Field Vegetable Research Activities

The field vegetable sector has two research activities with the Canadian AgriScience Cluster for Horticulture Cluster 4. These two activities are focused on making soil more resilient and protecting vegetable crops against pests.

THE CLUSTER 4 FIELD VEGETABLE RESEARCH ACTIVITIES ARE:

ACTIVITY 7

Increasing field vegetable yield and resilience to abiotic and biotic stresses through soil microbial engineering

LEAD RESEARCHER – Herve Van Der Heyden, research scientist with Agriculture and Agri-Food Canada Saint-Jean-sur-Richelieu Research and Development Centre

ACTIVITY 8

Reduce risk strategies for cabbage maggot control

LEAD RESEARCHER – Renee Priya Prasad, associate professor and department head for agriculture at the University of the Fraser Valley

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.

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Canada

Increasing Field Vegetable Yield and Resilience to Abiotic and Biotic Stresses Through Soil Microbial Engineering

LEAD RESEARCHER

Herve Van Der Heyden
Research scientist with Agriculture and Agri-Food Canada
Saint-Jean-sur-Richelieu Research and Development Centre

This research activity is working to develop, validate and implement bacterial inoculum to improve field vegetable yield and plant diseases while reducing fertilizer and pesticide inputs. This year, the researchers tested 45 candidate bacterial strains against four phytopathogenic *Pythium* species and *Sclerotinia sclerotiorum*. Several strains have shown sustained inhibitory effects on these pathogens for up to three weeks.

Thirty-three of these strains, all part of *Pseudomonas fluorescens* or *P. putida*, have shown restricted effects against the same five plant pathogens in vitro. Eighteen of these *Pseudomonas* strains proved effective against *Pythium* species, while 10 strains showed a restricted effect on *S. sclerotiorum*. Overall, two strains were highly effective in vitro at controlling *P. ultimum*, *P. irregulare* and *P. sylvaticum* (strains 249 and 829), while strains 901, 113, and 1126 showed good in vitro control of *P. tracheiphilum*. Strains 942 and 611 offered some control of *S. sclerotiorum.*

As the research activity moves into the final years, researchers are focusing on biocontrol approaches. The team is using proprietary bacterial strains, isolated from Canadian vegetable farms, that have been shown to promote plant growth, control pathogens and improve drought tolerance. Researchers are doing laboratory and greenhouse experiments along with small-scale field trials.

This year, the research team is extending their screening to include additional plant pathogens and starting greenhouse trials. The team will assess the persistence and durability of the resistance effects revealed by the bacterial strains. They plan to continue evaluating these strains against a wider range of plant diseases and document the impacts of plant growth-promoting rhizobacteria (PGPRs) on multiple crop species. The team wants to determine the effects of PGPRs at various crop growth stages to provide a better understanding of their practical applications, maximizing their agricultural benefits.

KEY TAKEAWAYS:

- Thirty-three strains, all part of *Pseudomonas fluorescens* or *P. putida*, have shown restricted effects against the same five plant pathogens in vitro. Eighteen of these *Pseudomonas* strains proved effective against *Pythium* species, while 10 strains showed a restricted effect on *S. sclerotiorum*.
- Researchers are using proprietary bacterial strains, isolated from Canadian vegetable farms, that have been shown to promote plant growth, control pathogens and improve drought tolerance. They are being tested against various diseases and on multiple crop species.

Reduce Risk Strategies for Cabbage Maggot Control

LEAD RESEARCHER

Renee Priya Prasad
Associate professor and
department head for agriculture
at the University of the Fraser Valley

Crucifers (crops in the cabbage family) provide numerous opportunities for Canadian vegetable growers but are under attack by cabbage root maggots. In this research activity, the team is working to find new management tools to allow growers to see decreased crop losses from cabbage root maggot. Researchers are taking part in their second field season for the study.

Trials this growing season are to confirm last year's successes and explore integrated pest management options. To date, the trial has tested three methods: transplant and spray; plant, spray and cover; and transplant treatment. Results last year showed effective control initially but timely sprays are important as pest pressure can overwhelm chemical control.

This year the researchers have found that regardless of what insecticide is used, based on the insecticides tested in these trials, the duration of control is about three to four weeks. It is important to identify how long any level of pest control or suppression lasts in the field in order to find the timing for follow up treatments. This is especially important for crops such as rutabaga, turnip and radish, which need season-long protection against cabbage root maggots.

The team is beginning to collect maggots and pupae from the field to examine levels of parasitism and to start a colony for small-scale experiments over the fall/winter.

KEY TAKEAWAYS:

- Results last year showed effective control initially but timely sprays are important as pest pressure can overwhelm chemical control.
- Researchers have found that regardless of what insecticide is used, the duration of control is about three to four weeks.

Rows of cabbage plants at Agriculture and Agri-Food Canada Agassiz Research and Development Centre. Photo: Toban Dyck

A broccoli plant at Agriculture and Agri-Food Canada Agassiz Research and Development Centre. Photo: Toban Dyck

The root of a cabbage plant infected with cabbage root maggots in a field near Abbotsford, B.C. Photo: Toban Dyck