Highlights of 2021

SLU Centre for Biological Control, CBC

A popular science report of CBC's activities

About the SLU Centre for Biological Control, CBC

The SLU Centre for Biological Control (CBC) is run by SLU with a grant from the Swedish government. Five researchers associated with the Centre engage in studies to stimulate the development and implementation of biological control, working in close collaboration with stakeholders.
A communicator is also linked to the Centre. Biological control is a collective term for various strategies to inhibit pests and pathogens using living organisms and is an important component of integrated pest management in plant production. Biological control has great potential to restrict the damage caused by harmful organisms such as insect pests and plant pathogens.

Highlights of 2021
- SLU Centre of Biological Control

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Contents


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New horizons for CBC

CBC's previous 3-year mandate ended in mid-2021 and a new 3-year period started. Impressive students and junior researchers participated in CBC's activities during the previous period, and both the projects and output in terms of results and published papers have been inspiring.

The end of the previous mandate also marked the retirement from CBC of our most senior member, Prof. Ingvar Sundh. Among other responsibilities, Ingvar served as the Director of CBC and focused on legislation and safety assessment of beneficial microorganisms. He leaves a profound legacy, not least in his major roles in the establishment of a robust, talented team and rigorous approaches that we believe will enable us to continue our engagement in highly relevant research.

Besides research and innovation, in the past year there was a marked increase in CBC's collaboration with Swedish public agencies and other stakeholders. For example, we started two formal hands-on projects with the Swedish Environmental Protection Agency to assist safety assessment of new biocontrol agents, and review the potential to combat invasive species using, for example, biocontrol methods.

Another important milestone in 2021 was the publication of a new global framework for biological control. Sixteen SLU researchers contributed to this publication which, among other things, will facilitate broader understanding of biological control generally and both the development and implementation of more uniform and appropriate regulatory approaches.

You can read more about this, and other selected achievements of CBC, in this booklet.

The need for biocontrol is ever increasing, and we look forward to intensifying our research efforts in 2022 and thereby helping efforts to reach the European Commission 'Farm to Fork strategy' to reduce use of chemical pesticides by 50 % by 2030. We look forward to collaborating with our friends and colleagues in Sweden and globally to enhance biocontrol's role in sustainable plant protection in 2022.

Johan Stenberg, director of the SLU Centre for Biological Control


© Mårten Svensson

Tackling current and future plant protection problems

Read a few examples of research at CBC during 2021.

Insects and rodents can reduce problems with agricultural weeds

By increasing biodiversity and exploiting ecosystem services we can reduce the use of herbicides in agriculture. An example of an ecosystem service is seed predation by insects and rodents. In her doctoral project, Eirini-Lamprini Daouti investigated this phenomenon and concluded that it is a promising approach for controlling weeds.

– To support weed regulation by the animals that eat weed seeds, cropping systems should not aim to eradicate weeds, but rather to maintain seed availability. A future research challenge is to figure out how to ensure weed seed availability without supporting problematic weeds, she concludes.

Read more here: www.slu.se/weedproblems

Evolutionary perspective provides better plant protection

Integrated Pest Management (IPM) is a strategy for controlling pests and pathogens in crops using a combination of sustainable methods, including biological control. Now SLU researchers suggest that an evolutionary perspective is needed to make it even more effective.

– We are identifying and exploring research fields where further knowledge is required. These include ways to optimize crop resistance, biological control, and other crop protection elements in a durable manner. If evolutionary perspectives are ignored in IPM there are risks that the targeted pests and pathogens will develop counter-resistance, Johan Stenberg concludes.

Read more here: www.slu.se/evolutionartvaxtskydd

Weeds can provide important ecosystem services such as pollination and soil quality. In addition, weed seeds can be valuable food sources for many animals. PHOTO: EIRINI LAMPRINI DAOUTI

Plant protection fungus can control pathogenic fungi with small RNAs

For the first time, researchers have shown that one fungal species can control the behaviour of another using secreted RNA molecules. This has important potential applications in food safety to protect crops from harmful fungi.

