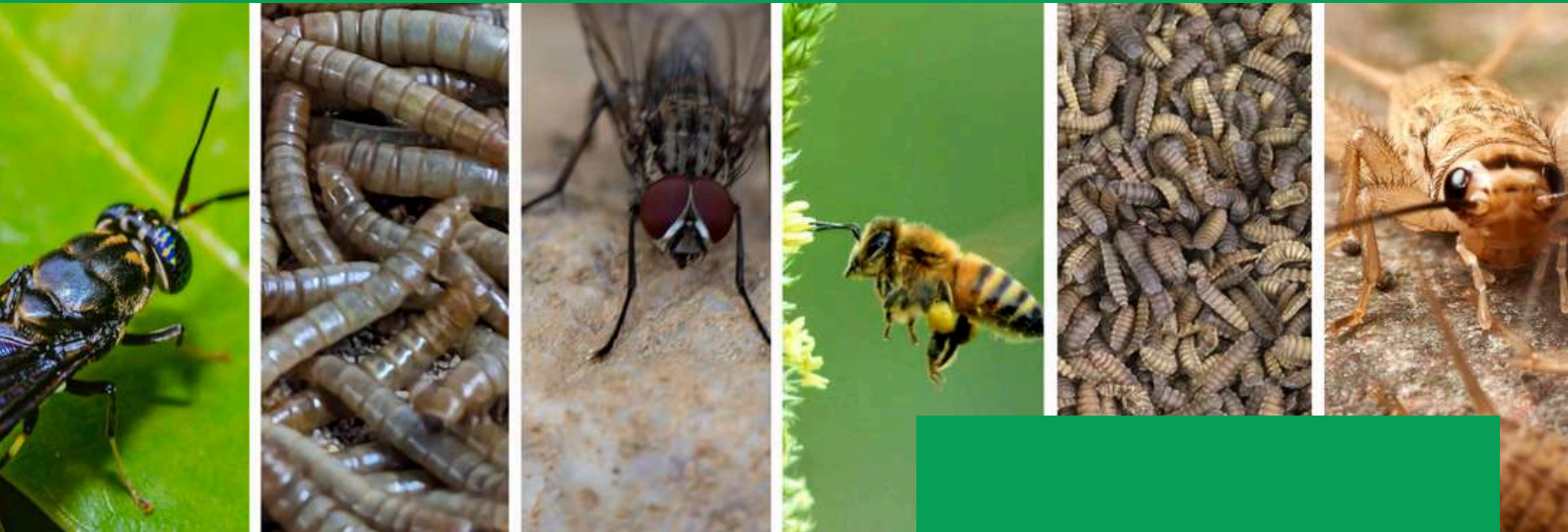


Newsletter

Insect-IMP COST Action CA22140:

Improved Knowledge Transfer for Sustainable Insect Breeding



It's been a pretty hectic but very fun first year for Insect-IMP! - When we set out on this journey in late 2022, we were still a relatively small group. We did not know for sure that what we were envisioning for the farmed insect space would be taken up as we were hoping.

Thank you all for proving our first instincts right and for engaging with the rest of the group (230 participants and growing!) in such enthusiastic manner! 2024 has been the year where we get our bearings and feel out the field, the issues and the people involved. - With the upcoming EAAP conference in Greece, we will surely be off to a great start for 2025.

Hope to see you in Athens!

Gertje & Jana

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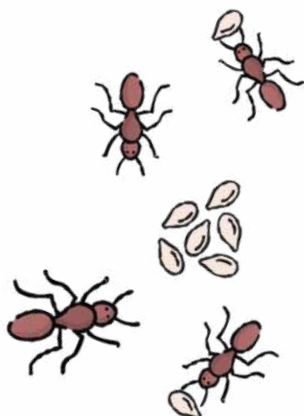
About Insect-IMP

Insect breeding, an exciting young field in animal production, is seeing growth, but slow overall improvements. Despite its growing importance, the industry lacks a cohesive platform for collaboration due to factors such as competition for funding, limited supply contracts, and a lack of publicly available information supporting the development of insect breeding schemes. This fragmentation inhibits progress and hinders the sustainable growth of the insect farming sector.

Insect-IMP is a COST Action which aims to connect researchers from various fields of genetics, entomology and veterinary sciences, both with each other and with other stakeholders across the entire farmed insects sector.



We will focus on knowledge transfer between various insect species, as well as from other animal breeding and genetics sectors to allow for economic and research gains in insect farming and beekeeping. The collaboration within the Action will enable a more sustainable growth in the insect farming sector, progress European research capacity by laying the foundation for long-term collaboration within both research and industry across borders, and support educated decisions on insect breeding regulations.



COST

COST (European Cooperation in Science and Technology) is a funding agency for research and innovation networks. Their Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.

<https://www.cost.eu/>

A look back at first year

1st MC meeting, Brussels (BE)

21st September 2023

The MC met for the first time on the kick-off meeting in Brussels. On the meeting, we familiarised ourselves with the aim of the Action, voted on the leading positions, and discussed our vision for the the first year! We also took some nice photos in prepared PRs in 10 different languages that can be found on Action's website.

