# Tomato brown rugose fruit virus (ToBRFV)

EXOTIC DISEASE – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

## What is tomato brown rugose fruit virus?

Tomato brown rugose fruit virus (*Tobamovirus fructirugosum;* ToBRFV) is classified as a National Priority Plant Pest (NPPP) and represents a significant biosecurity risk to Australia's vegetable industry. ToBRFV belongs to the solanaceous Tobamovirus group and was first detected in Jordan in 2014.

As of 2024, it has spread to an estimated 45 countries across four continents. The virus causes severe crop losses by damaging the leaves, stems and fruit of infected plants. The virus has no known effects on human health.


Figure 1: Severe mosaic and blistering on tomato leaves


Figure 2: Tomato fruit showing marbling and discolouration

## What does it look like?

ToBRFV causes distinct symptoms in different parts of the plant. In tomatoes, older leaves typically show dark green blistering, while younger leaves display yellow mottling and deformation. The virus also affects the fruit, leading to yellow/green discoloration that extends internally. The severity of the symptoms most likely depend on the cultivar, timing of infection and environmental conditions.

In capsicum, common symptoms include blistering and corrugated fruit surfaces, along with yellow mosaic patterns and deformed fruit.

## Primary hosts

The only known major natural hosts of ToBRFV are tomato (*Solanum lycopersicum*) and pepper (*Capsicum annum*), which includes capsicums and chillies. In addition, some weed species such as *Solanum* sp., *Chenopodium* sp., *Portulaca* sp., *Amaranthus* sp. and *Physalis* sp. have been reported to be susceptible to or potential reservoirs for ToBRFV.

PHA24-042

EXOTIC DISEASE – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED


Figure 3: Symptoms on pepper fruits


Figure 4: Symptoms on green fruits

## How does it spread?

As a *Tobamovirus*, ToBRFV is highly transmissible. The virus can be spread from infected seeds to seedlings, through mechanical contact, such as contaminated cutting tools, workers' hands, clothing, propagation materials, and direct plant-to-plant contact. In a greenhouse setting, ToBRFV can rapidly spread due to common cultural practices like transplanting, pruning and trellising.

The virus can infect up to 100% of plants, with crop losses ranging from 25%-70%. As the virus infects the plant systemically, all parts of the host plant become a source of inoculum for healthy crops. Research indicates that bumblebees (*Bombus terrestris*) can mechanically transmit the virus from an infected plant to a healthy plant in a glasshouse/greenhouse setting during pollination. In Italy (2018), bumblebees were associated with infection rates of 40% to 100% across 100 greenhouses.

Propagative materials like seedlings, seeds, grafts and cuttings are considered high risk pathways.

## Where is it now?

ToBRFV was first reported in greenhouses in Jordan and Israel between the autumn of 2014 and spring 2015. Since then, it has spread to various countries, including Mexico, California, Germany, China, Palestine, Turkey, and Italy. The virus is now highly prevalent in the United Kingdom, Netherlands, Greece, Spain and France.

In August 2024, ToBRFV was detected in three commercial greenhouses in South Australia.

## How can I protect my farm from ToBRFV?

To manage the risk of introducing ToBRFV into greenhouse or field settings, ensure that seeds and plant material are sourced with a Plant Health certificate. Regularly monitor crops for any changes in health or development of symptoms, and test suspect crops for ToBRFV to facilitate early detection and management of the virus. Maintaining a seed and seedling register and recording the source of farm inputs can aid in tracing and managing any detection events. If ToBRFV is suspected, report it immediately by calling the **Exotic Plant Pest Hotline on 1800 084 881**.

PHA24-042



## What can it be confused with?

Symptoms associated with ToBRFV can be easily confused with those of other viruses. For example, tomato spotted wilt virus (TSWV) also causes fruit deformation and yellow/green mottling. Similarly, other tobamoviruses, such as tomato mosaic virus (ToMV) and tobacco mosaic virus (TMV), as well as the exotic tomato mottle mosaic virus (ToMMV), exhibit varying symptomologies that may lead to misidentification of ToBRFV based on symptomology alone.

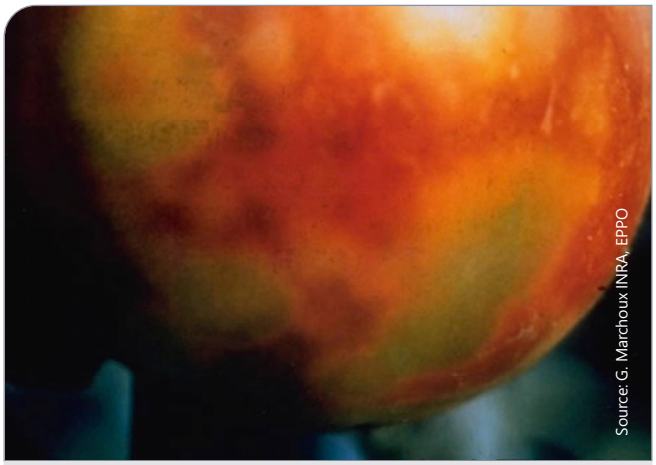


Figure 5: Tomato spotted wilt virus (endemic)


Figure 6: Tomato mosaic virus (endemic)


Figure 7: Tobacco mosaic virus (endemic)


Figure 8: Tomato mottle mosaic virus (exotic)

PHA24-042

EXOTIC DISEASE – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

## References


Tobamovirus fructirugosum (TOBRFV)[Overview]| EPPO Global Database. (n.d.). https://gd.eppo.int/taxon/TOBRFV

Tomato brown rugose fruit virus (Tomato brown rugose fruit virus) | CABI Compendium. (n.d.). CABI Compendium. https://www.cabidigitallibrary.org/doi/10.1079/cabicompendium.88757522

Reports of tomato brown rugose fruit virus in Australia. (August 2024). https://rijkzwaan.com.au/news/ToBRFV-tomato-virus-in-Australia

Salem, N. M., Abumuslem, M., Turina, M., Samarah, N., Sulaiman, A., Abu-Irmaileh, B., & Ata, Y. (2022). New weed hosts for tomato brown rugose fruit virus in wild Mediterranean vegetation. Plants, 11(17), 2287. https://doi.org/10.3390/plants11172287

Zhang, S., Griffiths, J. S., Marchand, G., Bernards, M. A., & Wang, A. (2022). Tomato brown rugose fruit virus: An emerging and rapidly spreading plant RNA virus that threatens tomato production worldwide. Molecular Plant Pathology, 23(9), 1262–1277. https://doi.org/10.1111/mpp.13229


If you see anything unusual, call the
**Exotic Plant Pest Hotline** on
**1800 084 881**.

EXOTIC PLANT PEST HOTLINE
1800 084 881


DISCLAIMER: The material in this publication is for general information only and no person should act, or fail to act on the basis of this material without first obtaining professional advice. Plant Health Australia and all persons acting for Plant Health Australia expressly disclaim liability with respect to anything done in reliance on this publication.



PHA24-042