



Image: Amaldo Aldana

Mercator Research Program | Call 7

Biological control of soilborne insect pests using a combination of beneficial organisms

Background

Worldwide annual losses on crop plants caused by insect pests are estimated at 15% or more. Persistent, broad spectrum insecticides have been applied to control below-ground pests with devastating side effects on non-target insects and the soil microbiome. Rising concerns about environmental and consumer safety recently led to a ban of many pesticides in Europe, so farmers are in need of new options to control the rise of soil pests, e.g. the cabbage root fly *Delia radicum*. By looking below ground, to the reservoir of beneficial organisms, solutions can be found.

Objective

This project aims to develop a new approach for biological control of soil-dwelling pests compatible with organic production. The first aim is to evaluate the potential of plant-beneficial fluorescent *Pseudomonas* bacteria with entomopathogenic activity for insect control. The second aim is to investigate whether below-ground insect biocontrol can be improved by combining these *Pseudomonas* with well-established biocontrol agents such as fungi and nematodes.

Research Approach

In lab experiments, the interaction of the three biocontrol agents will be studied. The possibility of entomopathogenic fungi and nematodes to serve as vectors delivering the bacteria into insect larvae, thereby intensifying or speeding up their killing effect, will be tested. Promising combinations of the biocontrol agents will then be tested in greenhouse trials and on infested farm fields against the cabbage root fly, for which no satisfactory control measures exist.

Relevance and Expected Outcomes

The project provides new insights into the complex interactions between agriculturally important members of the soil and rhizosphere ecosystem. More knowledge will be gained on the potential of fluorescent *Pseudomonads* as new bacterial biocontrol agents for insect pests. New methods based on the combined application of beneficial soil organisms for the control of the cabbage root fly *Delia radicum* will be evaluated. This concept may also be adapted to other problematic soil pests.

Food System Challenges Addressed

Food security, Sustainable farming practices, Crop protection, Biocontrol agents.

<https://worldfoodsystem.ethz.ch/research/research-programs/MRP/BeneComb.html>

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Project Duration 2018-2022

Project Cost 297'963 CHF

Funding WFSC Mercator Research Program