– It is very exciting that, for the first time, we have been able to show that one fungus, in this case the plant protection fungus *Clonostachys rosea*, can control the behaviour of other fungi! It is important to be aware of these mechanisms in future efforts to develop environmentally friendly plant protection strategies says Mukesh Dubey.

Read more here: www.slu.se/RNAplantprotection

Landscape complexity promotes resilience of biological pest control

Ecosystem services can be vulnerable to climate change, but the degree of vulnerability depends on their resilience, for example, to changes in temperature. In a new study, landscape complexity was found to promote resilience of biological pest control to climate change.

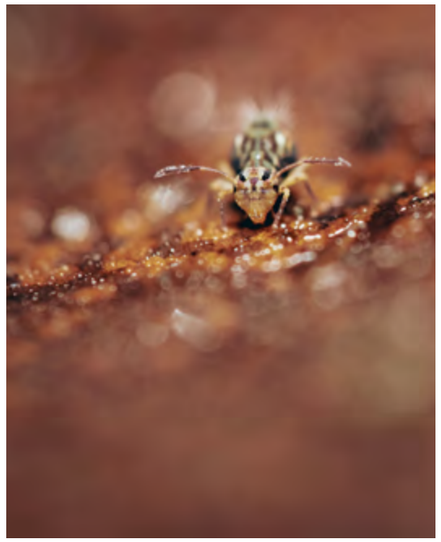
– If an ecosystem service is provided by diverse species that have differing responses to climate change, the service will have greater resilience to this growing threat, says Benjamin Feit.

Read more here: www.slu.se/biocontrol-landscape

How can the authorization of microbial control agents in the EU be rationalized?

Researchers based at SLU and the University of Copenhagen have investigated why the authorization process for microbiological plant protection agents is longer in the European Union than in comparable jurisdictions. Although the EU's regulatory process have strong scientific foundations, the study concludes that the most appropriate scientific concepts, knowledge and expertise have not been applied in the safety assessment of microorganisms utilized in biological pest and disease control.

Read more here: www.slu.se/EUbiocontrol



Soil organisms provide important ecosystem functions such as decomposition, nutrient and carbon cycling as well as water regulation. PHOTO: PIXABAY

Only certain types of organic fertilizers increase abundance of important soil biota for soil fertility

To understand how fertilization affects soil quality we need more knowledge of how fertilization affects soil biota. This has been examined in a new study by SLU researchers. A specific fertilizer was found to be a more important determinant of responses of soil biota than whether it was mineral or organic.

– We found that long-term addition of organic and mineral fertilizers had beneficial effects on the abundance of most soil organisms, relative to their abundance in unfertilized soil, but the responses differed between soil biota, says Maria Viketoft.

Read more here: www.slu.se/soilbiota

See CBC's full list of publications: www.slu.se/cbc-publications

New biocontrol framework

A new, clearer definition of biological control may facilitate its application in practice.

Biological control is expected to play an important role in future plant protection. Unfortunately, the definition of biological control has become less clear in recent years because several different terms and definitions have been proposed. The regulations for the approving biological products have contributed to the confusion by using inconsistent terminology and unclear definitions. Therefore, SLU researchers have developed clear definitions for various main elements of biological control. The new framework may improve understanding of biological methods and facilitate their use in practice.

– Therefore, it is important to define more precisely what we really mean when we say biological control, says Ingvar Sundh.

– We encourage researchers, legislators, authorities and practitioners to use the terminology and conceptual platform that we have developed to facilitate and clarify communication about biological control, says Johan Stenberg

– We hope that our research will help efforts to understand, optimize and formulate appropriate legislation for biological control to maximize its contribution to development of safer, more environmentally friendly food supplies, says Maria Viketoft.

- The framework has been rigorously peer-reviewed and published in a paper entitled "When is it biological control? A framework of definitions, mechanisms, and classifications" in the Journal of Pest Science (https://link.springer.com/article/10.1007/s10340-021-01354-7)
- A popular science summary of the paper can be found at www.slu.se/bc
- A film about the new definition can be fund here: https://youtu.be/aUyf72Ub-_E

Fact box

Biological control is the exploitation of living agents (including viruses) to combat pestilential organisms (pests and pathogens), directly or indirectly, for human good.

