



Fig. 1. Infection of tomato brown rugose fruit virus, resulting in a) blistering and mottling of tomato leaves; b) and c) mottling on tomato fruit d) and e) red and yellow mottling on capsicum fruit. (Photos courtesy of a) and b) Salvatore Davino, c) Aviv Dombrovsky, d) and e) Raed Alkowni, EPPO Database).

Disease: Tomato brown rugose fruit virus

Pathogen: Tomato brown rugose fruit virus (species *Tobamovirus fructirugosum*)

Classification: Kingdom: Virus, Phylum: Kitrinoviricota, Class: Alsuviricota, Order: Martellivirales, Family: Virgaviridae

Tomato brown rugose fruit virus (ToBRFV) is a member of the genus *Tobamovirus*. All tobamoviruses can be mechanically transmitted, such as pruning and fruit picking, and most are seed transmissible. Like cucumber green mottle mosaic virus (CGMMV), there is good evidence that ToBRFV can also be transmitted by bumblebees. As ToBRFV has the potential to break resistance in host crops, it can cause up to 100% infection in glasshouses if an early detection is not made.

Biology and Ecology:

As a Tobamovirus, ToBRFV is highly transmissible and can be spread from infected seed to seedling and through contact, such as cutting tools, propagation material and direct plant-to-plant contact. In a greenhouse setting, ToBRFV can rapidly spread. As the virus infects the plant systemically, all parts of the host plant become a source of inoculum for healthy crops. Propagative materials including seedlings, seeds, grafts and cuttings are considered high risk pathways.

In tomato plants, ToBRFV is associated with dark green blistering in older leaves and yellow mottling and deformation in younger leaves. In tomato fruit, the most common symptom is yellow/green discoloration. While in capsicum, the most common symptoms are blistering and corrugated fruit surfaces, with yellow mosaic and deformed fruits reported.

Symptoms associated with ToBRFV may be easily confused with tomato spotted wilt virus (TSWV). Other tobamoviruses, including tomato mosaic virus (ToMV) and tobacco mosaic virus (TMV) and tomato mottle mosaic virus (ToMMV), have the potential to mis-identify ToBRFV based on symptomology alone.

Distribution:

ToBRFV is estimated to occur in 45 countries, with multiple countries in Europe, Asia and Africa impacted. It was detected for the first time in Australia in August 2024.

Host Range:

Tomato (*Solanum lycopersicum*) and pepper (*Capsicum annum*) which includes capsicums and chillies, are the only known major natural hosts of ToBRFV. Several weed hosts include, *Amaranthus* sp., *Chenopodium* sp., *Physalis* sp., *Nicotiana* sp., *Portulaca* sp., and *Solanum* sp.

Impact:

In Australia, the tomato industry is the 3rd most profitable vegetable industry, with an estimated value of \$570.6m (2022/2023). In a glasshouse setting, infection rates have been reported to be between 40%-100%, with overall crop losses up to 100% in affected glasshouses.

Management options:

Ensuring that seeds and plant material are sourced with a health certificate, will help to reduce the risk of introduction within a glasshouse/field setting. Routine monitoring of crops for any change in health or development of symptoms may help in the early detection and management of the virus. If ToBRFV is suspected, it should be reported immediately by calling the Exotic Plant Pest Hotline on 1800 084 881.

Further Reading: Ghorbani, A. Sci Rep 14, 21281 (2024); González-Concha, L.F et al., (2023) Eur J Plant Pathol 165, 579–592; Klap C, et al., Plants. 2020; 9(5):623; He M, et al. Virus Res. 2023;323:198970; Panno, S, et al., (2020) Agronomy. 10. 834; **Plant Health Australia - ToBRFV Factsheet**; Salem, N., et al., (2016) Archives of Virology. 2016;161(2):503-506; Sánchez-Sánchez, M. et al., (2024) Comunicata Scientiae, 15, e4247; Zhang, S. et al., (2022) Molecular Plant Pathology, 23(9), 1262–1277.

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