

Tomato yellow leaf curl virus in Australia

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Background and importance

An exotic strain of Tomato yellow leaf curl virus (TYLCV) has recently been detected in several vegetable production areas of Queensland. To date, this virus appears to be widespread in South-East Queensland and in the Bundaberg region. Diseases caused by similar strains of TYLCV are known to cause severe economic losses in tomato (*Lycopersicon esculentum*) crops overseas. Yield losses of up to 100% have been recorded in greenhouse tomato crops of Southern Europe and the Middle East. It is considered to be the most important cause of tomato crop losses in these regions.

What other plants can be infected by TYLCV?

Other vegetable crops affected include capsicums (*Capsicum annuum*), chillies (*Capsicum chinense*) and French beans (*Phaseolus vulgaris*). Ornamental plants such as lisianthus (*Eustoma grandiflorum*), poinsettias and related plants (*Euphorbia* spp.) can also be infected. A number of weed species such as certain nightshades (*Solanum* spp.), thornapples (*Datura stramonium*), tobacco (*Nicotiana* spp.) and mallow (*Malva* spp.) can be infected but may not show symptoms.

How is TYLCV spread?

TYLCV is spread by silverleaf whiteflies, also known as *Bemisia tabaci* Biotype B (some authors refer to it as *B. argentifolii*). This pest was first detected in Australia in October 1994. It is a small sucking insect and is a major pest of cotton, vegetables and soybeans. It is similar in appearance to greenhouse

whitefly that does not spread this virus. There are other strains of *B. tabaci* in Australia that may also spread this virus. The virus is not seed-borne, nor is it spread with handling or pruning.

B. tabaci adults and immature stages (nymphs) pick up the virus by feeding on infected host plants. Adult whiteflies then spread the virus to healthy plants that take 10 to 21 days to show disease symptoms. Whiteflies pick up the virus within 30 minutes of feeding on an infected plant. The virus incubates inside these insects over the next 24 hours and is then passed on to healthy plants after feeding for as little as 15 minutes. Whiteflies retain the virus for up to 20 days, but it is not passed through their eggs to their progeny. Weed hosts can be important reservoirs of infection.

Symptoms in plants infected by TYLCV

Tomato plants that are infected at an early growth stage become severely stunted. Leaflets are reduced in size and are misshapen. Emerging leaves are cupped downwards (Figure 1). Leaves developing later are erect with yellowing between



Figure 1. Emerging leaves are cupped downwards.

veins; their leaf margins roll upward (Figure 2). Plants infected when they are young lose vigour; flowers abort and they stop producing marketable fruits. When infections occur in older plants, any fruits already present ripen normally but no further fruits are formed. TYLCV symptoms can be easily confused with nutritional imbalances and herbicide injury. We recommend that you send plant samples to a diagnostic laboratory for confirmation.

Capsicums and chilli infected with TYLCV may be symptomless or exhibit upward curling of leaf margins with interveinal and marginal chlorosis (Figure 3). Symptoms in lisianthus include significant reduction in flower quality, distortion of growing tips, cup-shaped leaves, swelling of veins on the lower surface of leaves and stunting of the plant. French beans symptoms include leaf thickening, leaf crumpling, upward curling of the leaves and abnormal lateral shoot proliferation. When beans are infected early, plants are severely stunted and flowers abort resulting in a total yield loss.

How do we control TYLCV?

- Exclusion and early eradication are the best strategies for preventing the establishment of TYLCV and its vector, silverleaf whitefly. Seedlings should be grown in facilities with insect screens (50 mesh) that exclude whiteflies.



Figure 2. Leaves developing later are erect with yellowing between veins; their leaf margins roll upward.



Figure 3. Capsicums and chilli infected with TYLCV may be symptomless or exhibit upward curling of leaf margins with interveinal and marginal chlorosis.

- Seedlings and crops should be regularly monitored for whiteflies. Yellow sticky traps and plant inspections are necessary to detect early infestations and to identify the type of whiteflies present. Crops should be carefully monitored for virus symptoms if *B. tabaci* is detected.
- Use insecticides and biological control options for *B. tabaci* on seedlings and crops, depending on the level of virus risk.
- Infected plants should be sprayed with insecticide and carefully placed into plastic bags for disposal.
- Weed control is important if the virus has become established in the local area.
- When cropping is finished, remove and dispose of crop residues immediately.
- Overseas, TYLCV-resistant and tolerant cultivars are becoming available.

Acknowledgements and further reading

Information presented in this document was obtained from a number of sources; several are available on the Internet:

European Plant protection Office (EPPO) Data Sheet on quarantine pests: Tomato yellow leaf curl bigeminivirus
http://www.eppo.org/QUARANTINE/virus/TYLC_virus/TYLCV0_ds.pdf

Asian Vegetable Research & Development Centre (AVRDC) Fact Sheet: Tomato yellow leaf curl virus (author Ray Cerkauskas)
<http://www.avrdc.org/pdf/tomato/TYLCV.pdf>

Department of Environment, Food & Rural Affairs (Defra), UK: Tomato yellow leaf curl virus
<http://www.defra.gov.uk/plant/pestnote/yellow.htm>

Queensland Department of Primary Industries & Fisheries: Emerging plant pests – Tomato leaf curl viruses
<http://www2.dpi.qld.gov.au/health/18450.html>

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