Biological control always involves the following three separate players:

1. a biocontrol agent,
2. a pest, and
3. a human stakeholder benefitting from the pest control provided by the biocontrol agent.

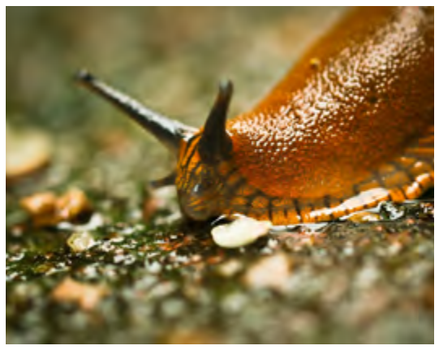
Biological control can be divided into:

- Natural biological control: The service carried out by resident natural enemies of pests and pathogens without human involvement.
- Conservation biological control: Directed stimulation of resident natural enemies to enhance their control of pests and pathogens.
- Augmentative biological control: Addition of propagated biocontrol agents, temporarily increasing their population densities in a targeted area.
- Classical biological control: Addition of new biocontrol agents for proliferation and long-term establishment.

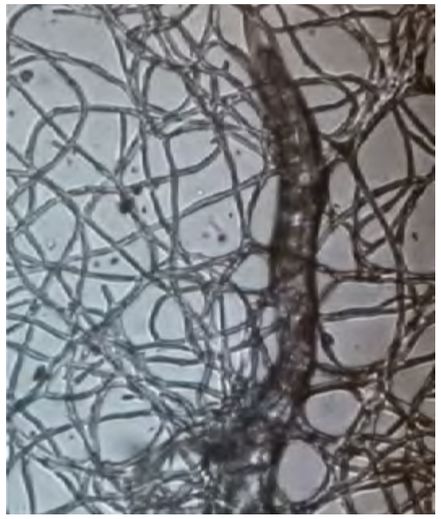
CBC-financed projects and teaching

Pilot project on rhizosphere competence of fungal biocontrol agents
During 2020 CBC allocated funds for a pilot project on rhizosphere competence of fungal biocontrol agents. An important property of a successful augmentative biocontrol agent is its ability to establish populations on crop plants. In this project, led by Mukesh Dubey, the ability of fungal biocontrol agents to establish in the root system of wheat has been tested. Results show that certain strains can establish on wheat roots, but their capacity to establish themselves on wheat roots is not connected to their efficiency as growth-promoters.

Pilot project on slug-parasitizing nematodes
Another CBC-funded pilot project, led by Sara Emery, examined the presence of nematodes in field-collected slugs. Nematodes for biocontrol of slugs can be purchased, but knowledge of their presence in the field is limited. Preliminary results indicate a nematode infestation rate of around 10%, but with different nematodes from the available biocontrol agent.



What nematode species live inside this Spanish slug? PHOTO: PXHERE



We teach biological control and related subjects in dozens of courses at SLU, for example a mycology course. The photo shows a nematode caught by fungal hyphae. PHOTO: MUKESH DUBEY

Teaching biological control
CBC staff give lectures on biological control, IPM and plant protection in both basic and advanced courses at SLU. We also supervise Bachelor's and Master's project work, as well as PhD students. Among other contributions, CBC has developed a half-day teaching module on biological control for basic level university courses. It includes introductory lectures and a group exercise with case studies covering augmentation, conservation and classical biological control.

During 2021 the module was included in SLU courses in crop production. CBC also contributes to post-graduate education with lectures on biological control, including a course called *Mycology - it's basics and applications*.

Grace contributes to food security

Meet our new co-worker Grace Mercy that contributes to food security with push-pull technologies!

