



AVRDC - The World Vegetable Center

# Fact Sheet

## Tomato Diseases

# Tomato Yellow Leaf Curl Virus (TYLCV)

Found worldwide



### Symptoms

Plants are severely stunted with shoots becoming erect. Leaflets are reduced in size and pucker. Leaflets curl upwards, become distorted, and have prominent yellowing along margins and/or interveinal regions. Flowers wither.

Plants will set very few fruit after infection occurs; therefore any plants infected before flowering stage will produce extremely low yields. The appearance of the fruit is unaffected.

### Conditions for Disease Development

The virus is not seed-borne. It is only transmitted by the whitefly, *Bemisia tabaci*, which is commonly found in tropical and sub-tropical regions, and in greenhouses in temperate areas.

The whitefly vector has a very wide host range and feeds by sucking plant juices from the underside of leaves of crops such as 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 light-colored eggs are laid on the leaf undersurface and hatch in

## How to Identify Tomato Yellow Leaf Curl Virus



Infected plant (left) is yellowing and becoming stunted as compared to healthy plant (right)



Leaf curling and erect growth



Leaf curling; yellowing between veins and along margins

about 16 to 38 days depending upon environmental conditions.

The whitefly can acquire the virus after feeding on infected plants for 15 to 30 minutes, and can transmit the virus to tomato plants after about 24 hours of incubation within the insect. A period of at least 15 minutes feeding on the new tomato 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 its progeny. Symptoms develop on young plants after 10 to 14 days.

Hot and dry conditions favor the whitefly, and therefore, help the spread of TYLCV. Whitefly populations decrease after heavy rain showers. Under normal conditions whiteflies hover above the crop during the day or they are passively wind-driven over long distances. During the night they settle on the lower leaf surfaces.

Disease incidence increases rapidly and can reach 100% infection at harvest. In the field, disease incidence varies with location rather than with season. Tobacco is a symptomless host and can therefore serve as a source for re-infection of tomato crops. Other hosts for the virus are weeds such as jimsonweed that can serve as a source of inoculum.

## Control

Grow seedlings in an insect-proof nethouse (50-mesh size or finer) or in a greenhouse, and maintain good control of whiteflies in these structures in order to prevent early infection of seedlings by whitefly feeding. If non-insect-proof nets are used with transplants, then they should be sprayed with insecticides to control entry of whitefly into the structures.



*It's critical to protect tomato seedlings from TYLCV infection. Exclude whiteflies (actual size 1–2 mm long) using a fine mesh (50-mesh or finer) screen.*

The whitefly vector favors the young plants. To reduce this effect, tomato plants should be about 30 days old at the time of transplanting. Timing of transplanting also can be effective for avoiding high populations of whitefly and therefore reducing or preventing TYLCV infection. Avoid overlapping tomato crops that allow the vector to subsist and develop new populations. Rouging of volunteer tomato and tobacco plants and weed control are also important to reduce sources of virus inoculum.

Plant new tomato crops in isolated fields. If feasible, plant a tall border crop, such as maize, around the tomato crop. Use mulches of straw, yellow plastic or UV-reflective material to reduce landing of whiteflies.

Spray infected plants with an insecticide before rouging to prevent migration of whitefly vectors to neighboring plants. Rouge infected seedlings in the seedbed or infected plants in the field to reduce spread of the disease by whiteflies. Rouged plants should be placed in plastic bags and tied shut to prevent spread of whiteflies.

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

Chemical control methods include the application of systemic insecticides as soil drenches or regular sprays during the seedling stage to reduce the population of the whitefly vector. A second application may be necessary to control adults that have emerged from the egg and nymph stage since the application of the first spray. Rotation of insecticides may be necessary to prevent the development of resistance in the vector. However, chemical control may not be effective in areas where disease incidence is high.

Other methods include a 1% soap solution carefully applied to the leaf undersurface to control the adult vector. Care should be taken to avoid development of phytotoxicity if spraying occurs during very high temperatures. 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.

TYLCV-resistant and tolerant tomato varieties for some strains of the virus are commercially available. Confer with the local extension agent to determine which varieties are suitable in your area.

**For more information on the production of tomato and other vegetables, go to <[www.avrdc.org](http://www.avrdc.org)>.**