



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



LEAD RESEARCHER

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Researchers are working to stop Tomato Brown Rugose Fruit Virus (ToBRFV) from threatening Canadian greenhouse tomatoes and peppers. This research activity, a continuation of previous federal research work after the discovery of ToBRFV in Canada, is studying the infection process and developing novel genetic resistance to ToBRFV.

Tomatoes are the primary host of ToBRFV. The viral pathogen has been recently identified and spreads rapidly. It can overcome genetic resistance to tobamoviruses, including the durable broad-spectrum resistance gene Tm-2². The virus is stable, easily transmissible and highly contagious. ToBRFV causes tomato yield losses of around 30 to 70 per cent.

ToBRFV is a regulated pathogen in many countries, including the United States, meaning it can be a threat to Canadian tomato exports. This research activity is focusing on understanding the ToBRFV infection process and developing novel genetic resistance to effectively control it in greenhouse vegetable crops.

KEY TAKEAWAYS:

- Genetic resistance is the most effective, economical and sustainable approach for controlling viral diseases. It is environmentally friendly, target-specific and offers reliable protection without additional labour or material costs during the growing season.
- Unlike resistance from wild tomatoes, which often requires multiple years of breeding efforts to transfer resistance into cultivated tomatoes, novel genetic resistance in elite cultivars can be readily accessible to tomato production.
- The use of genetic resistance provides immediate and accessible solutions for controlling viral diseases in cultivated tomato crops.
- During the 2023–24 crop year a tomato mutant population was developed with more than 10,000 plants screened. Promising lines showing resistance or tolerance to ToBRFV infection were found.
- Four full-length complementary infectious DNA clones of Ontario ToBRFV isolates were developed and found to be infectious on the model plant *N. benthamiana* and tomato.
- The Tm-2² gene and all ToBRFV genes were cloned. These clones will be used to understand why ToBRV can overcome Tm2²-conferred resistance.



A tomato plant infected with tomato brown rugose fruit virus (ToBRFV) in a greenhouse.

Photo credit: Aiming Wang



A tomato plant infected with tomato brown rugose fruit virus (ToBRFV).

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