Grace Mercy wants to contribute to food security, sustainable agriculture and new biocontrol solutions with her new PhD project on push-pull technology. Push-pull is a cropping system that reduces pest pressure by providing repellents (push), combined with attractants (pull).
– In my PhD project I will attempt to increase our understanding of when and where push-pull is most likely to work. I will carry out the study in five East African countries.

Grace started her PhD education at SLU in December 2021.
She completed an MSc in 2019 and subsequently joined the Department of Environmental Health at the International Centre of Insect Physiology and Ecology (ICIPE), where she started working on a project on interactions with plant and pollinators.
–I am currently developing field protocols for my PhD studies that will focus on push-pull technology. In my PhD work I hope to make contributions on matters of food security, sustainable agriculture, bio-control solutions and help realization of the UN's Sustainable Development Goal 2 (Zero hunger).

Push-pull
Push-pull technology is a cost-effective, and long-term management practice created for African smallholder farms. It is a cropping system developed by ICIPE and partners that reduces pest pressure by providing repellent stimuli (push), combined with attractive stimuli (pull). Push-pull was developed to protect maize crops from stem borers but has also been found to improve soil fertility and reduce the abundance of fall army worms and striga weeds.

© Grace Mercy

Read more here:
www.slu.se/grace-foodsecurity

New research funding

During 2021 CBC received grants for the following new research projects.

Harnessing soil-microbe-plant interactions for sustainable wheat production

Beneficial microorganisms can reduce plant stress caused by diseases and unfavourable climatic conditions. In a project recently funded by Formas, Mukesh Dubey together with colleagues at the Department of Forest Mycology and Plant Pathology and the Department of Crop Production Ecology will investigate how beneficial fungi can increase the health and climatic resilience of wheat. More specifically, they will investigate the ability of the fungus *Clonostachysrosea* to reduce damage caused by fusariose disease and drought stress. The work will also identify ideal wheat cultivars for *C. rosea* application.

– The results will demonstrate how beneficial fungi can reduce application of fertilizers and fungicides, and improve plant health in wheat production, says Magnus Karlsson.

The Yungas region in Bolivia produce coffee of great quality. PHOTO: PIXABAY

Microbial treatment for sustainable production of quinoa and coffee in Bolivia

Bolivia is an important producer of quinoa and coffee, which make important contributions to the country's economy. The aim of a program supported by SIDA is to develop ways to use beneficial microorganisms to mitigate salt and drought stress of quinoa, and management of coffee plant diseases caused by fungal pathogens, including coffee leaf rust and leaf spot diseases. The project is coordinated by Dan Funck Jensen of the Department of Forest Mycology and Plant Pathology, and involves close collaboration with the Universidad Mayor De San Andres in La Paz, Bolivia.

Integrating insect olfaction and behaviour to improve biocontrol with hoverflies

Hoverflies are fascinating ecosystem service providers. Some species feed on aphids and other pests as larvae and later turn into pollinating flies. Their services are important for natural and agricultural systems where hoverflies are naturally present or actively released for biocontrol. Semiochemicals play an important role in hoverfly behaviour but few studies have investigated specific chemical cues.

Detailed knowledge of chemical signals, chemosensory detection, processing and insect behaviour is valuable for the management of ecosystems and pests. Formas will support this project, which will involve collaboration by the SLU Department of Plant Protection Biology, Flinders University in Australia, the National Centre for Biological Sciences in India and the USDA-Agricultural Research Service.

– Our project aims to improve understanding the olfactory system and regulation of key hoverfly behaviours as a basis for advanced biocontrol applications, says Paul Becher.

Seminars and conferences

During 2021 CBC has arranged a workshop on ways to improve EU's regulations of beneficial microorganisms. We have also arranged a digital seminar series on biological control.

Policy for regulation of beneficial microorganisms

In May 2021, Professor Ingvar Sundh held a digital seminar entitled "Reaping the benefits of microorganisms in cropping systems: Is the regulatory policy adequate?" The seminar included a review and critical discussion of the current legislation and regulatory policies for plant beneficial microorganisms in the EU, with particular emphasis on microbiological pest/disease control and plant growth stimulation.

