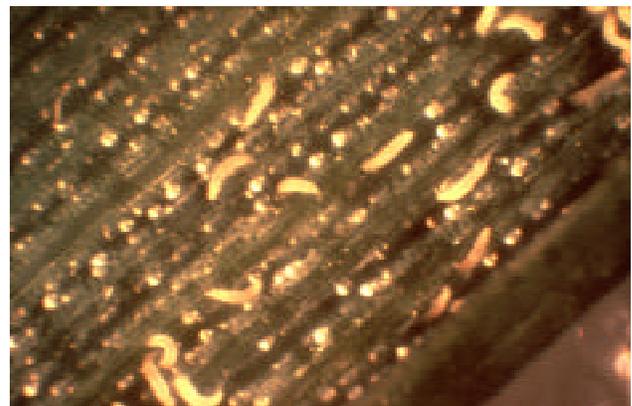
Reaction of selected corn varieties to the high plains disease. Varieties listed are a compilation based on observations by several workers under varying conditions.

<u>Susceptible</u>	<u>Resistant or tolerant</u>
Sweet corn varieties	
Ambrosia	Delectable
Challenger	Empire
Crisp'N Sweet	Gemini
Del Monte DMC 20-3	Imaculata
Del Monte DMC 20-10	Incredible
Double Gem	Platinum Lady
Extra Sweet	Silver Queen
Honey and Pearl	711
How Sweet It Is	
Native Gem	
Phenominal	
Shasta	
Style Sweet	
710	
Dent corn hybrids	
Golden Harvest 2544	
Funks 4292	
ICI 8310	

Figure 6.

The wheat curl mite spreads high plains disease. It can be seen with 10X magnification.

(Photo courtesy of the University of Nebraska.)



of the HPD agent. HPD has occurred widely in wheat grown in the Panhandle region of Texas, but a 1994 survey of winter wheat in southern Idaho's Jerome and Gooding Counties, in the vicinity of the previous year's diseased corn fields, revealed only two affected plants, one each in fields at least five miles apart. Although barley seedlings in a greenhouse study were killed when mites carrying the causal agent of HPD were transferred onto them, there haven't been any reports of affected barley fields. In Kansas, HPD is commonly found in yellow foxtail and occasionally found in green foxtail.

Control

No specific control measures are known for HPD, but measures similar to those for wheat streak mosaic are thought to be helpful. The key is to break the green bridge and prevent spread of the disease to corn and other hosts: 1) plant corn early; 2) control volunteer wheat and grassy weeds which may harbor the mite and/or the disease agent; and 3) plant resistant varieties when they become available.

Acknowledgments

The author thanks Dr. Nancy Robertson, formerly of Texas A & M University, for much of the early work in the diagnosis of this new disease in Idaho and Dr. Stanley Jensen for recent work in diagnosis.

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Cover: Most of the sweet corn plants in this 100 acre field in Gooding County in 1993 have the high plains disease.

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, LeRoy D. Luft, Director of Cooperative Extension System, University of Idaho, Moscow, Idaho 83844. The University of Idaho provides equal opportunity in education and employment on the basis of race, color, religion, gender, national origin, age, disability, or status as a Vietnam-era veteran, as required by state and federal laws.