Whiteflies acquire the virus by feeding at least 5 to 10 minutes on an infected plant. After about 10 hours they can spread the virus by feeding on uninfected plants for at least 5 to 10 minutes. Once whiteflies acquire the virus, they can infect plants for life, but they do not pass the virus to their progeny nor does the virus replicate in the insect.

TYLCV is spread over long distances by the movement of infected plants, especially tomato transplants, and by movement of virus-carrying whiteflies either on host plants or by wind currents. Because infected plants may take up to 3 weeks to develop symptoms, the virus can be spread in symptomless, infected transplants.

Origins

Tomato yellow leaf curl was first described in Israel around 1940 and was known only in Old World locations until the early 1990s, when it was introduced into the Dominican Republic. It has since spread to other Caribbean islands, is now established in Florida, and has been found in Georgia, Louisiana, and North Carolina.

A severe outbreak of TYLCV occurred in northern Mexico during the 2005-2006 season. In fall 2006, TYLCV was found in Texas and Arizona. The virus was first identified in California in March 2007, in diseased tomato plants from a non-commercial greenhouse in Brawley, California. Researchers think these greenhouse plants were infected by whiteflies that acquired the virus from host plants outside the greenhouse, and that the virus most likely came from northern Mexico.

Identification

Because the TYLCV symptoms can be confused with those caused by other viruses, symptoms alone cannot be used for definitive identification. Rapid, accurate tests for identifying the virus are available at UC Davis and the California Department of Food and Agriculture (CDFA).

Anyone finding tomatoes with TYLCV-like symptoms should contact:

- **their local UC Cooperative Extension office, or**
- **UCD pathologist Robert Gilbertson (530-752-3163, rlgilbertson@ucdavis.edu), or**
- **CDFA scientist Tonyan Tian (916-262-1127, TTian@cdfa.ca.gov).**

Management

CDFA has contained the initial outbreak of TYLCV and is monitoring tomatoes in commercial fields, retail stores, and backyard gardens to determine the spread and establishment of the virus in southern California.

Should the virus become established, long-term approaches that may be needed are a tomato-free period in Imperial County and a restriction on the movement of transplants from locations where TYLCV is known to occur to virus-free tomato-producing areas. TYLCV-resistant tomato varieties are available and an effective IPM program has been developed for the virus in areas where it is endemic.

However, there are a number of factors that may not favor establishment of the virus in the major tomato-producing areas of California, including the Central Valley. First, *Bemisia* whiteflies are not typically found in these tomato-producing areas because the insect is intolerant of cold winter temperatures. Second, the winter season provides a "natural" tomato-free period, usually from late November through early February. This break would eliminate the primary host of the virus. Even if the virus were able to overwinter in other (weed) hosts, it would probably do so inefficiently, thereby minimizing economic damage.

For more detail on management strategies, see the *UC IPM Pest Management Guidelines: Tomato*, available on the Web at www.ipm.ucdavis.edu.

Tomato Yellow Leaf Curl

A New Disease in California Tomatoes

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Disease photos: Robert L. Gilbertson
Whitefly photos: Jack Kelly Clark

In March 2007, the virus that causes tomato yellow leaf curl was identified in greenhouse tomatoes from Imperial County. Because this disease is potentially devastating for tomato production in California, it is critical to limit its spread. This flyer is intended to inform growers and PCAs about the disease, how to identify it, and what to do if they find diseased plants.

Symptoms

Tomato plants infected with *Tomato yellow leaf curl virus (*TYLCV) are stunted, grow abnormally upright, and take on a bushy appearance because internodes are shortened.

Tomato plant infected with *Tomato yellow leaf curl virus*.

Flowers on infected plants commonly fall off before fruit set and fruit production is dramatically reduced. Losses can be 100% in fields with heavily infected plants.

Foliar (leaf) symptoms are the most diagnostic for this disease. Leaves of infected plants are small, strongly crumpled, curl upward, and turn yellow at the edges and between veins.

Typical foliar symptoms of tomato yellow leaf curl.

Host Range and Spread

TYLCV is a geminivirus, a family of viruses that are spread by whiteflies or leafhoppers. Whitefly-transmitted geminiviruses are classified in the genus *Begomovirus* and infect certain broadleaf plants. Hosts of TYLCV include solanaceous crops (tomatoes, peppers, and some tobacco species) and a range of weed species. Common bean is also a host for this virus and may develop leaf curl symptoms if infected. Many weed hosts do not develop symptoms, and it is not known how well whiteflies can acquire the virus from symptomless hosts. However, these hosts may allow the virus to survive in the absence of tomatoes, and may help the virus become permanently established. **Tomato is by far the most important TYLCV host;** it will show diagnostic symptoms and be the key to the development of the disease in the field.

TYLCV is spread by the sweetpotato whitefly, *Bemisia tabaci* biotype B (=silverleaf whitefly, *B. argentifolii*), and other *B. tabaci* biotypes, but not by other whitefly species. The virus is not transmitted in seed nor spread mechanically (e.g., by touch).

Adult *Bemisia* whiteflies fold their wings like a tent over their bodies. Nymphs (right) do not have a fringe of filaments around their edges.

Greenhouse whiteflies, *Trialeurodes vaporariorum,* occur commonly but are not vectors of TYLCV. Adults fold their wings flat over their bodies. Older nymphs have long filaments. Younger nymphs (right) have a fringe of short filaments.