

Emerging Viruses in Greenhouse Tomatoes

Updated: October 2003

Three new viral diseases have shown up in greenhouse tomato crops worldwide. Pepino Mosaic Virus (PepMV) has been introduced recently into Canada but the other viruses discussed in this fact sheet have not been found here yet. Information on the viruses is limited, and further research is required. Early detection of viral outbreaks is critical to reducing crop loss.

If a new viral disease is found, it is critical to get it properly identified. Viruses are too small to be seen with light microscopes. Specialized techniques are required in order to confirm the disease. Once you know which virus is present, specific control strategies can be implemented.

Pepino Mosaic Virus (Potexvirus)

Virus Description

Pepino Mosaic Virus (PepMV) is a flexuous rod-shaped virus that was first described in 1980 from the pepino plant. It recently appeared in greenhouse tomatoes in Europe and later in North America and it may be a different strain of PepMV from the one originally described in pepino. PepMV systemically infects tomatoes; the virus has been detected in leaves and roots of infected plants. A minimum temperature of 65 – 70° C for 10 minutes is required to inactivate the virus in plant sap.

Current Distribution

PepMV was first reported in 1980 from pepino in Peru. It re-appeared in 1999 in greenhouse-grown tomatoes in the Netherlands and UK (south England) and has subsequently been found in North American greenhouse tomato production. It was first detected in British Columbia in 2003. Studies have shown that potato can also be infected, although the disease has never been seen in a potato crop.

Symptoms

Infected tomato plants (figures 1 – 3) have yellow spots and bubbly areas on the leaves, mild interveinal chlorosis (yellowing), and leaf distortions such as spindly leaves. The heads of infected plants are often stunted and thin. Reports on the severity of the damage have varied from minor to severe.



Figure 1: Leaf symptoms of a Pepino Mosaic Virus infected tomato plant. Photo courtesy of R. Valentine, Kopperts



Figure 2: Close up of Pepino Mosaic Virus infected tomato leaf. Photo courtesy of R. Valentine, Kopperts



Figure 3: Severe symptoms of a Pepino Mosaic Virus infected tomato plant. Photo courtesy of R. Valentine, Kopperts



Figure 4: Symptoms of fruit from a plant infected with Pepino Mosaic Virus. Photo courtesy of R. Erwin, Canagro Produce Ltd.

Spread

PepMV appears to be spread mainly by contact. Contact can occur from contaminated tools, hands, and clothing. Direct plant-to-plant contact may also spread the virus. Seed or insect transmission appears to be unlikely at this time. Its ability to spread through recirculating irrigation systems is unknown. Further study is required.

Control

European recommended control strategies for PepMV focus on sanitation. Plant removal, limited access to affected rows, sanitation of clothing and tools are all critical. Submerging hands and tools in skim milk prior to working with each plant has been reported to reduce transmission of the virus.

Tomato Infectious Chlorosis Virus (Closterovirus)

Virus Description

Tomato Infectious Chlorosis Virus (TICV) has been shown to have a moderately wide host range, with 26 species of plants in many families which all show similar symptoms. It does not infect cucurbits. Hosts include tomato, potato, lettuce, and petunia.

Distribution

The disease was first reported in 1993 from California field tomatoes. Infected petunia and ranunculus in greenhouses were also confirmed. In 1997, the virus was found in greenhouse tomatoes in North Carolina and Italy.

Symptoms

Symptoms can be confused with nutritional disorders, pesticide toxicity, or natural senescence. Tomato leaves have yellowing between veins, leaf rolling, and tissue death (browning) (figure 5). Infected leaves (especially older ones) may also turn red.



Figure 5: Tomato plant infected with Tomato Infectious Chlorosis Virus. Courtesy of G. Wisler, USDA-ARS, California

Spread

Transmitted by the greenhouse whitefly (*Trialeurodes vaporariorum*). Other whiteflies (*Bemisia* spp.) are not known to transmit TICV. The virus is not mechanically transmitted.

Tomato Yellow Leaf Curl Virus (Bigeminivirus)

Virus Description

Tomato Yellow Leaf Curl Virus (TYLCV) has a broad host range but has only been reported to be a problem in tomato.

Current Distribution

In the early 1990's, TYLCV was introduced into the Dominican Republic, Cuba, and Jamaica from Israel. In 1997 it was found in Florida for the first time. By 1998 it had spread throughout much of Florida and into Georgia. It has since been reported in Morocco.

Symptoms

Infected tomato plants have smaller-than-normal leaves that are distorted, cupped, and have a yellow mottle (figure 6). Infected plants become severely stunted (figure 7), especially plants that are infected when young. Flower drop often occurs, causing serious yield loss.



Figure 6: Leaf symptoms of a tomato plant infected with Tomato Yellow Leaf Curl Virus. Courtesy of T. Schubert, Florida Department of Agriculture.

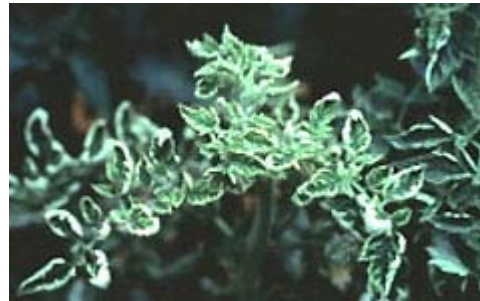


Figure 7: Severe symptoms of a tomato plant infected with Tomato Yellow Leaf Curl Virus. Courtesy of T. Schubert, Florida Department of Agriculture.

Spread

Adult silverleaf whiteflies, *Bemisia argentifolii* (previously known as *Bemisia tabaci* biotype B), transmit the virus. Silverleaf whiteflies are rarely seen in BC and they do not survive our winters. The virus can also be transmitted through cuttings taken from infected plants. TYLCV is not spread by normal contact (mechanically) and is not spread by seed. If TYLCV shows up in BC, it will probably not become established here. It does not pose a long-term threat to BC tomato production.

References

- Duffus, J.E., Liu, H., and G.C. Wisler. (1996) Tomato infectious chlorosis virus - a new closterovirus-like virus transmitted by *Trialeurodes vaporariorum*. *European Journal of Plant Pathology* 102:129-226.
- Wisler, G.C., J.E. Duffus, H. Lie, R. Li, and B.W. Falk. (1997) New whitefly-transmitted closterovirus identified in tomatoes. *California Agriculture*. 51:24-26.
- Pro-MED mail report Feb. 2, 2000 (From EPPO Report, 2000-01)
- Groenten & Fruit/glasgroenten (1999) 43:6-7
- Brunt, A.A., Crabtree, K., Dallwitz, M.J., Gibbs, A.J., Watson, L. and Zurcher, E.J. (eds.) "Plant Viruses Online: Descriptions and Lists from the VIDE Database. Version: 20th August 1996. URL <http://biology.anu.edu.au/Groups/MES/vide/>

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