Read more here:
www.slu.se/cbc-seminar-policy

Processes in fungal mycoparasites

In April 2021, Dr Lea Atanasova of the University of Natural Resources and Life Sciences (BOKU) in Vienna, Austria, held a seminar entitled "Sensing and regulation of mycotrophic and biotrophic processes in fungal mycoparasites". Lea discussed the processes of these mycoparasitic fungi that allow them to sense and regulate their transcriptional patterns in contact with fungal prey and plants. She also showed examples of such involvement in antagonistic attack and fungal-plant interactions.

Read more here:
www.slu.se/seminar-mycoparasites

International workshop arranged by SLU on improvement of regulations on useful organisms in plant cultivation

How can we improve the EU's regulations on beneficial microorganisms? This issue was discussed during a workshop in March as part of the EU project EcoStack. The meeting was attended by researchers and representatives of both relevant industries and regulatory authorities.

– The participants had a very rewarding discussion of our proposals for revising and improving the regulatory processes. In the near future, we hope to publish our results, conclusions and proposals in a scientific article, says Ingvar Sundh.

The aim of the regulatory policy workshop in May was to discuss preliminary improvement proposals with key stakeholders. PHOTO: JULIO GONZALEZ

Read more here:
www.slu.se/regelverk-workshop

Biodiversity and ecosystem services on organic farms

Carmen Blubaugh of the University of Georgia, USA, gave a seminar in November entitled "Biodiversity and ecosystem services (and disservices!) on organic farms".

CBC in the media

Examples of CBC researchers interviewed in different media.

Zombie fungus manipulates – and kill – flies

A deadly fungus cheats common houseflies. Not only does it manipulate the female's behaviour, but by emitting an aphrodisiac it also tricks the male into having sex with the female - when it has died and is full of fungal spores. These are results of a new scientific study that Paul Becher talked to the Swedish daily newspaper Dagens Nyheter about.

Read more here (in Swedish): www.dn.se/vetenskap/zombiesvamp-manipulerar-och-dodar-flugor

Bumblebees keep strawberries healthy

In a master's project at the center Matilda Jützeler is focusing on entomovectoring of a microbial biocontrol agent using bumble bees, and the journal Extrakt, has published an interview with her about this work.

– I got to follow the bumblebees' whole life, from the larval stage until they became adults, and I have really started to love bumblebees. They are so cute! And very interesting, Matilda says.

Read more here (in Swedish): www.extrakt.se/humlor-hjalper-till-att-halla-jordgubbarna-friska/

How does the weather affect strawberries?

In July, Professor Johan Stenberg talked about strawberries, climate and weather in the Swedish radio program Nordegren & Epstein on the P1 channel.

Listen to the program here (in Swedish): https://sverigesradio.se/avsnitt/hur-paverkar-sociala-medier-vara-sota-vanor

Broad defence against aphids is becoming increasingly important in a changing climate

Mattias Jonsson talked about biological control of aphids on Vetenskapsradion (a science radio program on the P1 channel).

– With future climate change, it may become even more important to protect ladybugs and other insects that eat aphids, says Mattias Jonsson. Listen to the program here (in Swedish): https://sverigesradio.se/artikel/brett-forsvar-mot-bladloss-allt-viktigare-i-ett-forandrat-klimat

Biocontrol can increase strawberry yields and shelf life

Eating strawberries is an essential part of many people's lives in the summer, but grey mould is a common problem. Research by the strawberry group in Alnarp is focusing on a new biological fungicide that can reduce yield losses and increase their shelf lives.

– We want to rewild our strawberries and cultivation systems, Johan Stenberg said on Swedish radio channel Radio P4.

Listen to the program here (in Swedish): https://sverigesradio.se/artikel/jordgubbsforskning-vill-forvilda-jordgubben

Matilda Jützeler investigated if bumblebees can act as flying doctors and deliver biocontrol agents to plants.
PHOTO: MATILDA JÜTZELER

A year of fruits and vegetables

The UN General Assembly designated 2021 the International Year of Fruits and Vegetables (IYFV).

