



## Novel Approaches for the Management of Tomato Brown Rugose Fruit Virus (ToBRFV)



LEAD RESEARCHER

**Aiming Wang**

Research scientist with Agriculture and Agri-Food Canada at the London Research and Development Centre

Researchers are working to stop Tomato Brown Rugose Fruit Virus (ToBRFV) from threatening Canadian greenhouse tomatoes and peppers. This research activity is studying the infection process and working to develop novel genetic resistance to ToBRFV. Researchers want to better understand how ToBRFV overcomes broad-spectrum resistance given by Tm-22 and bring back Tm-22-mediated resistance to ToBRFV.

To date, researchers have been able to create a tomato mutant population with more than 10,000 plants screened. Three lines resistant or tolerant to ToBRFV infection have been identified with confirmation of resistance being passed to the next generation. The resistance gene Tm22 and ToBRFV movement protein (MP) gene have been cloned with confirmation of the interaction of proteins encoded by Tm22 and ToBRFV. Researchers also found that both ToBRFV MP and Tm22 proteins are located in the cytoplasm and are not stable with very short turn-over time.

A number of mutations have been introduced into the different coding regions of ToBRFV. Both replicase proteins found to be essential for viral viability and infectivity. The ToBRFV susceptibility gradient test was done to test ToBRFV resistance across 12 tomato varieties. Seedlings were prepared and inoculated with researchers finding symptom severity varying on leaves across several varieties, ranging from mild to severe. ToBRFV diversity was assessed with the ToBRFV genetic sequence found to be largely stable.

Researchers are conducting resistance screening to confirm ToBRFV resistance is inherited from generation to generation of plants. Researchers are continuing to monitor ToBRFV diversity in Canada, decode the mechanism underlying ToBRFV break-down of Tm22 resistance, and do transcriptomic profiling on tomato lines responsive to ToBRFV infection and viral protein expression.



Tomato plants infected with tomato brown rugose fruit virus (ToBRFV).



Tomato plants infected with typical tomato brown rugose fruit virus (ToBRFV) symptoms.

Photos: Aiming Wang

### KEY TAKEAWAYS:

- Both ToBRFV MP and Tm22 proteins are located in the cytoplasm and are not stable with very short turn-over time.
- ToBRFV diversity has been assessed with the ToBRFV genetic sequence found to be largely stable.
- Researchers are conducting resistance screening to confirm ToBRFV resistance is inherited from generation to generation of plants.

