



CORE organic II

BICO POLL

Targeted precision biocontrol and pollination enhancement
in organic cropping systems



Main research questions:

This project focuses on how to significantly improve the yield and quality of organic fruit and berry production via targeted precision biocontrol and improved pollination.

Main outcomes at this stage?

- Pan-European field trials have consistently shown, using strawberry as a case study, that bee-disseminated biocontrol of the grey mould provides equal or better crop protection than chemical fungicides.
- In organic strawberry, marketable yields significantly increase, often by over 50 %.
- Improved pollination accounts for about half of the yield increases.
- Honey bees, bumble bees, and solitary bees can all be used for vectoring beneficial biocontrol microbes
- Efficacy and impact of the entomovectoring technique can be improved by management of hives (size, location, and properties), vegetation management, and optimization of dispensers and properties of the microbial prepate.
- No negative outcomes on products (berries, bee-products) have been detected, nor on humans or non-target organisms; properties of the carrier material and its particle size need to be optimized to ensure harmlessness to the bees themselves.
- The concept has proven to be effective on a wide range of crops, such as strawberries, raspberries, pears, apples, blueberries, cherries, and even grapewine.

Recommendations to end-users

- Organic berry and fruit growers are recommended to (i) keep bees themselves, or to hire the service from beekeepers for entomovectoring; (ii) manage vegetation within and around the target crop to support the activity of bees and other pollinators, which can



help to disseminate the beneficial microbes within the crop.

- Beekeepers are recommended to market pollination and biocontrol services to fruit and berry growers, and in the management of bees and the dissemination activity to ensure that all operations are optimized for efficacy.
- Biocontrol product manufacturers are recommended to develop products and their formulations specifically for entomovectoring, because current formulations are optimized for other uses.
- Administrators are recommended to register, and to promote the registration of biocontrol products, which are needed for effective control of the target diseases and pests amenable to entomovectoring – in all countries (lack of registered products is a major bottleneck to adopting these techniques more widely).



Relevance

All results are globally applicable. We have on-going collaborative research using these techniques and/or their modifications in Australia, and emerging collaborations in South-East Asia, South-America, the Caribbean, and South Africa.

Experience in Finland shows that entomovectoring can easily be integrated also in conventional production of strawberry.

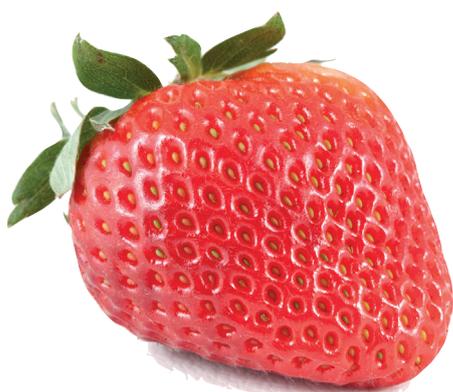




New and important research questions

Other important aspects:

- Assuring the availability of healthy bees for entomovectoring, in particular honey bees free of varroa.
- Investigating the behavior and visitation of bees in specific wind-pollinated crops, and possibilities to steer bee foraging activity in these crops.
- Possibilities to improve bee activity and health via vegetation management (e.g., provision of flowering plants at strategically important locations and times during the year)



Coordinator

Professor Heikki Hokkanen,
University of Helsinki, Finland
E-mail: Heikki.hokkanen@helsinki.fi

Partners

Dr. Otto Boecking, Lower Saxony State
Institute for Consumer Protection and
Food Safety, Germany
Professor Marika Mänd, Estonian
University of Life Sciences, Estonia
Professor Guy Smagghe, Ghent
University, Belgium
Professor Andrzej Cokl, National Institute
of Biology, Slovenia
Research Leader, PhD Bettina Maccagnani,
Agricultural and Environment Center
Association, Italy
Professor Cafer Eken, Erzincan
Horticultural Research Institute and
Suleiman Demirel University, Turkey



Find all publications at [orprints.org/
view/projects/BICOPOLL.html](http://orprints.org/view/projects/BICOPOLL.html).



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 BICOPOLL and 10 other projects.

Read more at coreorganic2.org/BICOPOLL.