IYFV 2021 provides a potent opportunity to raise awareness of the importance of fruits and vegetables in human nutrition, food security and health, as well for achieving UN Sustainable Development Goals. In fruit and berry cultivation, fruit flies such as *Drosophila suzukii* pose major problems. To raise awareness of the roles that flies can play not only as pests but also as beneficial organisms, CBC produced a short video on Paul Becher's research in this area.

– In the video, we talk about our research on how flies can be manipulated to protect plants. For example, *Drosophila suzukii* can cause large crop losses, but can be lured away with the help of yeast and hoverflies can act as flying doctors by spreading biological control agents, says Paul Becher.

See the movie here:
https://youtu.be/-Q7iD_6iCUA

The fruit fly Drosophila suzukii on blackberries and yeast in a laboratory environment. PHOTOS: PAUL BECHER

Master's projects at CBC

Bumblebees can spread biocontrol products to strawberry flowers

Matilda Jützeler has investigated whether grey mould can be controlled with the help of bumblebees. The beneficial fungus *Aureobasidium pullulans* is found naturally on wild strawberries and has previously been shown to inhibit grey mould.

– New strains of this beneficial fungus were isolated and used in a powder formulation, which was then placed in bumblebee hives. When the bumblebees flew out of the hive the powder with the beneficial fungus stuck to their bodies and the bees carried it to the strawberry flowers they pollinated. This proved to be an effective method for controlling grey mould and the bumblebees were not negatively affected by the beneficial fungus, Matilda explains.

Read an interview with Matilda (in Swedish) at www.slu.se/humlor-jordgubbar and Matilda's thesis "Evaluation of bee-vectored Aureobasidium pullulans for biocontrol of grey mould in strawberry" at https://stud.epsilon.slu.se/16464/.

Matilda Jützeler examines strawberry plants in a greenhouse in Alnarp. PHOTO: LEON OEHME

"There has been no doubt that my future would be in horticulture. Since I was a child, I have been engaged in plant protection", says Izabella Lundborg. PHOTO: PRIVATE

Izabella wins the Global Sustainability Award with presentation on cover crops

Izabella Lundborg of the Centre won the Global sustainability award on SLU's Thesis Day on the 26th of May. At this digital event, Izabella presented her work on the role of cover crops in control of root parasitic and pathogenic organisms.

Izabella's project included greenhouse bioassays of effects of cover crops on parasitic or pathogenic organisms, particularly their ability to counter plant pathogens/pests that cause severe crop loss.

The cover crops have potential utility as tools for controlling plant parasitic nematodes and an organism causing clubroot.

– We're very proud of Izabella, she really deserves this award for her excellent presentation and great master's project work, says Paul Becher.

Read more here:
www.slu.se/izabella-award

© Cajsa Lithell

Steps towards application

CBC contributes to research providing direct benefits to society.

DNA fingerprinting in industrial development of commercial biocontrol products

The process of developing biocontrol products for commercial use is complex and requires compliance with legislation, registration of the biocontrol organisms and industrial processes for large-scale production and formulation. DNA fingerprinting technology can be used to identify strains for registration and quality assurance during production.

During 2021, CBC provided expert advice on DNA fingerprinting of the biocontrol fungus *C. rosea* for BVT Bee Vectoring Technology.

Flower strips for sustainable agriculture

Establishing flower strips in agricultural fields may contribute to sustainable agriculture. Maria Viketoft, Mattias Jonsson and Johan Stenberg are striving to optimize this approach by assessing flower species' effectiveness for attracting pollinators and natural enemies of pest insects in field trials.

Concurrent surveys in farmer fields show that flower strips attract pollinators and can have a positive effect on biological control. Based on data collected in field trials during 2020 and 2021, optimized flower mixtures will be tested in strawberry fields during the coming year.

