CORE organic II

Softpest Multitrap

Management of strawberry blossom weevil and European tarnished plant bug in organic strawberry and raspberry using semiochemical traps

Main research questions:

The main research question in this project is how to manage populations of strawberry blossom weevil (*Anthonomus rubi*), European tarnished plant bug (*Lygus rugulipennis*) and the raspberry beetle (*Byturus tomentosus*) in organic strawberry and raspberry, in order for these two soft fruit crops to grow without significant economic losses by these pests.

Main outcomes at this stage?

After two seasons with field tirals (2012 and 2013), important results have been achieved. However, to make final conclusions the results from the third season will need to be included. Important mass trapping experiments will conclude the project later in 2014.

WP 1 – Chemical analysis

- Analyses of the volatiles of raspberry and strawberry plants confirm the presence of the same sesquiterpenes in both type of plants; potential insect pheromone synergists.
- Possible insect repelling volatiles were identified in fungi infested host plants.

WP 2 – Pest insects in strawberry

- *A. rubi* traps, baited with a blend of aggregation pheromones and a plant volatile, caught weevils throughout the growing season but the summer and autumn catches were much higher in Norwegian than in Danish or UK strawberry crops.
- Catches of *L. rugulipennis* traps baited with sex pheromones peaked at least two months later in Denmark and UK than in Norway, reflecting more generations per year at lower latitudes.
- For both species, trap catches were usually much higher in the crop than in the boundary vegetation.

WP 3 – Pest insects in raspberry

- Seasonal distribution of *A. rubi*:
  - o Highest catches overwintering generation: between weevil dormancy and single flower buds.
  - o Catch rates in Switzerland: peak new generation > peak overwintering generation.
  - o Catch rates in Norway: peak overwintering generation > peak new generation.

- No difference between male and female catches.

- Seasonal distribution of *B. tomentous*:
  - Highest catch rates: peak between leaves development and single flower buds.
  - In Switzerland a generation develop in one year, in Norway it takes two years .
- Volatile combination for *B. tomentosus* and *A. rubi*:
  - The most attractive combination: raspberry volatiles and aggregation pheromone .
- Damages assessment:
  - Perimeter traps (traps around the field) did not protect the crop.
  - Indication of fewer damaged flowers in plots with traps than control plot.
  - More severe flower damage in plots with a high compared to a low trap density.

WP 4 – Trap design

- For strawberry, a combined Unitrap with green cross vanes was effective for trapping both *A. rubi* and *L. rugulipennis*.
- Increasing the height of the cross vane or having a white cross vane significant increased the by catch especially beneficial insects such as pollinators, ladybirds and harvestmen (Opiliones).
- *L. rugulipennis* were shown to walk on the cross vanes, until tiring, before slipping into the bucket of the trap. Trap efficacy was estimated to be around 16 %.
- Tests are currently underway to determine if fruit damage can be reduced by mass trapping for *A. rubi* and *L. rugulipennis* using their pheromones, a wild strawberry volatile and phenylacetaldehyde.
- Most effective position of the baited lures was at the top of the cross vane of the bucket trap.
- A more effective trap for *A. rubi* in raspberry is needed. Traps with white vanes, volatile lures and a grid attract strawberry blossom weevils but the catch rate appears relatively low.

Coordinator

PhD, Research Director Atle Wibe,
Bioforsk - Organic Food and Farming Division, Norway
E-mail: atle.wibe@bioforsk.no

Partners

PhD, Prof. Jerry Cross and PhD, Researcher Michelle Fountain, East Malling Research, United Kingdom
PhD, Prof. Anna-Karin Borg-Karlson, Kungliga Tekniska Högskolan, Sweden
PhD, Prof. David R. Hall, University of Greenwich, United Kingdom
PhD, Researcher Nina Trandem, Bioforsk, Norway
PhD, Assoc. Prof. Lene Sigsgaard, University of Copenhagen, Denmark
M.Sc, Head of group Catherine Baroffio, Agroscope Changins-Wädenswil, Switzerland
M.Sc, Researcher Baiba Ralle, Latvian Plant Protection Research Centre, Latvia

Find all publications at orgprints.org/view/projects/Softpest-multitrap.html.

Recommendations to end-users

The end-users of this project are organic strawberry and raspberry producers. In addition, enterprises that produce traps for sale have interest in the outcome of this project.

Pest insects in strawberry

- Mount traps on the ground in the crop.
- Use the green cross vane unitraps without the bee excluder grid to catch both species.
- In perennial strawberry crops, traps should stay in the field till end of September to reduce overwinter generation (except for *L. rugulipennis* in Norway, which is not caught after June).

Pest insects in raspberry

- For catching *A. rubi* mount traps on the ground in the crop.
- To catch *B. tomentosus* and *A. rubi* the traps should contain lures with a combination of host plant volatile and the beetle aggregation pheromone.
- The traps should be mounted in the crop before dormancy termination (spring emergence) for overwintering *B. tomentosus* and *A. rubi*.
- The volatile lures on the traps should be changed before the new generation of *A. rubi* appear in the crop.

Relevance

Organic strawberry and raspberry producers in the middle and northern Europe face challenges with these pest insect species. Thus, positive results from this project can be implemented in the whole region. The results are also fully transferable for implementation to conventional farms aiming to reduce use of insecticide applications and subsequent residues.

New and important research questions

There is a system for trapping the three soft fruit pests. Future research should aim at making the trapping cost effective by reducing the labour involved and increasing the trap catches. The behavior of the insect pests in response to the baits is an important part of optimizing trap catches and this should be incorporated into future studies.

Further information

This project is funded via the ERA-net CORE Organic II by national funds to each partner. CORE Organic II is a collaboration between 21 countries on initiating transnational research projects in the area of organic food and farming. In 2011, CORE Organic II selected Softpest Multitrap and 10 other projects.

Read more at coreorganic2.org/Softpest multitrap.