

# MANAGING ToBRFV IN THE TOMATO SECTOR





Tomato brown rugose fruit virus (ToBRFV) is a member of the genus Tobamovirus. It was first detected in tomato crops in Israel in 2014 but has subsequently spread to other tomato growing regions around the world.

The first UK outbreak was reported in June 2019 and the virus has already led to significant yield and economic loss for UK growers.

The major hosts of the virus are tomatoes and peppers, and is readily spread via contact transmission and is also seed transmissible.

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The industry has been under significant pressure in recent years from access to labour issues and the high cost of energy,

but now also must deal with potential ToBRFV outbreaks.

Therefore, there is the need for the industry to identify ways to collectively deal with this issue to continue to develop profitable and productive businesses for the future.

It is possible for plants to show no obvious symptoms and yet still be infected. The susceptibility of the crop is dependent on the variety, cultural practices, and the climate, with glasshouse crops expected to be more

susceptible than outdoor grown crops, as there is more handling and spread via mechanical transmission.

ToBRFV can lead to yield losses, and it has caused significant economic losses where outbreaks have occurred. The virus has the potential to continue to impact commercial production due to reduced crop quality and yield, and the need to implement extra biosecurity measures to minimise risk of infection.

## ENIGMA II – BETTER DISEASE DETECTION WITH DECENTRALISED MONITORING METHODS

Fera scientists have been engaged with the industry, Defra, and commercial tomato and pepper growers to develop initial strategies for the management of the virus.

“This collaborative project between Fera Science and tomato growers will use the technical and scientific capability of Fera to develop new detection and surveillance methods for growers managing ToBRFV, and to better understand the resistance and tolerance attributes of new varieties in a commercial growing environment.”

Adam Bedford, Enigma Projects Director, Fera Science

The **Enigma II** project aims to further protect businesses from ToBRFV in the first instance, mitigate these problems when they arise and provide an ongoing collaborative platform for the sector as work in this area develops.

Fera researchers will lead a scientific assessment of currently available approaches for infield detection of ToBRFV on leaf, fruit, and through swabs.

Previous work has shown that LAMP diagnostics for ToBRFV detection works well and has been scientifically validated on leaf and swabs with further work ongoing on fruit validation. Under the new project, we aim to transfer those assays (and other tomato pathogens) onto lyophilised (freeze dried) reagents and further validate crude extraction

approaches for use in a closed cartridge system.

This closed cartridge system will require new technology to be developed, with the aim for this practical approach to be put in the hands of growers for immediate results in the glasshouse to influence disease management strategies.



## UNDERSTANDING RESISTANCE AND TOLERANCE TO ToBRFV IN NEW VARIETIES

There are now numerous seed varieties with 'resistance' to the virus - cultivars with 'high' resistance and 'intermediate' resistance. The Enigma II project seeks to work with growers to answer the following questions:

- Does the ToBRFV replicate and translocate in the plant?
- Can ToBRFV be passed on from infected plants?
- What is the impact on phenotype and yield?



## OUTPUTS

- A scientific assessment of currently available approaches for infield detection of ToBRFV on leaf, fruit and swab (Dipstick, LAMP, RPA)
- Improving crude extraction approaches to support swab, leaf and fruit testing
- Working with project partners to develop 'holistic' surveillance approaches to develop a way to monitor a site across a growing season in the most effective way
- The development of practical grower-led suitable diagnostics through advancements in the development and validation of automated extraction to results systems
- The development and expansion of the diagnostic range to include other targets e.g. food borne pathogen monitoring to develop a further 'one health' approach
- The potential testing of viability of detected virus, focussed on post-outbreak clean-up work on site
- A development of scientific understanding of the level of 'resistance' to ToBRFV of new varieties and the practical commercial impact of using such varieties in conjunction with in-field detection methods



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