Experimental flower stips from above. PHOTO: CAJSA LITHELL

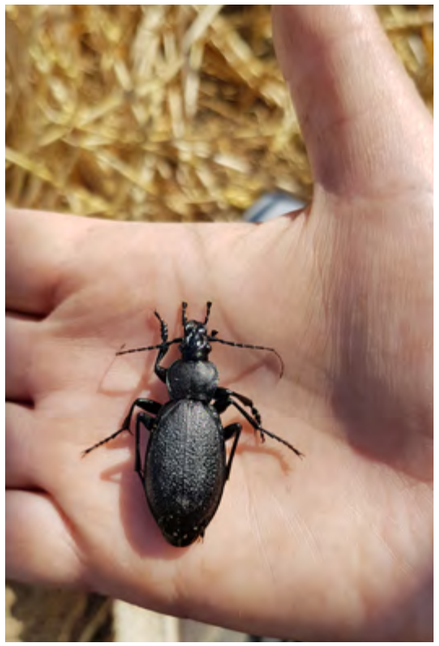
Scientific advice

CBC continuously communicates about scientific issues with Swedish and international authorities, industries, farmer organizations, and individuals.

New microorganisms that can be utilized for augmentative biological control of pests and diseases must be authorized as plant protection products or biocides. Clearly, regulatory measures must be well balanced and consistent with recent research findings.

Thus, CBC provides findings and advice to the regulatory authorities that helps to ensure that knowledge of new, safe products and methods is disseminated to end users quickly and efficiently.

CBC also gives advice to the Swedish Environmental Protection Agency regarding approval of macroorganisms (nematodes, insects, and arachnids).



A beetle found in the field during Eirini Lamprini Daouti's PhD project. PHOTO:EIRINI LAMPRINI DAOUTI

Ingvar Sundh - ten years of handling safety and regulations of microbes at CBC

During his time at CBC Ingvar Sundh assisted The European Food Safety Authority (EFSA) in evaluating microbes for safe use in the food and feed chain. He is now a member of the working group for QPS (Qualified Presumption of Safety of microorganisms) of the EFSA at least until the end of 2022. He has also assisted the EU Commission in work with new data requirements and guidance documents for safety assessments and authorization of microbial plant protection products

Ingvar is now moving towards retirement and his last day at CBC was 30 June 2021. In total, Ingvar has been part of CBC for almost 10 years.

– The best thing with being a part of CBC has been that the assignments also involve, apart from research, interaction with stakeholders in society. The stable support from the centre enabled me to establish and maintain strong relationships with regulatory institutions, industry as well as non-governmental organizations, at both international and Swedish level. And the positive, supportive atmosphere in the CBC activity group has been very rewarding, says Ingvar.

Ingvar's work on safety and regulation of microorganisms started in 2003 in the program Domestication of Microorganisms ('DOM') funded by Mistra.

Ingvar Sundh is a Professor of Ecological Microbiology and his research topics are related to safety assessment and regulation of beneficial microorganisms utilized within the food chain and for a better environment. PHOTO: CAJSA LITHELL

– I have been involved in both experimental studies on new test methods for evaluating human and environmental safety of microorganisms and 'dry' investigations of the functionality of the regulatory frameworks applicable to utilization of microorganisms.

Over time, Ingvar's research focus has shifted increasingly towards studies of how safety assessments and regulatory systems can be improved to further facilitate the implementation of microbial biocontrol in practice. This has gone hand in hand with growing engagement in providing scientific support to relevant authorities and other stakeholders.

– I think that the interface between the biological properties of microorganisms, characteristics of our legal systems, and the various norms and values in society is very interesting. But it is also highly complex and should, in my opinion, be the subject of further research, says Ingvar.

– It has been a pleasure working with Ingvar and he will be sorely missed! His in-depth knowledge in the area has been a valuable asset for CBC, says Johan Stenberg, CBC's director.

CBC wish Ingvar the best of luck in his future endeavours!

The people at CBC

This is the operational group that has been active during 2021. We have worked together in this constellation for three years. Ingvar Sundh is now retired and quit his work with CBC in August 2021. The rest of the group will continue for at least three more years with a renewed mandate.

