AVRDC - The World Vegetable Center

Fact Sheet

Pepper Diseases

Whitefly-Transmitted Geminiviruses

Whitefly
20X actual size

Found in tropical and subtropical regions of Asia and the Western Hemisphere, depending on specific virus

Symptoms

Several whitefly-transmitted geminiviruses infect peppers, including chino del tomate virus (CdTV), pepper mild tigré virus (PMTV), Serrano golden mosaic virus (SGMV), Sinaloa tomato leaf curl virus (STLCV), and Texas pepper virus (TPV). These viruses all have similar symptoms but are biologically and genetically distinct.

Symptoms depend upon the geminivirus and the pepper variety. Common symptoms are stunting, curling, or twisting of the leaves, bright yellow mosaic, distortion of leaves and fruit, and reduced yields.

Peppers with CdTV infection are symptomless or have a mild mosaic with slight leaf distortion (see below). Symptoms due to PMTV include stunting, leaf distortion, yellow-green mottling on foliage, and small, misshapen fruit. These viruses are components of Tigré disease, a severe disease complex.

Pepper plants affected by SGMV have foliage with a bright golden mosaic color (see next page). STLCV symptoms include foliage with yellow to yellowish-green mosaic, interveinal chlorosis, and various degrees of leaf curl from moderate to severe, as well as stunting accompanied by shortened internodes, and small fruit.

How to Identify CdTV, PMTV and the Tigré Disease Complex

CdTV alone causes a mild mosaic and slight leaf disortion

PMTV alone causes interveinal chlorosis and mild stunting

The complex causes stunting, severe and upward leaf curl, and interveinal and marginal chlorosis

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How to Identify Serrano Golden Mosaic Virus and Texas Pepper Virus

SGMV causes a bright golden mosaic in the leaves

TPV-infected leaves are distorted, curl upwards, have bright yellow spots and at times yellow margins and interveinal tissues

Conditions for Disease Development

The pepper geminiviruses are transmitted by the sweet potato whitefly, *Bemisia tabaci*, which is commonly found in tropical and sub-tropical regions, and in greenhouses in temperate areas. No aphid or thrip transmission occurs, and only the TPV and SGMV geminiviruses are mechanically transmitted from pepper to pepper. Pepper geminiviruses are not seed-borne.

This whitefly has a very wide host range and feeds by sucking plant juices from the underside of leaves of crops such as pepper, tomato, tobacco, cucumber, sweet potato, as well as some weeds. Adult whiteflies look like tiny white moths, about 1–2 mm in length. They fly when the leaf is disturbed.

The whitefly can acquire the virus after feeding on infected plants for 15 to 30 minutes, and can transmit the virus to pepper plants after 24 hours of incubation within the insect. A period of at least 15 minutes feeding on the new pepper host is subsequently required for transmission of the virus. The whitefly retains the virus for up to 20 days and does not transmit it to the progeny. Symptoms develop on young plants after 10 to 14 days.

Hot and dry conditions favor the whitefly and therefore help the spread of these viruses. Whitefly populations decrease after heavy rains.

Control

Control of geminiviruses is difficult once a crop becomes infected. Numerous cultural practices can be used to prevent infestations.

Grow seedlings in an insect-proof nethouse or seedbed (32-mesh size or finer) to prevent early infection, which leads to severe crop damage.

A barrier of maize may be planted around the pepper crop, and mulches of straw, sawdust or yellow plastic or UV-reflective material will reduce landing of whiteflies.

Inter-planting of pepper with 'bait' plants may be useful for control of this virus but other viruses may increase in importance. The 'bait' plants are then sprayed with an insecticide.

Timing of transplanting can be effective for avoiding high populations of whitefly and therefore reducing infection by pepper geminiviruses. Avoid overlapping pepper crops that allow the vector to subsist and develop new populations. Rotation with non-host crops is also recommended. Roguing of volunteer pepper, tomato and tobacco plants, and controlling weeds are important to reduce sources of virus inoculum.

Chemical control methods include the use of systemic insecticides as soil drenches or overhead sprays during the seedling stages. Applications in the field may be needed to control adults that emerge after transplanting. Rotation of insecticides is recommended to prevent insects developing resistanceto the chemicals. Chemical control may not be effective in areas where disease incidence is high.

Oil sprays may also be effective in reducing levels of infestation. Neem tree seed extracts control young nymphs, inhibit the growth and development of older adults, and reduce egg-laying by adults.

Pepper varieties resistant or tolerant to pepper geminiviruses are not yet commercially available.

For more information on the production of pepper and other vegetables, go to <www.avrdc.org>.

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