



Greenhouse Vegetable Research Activities

There are two research activities that are part of the greenhouse vegetable group for the Canadian AgriScience Cluster for Horticulture Cluster 4. These two activities are focused on protecting vegetables against pests and managing disease in tomatoes.

THE CLUSTER 4 GREENHOUSE VEGETABLE RESEARCH ACTIVITIES ARE:

ACTIVITY 9

Developing a systems approach to pest management on greenhouse vegetable crops: mirid predator selection

LEAD RESEARCHER – Roselyne Labbé, research scientist in greenhouse entomology with Agriculture and Agri-Food Canada at the Harrow Research and Development Centre

ACTIVITY 10

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

This project is generously funded through the Canadian AgriScience Cluster for Horticulture 4, in cooperation with Agriculture and Agri-Food Canada's AgriScience Program, a Sustainable Canadian Agricultural Partnership initiative, the Fruit and Vegetable Growers of Canada (FVGC), and industry contributors.



Developing a Systems Approach to Pest Management on Greenhouse Vegetable Crops: Mirid Predator Selection



LEAD RESEARCHER

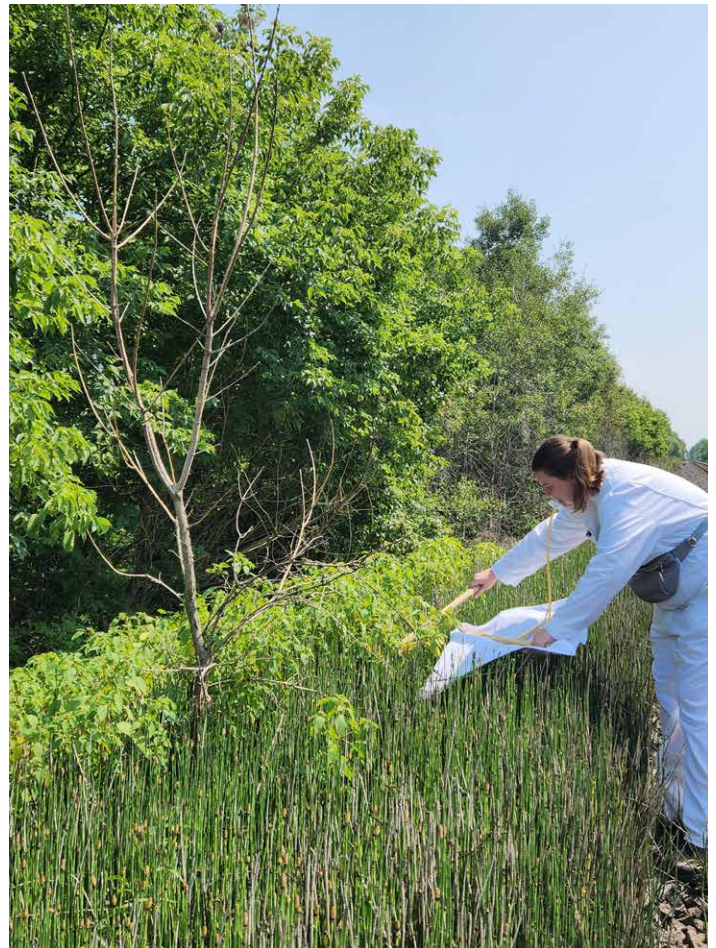
Roselyne Labbé

Research scientist in greenhouse entomology with Agriculture and Agri-Food Canada at the Harrow Research and Development Centre

To find new integrated pest-management strategies to protect greenhouse vegetable crops, a research team is studying three native North American mirid species: *D. discrepans*, *D. famelicus*, and *Macrolophus tenuicornis*, and one adventive species *Nesidiocoris tenuis*.

This year, colonies for three mirid species were initiated and two were bred. Over 60 lab assays were conducted to assess the zoophytophagy capacity of these predators. A greenhouse trial tested oviposition preferences and suitability of four host plant types for the four mirid species, finding promising preliminary trends. New details on host plant dynamics were found that could influence future integrated pest management programs with mirid bugs in greenhouses. There were also new mirid specimens collected from six locations in Ontario, increasing the genetic pool for future selections.

Starting this fall, there will be documentation of genetic differences among mirid colonies based on geographic origins and species done. This research will build on the Canadian National Collection's research, with further work happening next summer. This winter, breeding efforts will continue with the formation of new Isofemale lines from mirid colony sources. Phytophagy and zoophagy tests, as well as host plant suitability comparison trials, will be done.



Carly Demers, a PhD student working on the Developing a systems approach to pest management on greenhouse vegetable crops: mirid predator selection research activity, collects mirid species.

Photo: Roselyne Labbé

KEY TAKEAWAYS:

- Collection sites are spread across Ontario and Quebec with research happening at two sites including the Agriculture and Agri-Food Canada Harrow Research and Development Centre in Ontario, and the Centre de Recherche Agroalimentaire de Mirabel in Quebec.
- To improve the success of applying selectively bred mirid species in commercial settings, commercial greenhouse trials will be conducted.
- Work is being done to create colonies of mirid predators with high pest predatory capacities and low plant damage. Laboratory bioassays are reviewing predation and plant damage — individuals with better traits in future generations are being chosen. Over six generations, selected strains will be compared to unselected ones identifying those with improved pest predation and reduced plant injury.





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. There have been some promising lines found that are showing resistance or tolerance to ToBRFV infection. The ToBRFV coding sequences for P1, MP and CP have been cloned with four full-length cDNA clones created and confirmed as all being infectious on *Nicotiana benthamiana* model plant and tomato plants.



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

KEY TAKEAWAYS:

- This research activity is happening at four sites including the AAFC London Research and Development Center in Ontario, AAFC Harrow Research and Development Center in Ontario, Vineland Research Farm in Ontario, and AAFC St-Jean-sur-Richelieu Research and Development Center in Quebec.
- Tomato leaf samples were collected at two tomato greenhouses in Quebec and sampling was also done at two tomato greenhouses in Ontario. The samples collected will be used to determine ToBRFV diversity.
- There have been promising tomato mutant lines with resistance or tolerance to ToBRFV identified.



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

Photos: Aiming Wang