Paul Becher - studies chemically mediated interactions between organisms, including host-finding and sexual communication in insects. He is specifically interested in the function of semiochemicals in biological control.

Mattias Jonsson - specializes in insects and arachnids for biocontrol. He mainly focuses on natural and conservation biological control of invertebrate pests in agroecosystems.

Magnus Karlsson (Deputy director) - interested in microorganisms and their interactions with other microbes, plants and the environment. He investigates fungal interactions in relation to plant pathology and biological disease control.

Cajsa Lithell - CBC's communications manager.

Johan Stenberg (Director) – Johan's work focuses on optimization and evolution-proof biocontrol within the framework of Integrated Pest Management, often involving wild genetic resources and studies of natural selection in agroecosystems.

Ingvar Sundh - works on issues related to safety and regulatory measures. He focuses particularly on strategies to ensure that a biocontrol agent has no unacceptable adverse effects on humans or non-target organisms in the environment.

Maria Viketoft – works on nematode ecology, particularly these worms' interactions with plants (crops and wild species) and other soil organisms.

Team and reference group meetings

Team meeting in Alnarp
On November 11, 2021, a team meeting was held with CBC researchers and associated researchers at the SLU campus in Alnarp. The meeting included a trip to Lönnstorp Research Station where Johannes Albertsson talked about opportunities for using the station for research projects and gave a guided tour of the area.

Reference group meeting in Malmö
CBC's annual reference group meeting took place the following day in Malmö. Some participants joined the meeting online.

– This was an enjoyable and productive meeting with Swedish stakeholders. We discussed collaborative projects on ways to exchange knowledge and got a good overview on what is happening in the different organisations, says Johan Stenberg.

The CBC team at Lönnstorp.

A bridge between academia and society – CBC's reference group

Tasks of SLU Centre for Biological Control include dissemination of the university's knowledge for the benefit of society and provision of a bridge between academia and various external actors, as well as between researchers. CBC's reference group provides one such bridge for interacting with actors in society.

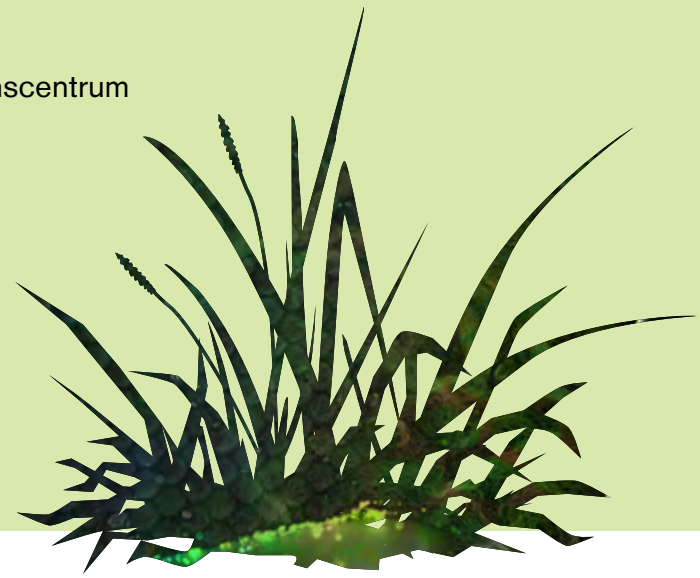
The reference group consists of representatives of the Swedish Board of Agriculture, Swedish Environmental Protection Agency, Swedish Chemicals Agency, Swedish Federation of Rural Economy and Agricultural Societies, LRF (Federation of Swedish Farmers), RISE (Research Institutes of Sweden) and the biological control company Lantmännen BioAgri. The aim is to develop knowledge and understanding of biocontrol through collaboration between SLU and these actors.

FOLLOW SLU CENTRE FOR BIOLOGICAL CONTROL HERE:

www.slu.se/cbc

twitter.com/CBC_SLU

YouTube: CBC - Kompetenscentrum för biologisk bekämpning



SLU

SCIENCE AND EDUCATION **FOR SUSTAINABLE LIFE**

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