Industry workshop at INSECTA, Potsdam (DE)

16th May 2024

We held a workshop targeting industry partners aiming to communicate and discuss how targeted breeding efforts could help future-proof the insect farming industry and how academia and industry can interface in the sector.

Workshop of working groups, Celle (DE)

28 – 29th May 2024

This was the first in-person working group meeting of the Insect-IMP! We met at the Institute for Apiculture in Celle for a combined workshop of working groups 4 – Breeding objectives, 5 – Phenotyping systems, and 6 – Estimation of breeding values. On the meeting, we followed presentations from members of each working group and discussed, how to combined knowledge across species anda cross fields to find new solutions.



EAAP preparation meeting, Celle (DE)

30th May 2024

Insect-IMP is heavily involved in the organisation of the EAAP conference on insect genetics in early 2025. You can read more about it on page XX. On the conference, we are organising three training schools. We met in Celle to discuss content and logistics of the workshops. You can find more info about the conference in the Upcoming events section.



2nd MC Meeting, Florence (IT)

21st September 2024

The MC met for the second time in Florence. The meeting was attached to the annual EAAP conference. On the meeting, we learnt about the Action progress in the first year, budget and reimbursement rules, and working group progress. We also learn more about related COST Actions - already running Actions EU-LIPHE and ECO4ALL, and a newly funded Action GIN-TONIC. We finished it all with an Italian dinner!



PRESENTATIONS

Progress of the working groups

Insect-IMP is a COST Action with quite a broad range of working groups, and since the success of the Action will hinge entirely on collaboration between various fields of academia as well as the “executive” industry players, one of the main goals of the first Grant Period was to get closer interactions between research and industry. This was done by making Working Group meetings accessible as online meetings and by covering a wide array of topics within each group to foster discussion and exchange. Insect-IMP was able to garner some interest from other groups as well, such as the European Association for Animal Science (EAAP), who offered to host a mini-conference on the topic of Insect Genetics in early 2025, and the editorial board of ANIMAL, who offered to publish Action outputs in a special issue that submissions will be able to be made to in late 2025.

While tangible outputs for all Working Groups cannot be expected this early on, great strides have been made in understanding what our biggest scientific challenges and logistic/organisational issues will be going forward.

WG1: Population structure, inbreeding management, and genetic diversity

Led by: Christoph Sandrock

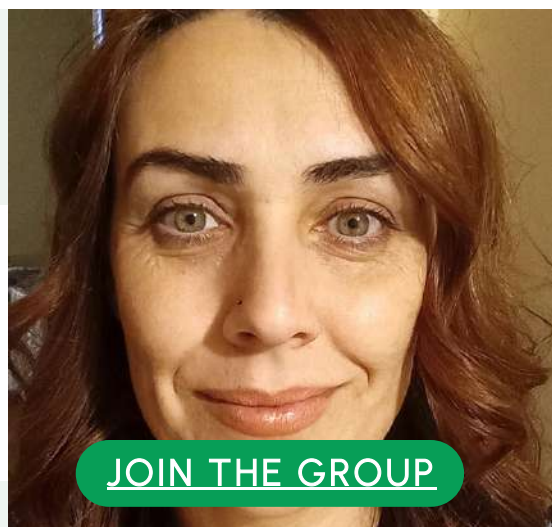
WG1 aims to connect researchers in the study of the population structure, genetic diversity, and the impact of domestication on populations in insect populations across different geographies and populations.

There were 3 online meetings (Dec. '23; Feb. '24; May '24).

In the first meeting the Action was presented as originally outlined, and during extended discussions feedback from the audience was fetched to initiate a secondary freehand-shaping of future contents. The second meeting comprised an impulse talk "Global population genetic structure of the black soldier fly" by Christoph Sandrock followed by an exciting discussion and completed by break-out group discussions on various topics, primarily on prioritizing topics, identifying potentials, gaps, challenges etc.. The third meeting comprised an impulse talk "Does early domestication of yellow mealworm affect life history traits QTLs?" by Amin Madoui followed by an exciting discussion and completed by more specific discussions on dissemination options such as publication options. Overall the interests and the expertise across participants appear very diverse, as are the insect species they are primarily working with. Identifying hot spots and overlaps in the contextually broad topic to be mined and advanced is still ongoing, and may be fortified during an in-person meeting during the next year. However, within the network a number of fruitful more closer networks have already established and are becoming fruitful in terms of collaborations (within and between academia and industry).



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WG2: Mating control

Led by: Olga Ameixak

WG2 aims connect researchers to revise, collate, and distil all available knowledge on mating behaviour in farmed insect species and identify common features; investigate genetic architecture of mating behaviours, and revise established methods in insect breeding programs and explore the transferability across species.

Working Group 2 reunited 3 times since the start of the action. During the first meeting there was a general presentation on the WG objectives and main goals proposed in the MoU and discussions were carried on how to achieve them. In the second meeting there was a presentation made by one of the group members related with the WG topic and a general discussion on how to advance the knowledge on mating behaviours for up-scale production. The third meeting aim was to define the guidelines for producing a shared publication regarding mating behaviours, currently a first draft is shared among the participants in this meeting. This revision will compile the information available on mating behaviours of different insect species.

WG3: Interplay of genetics, environment, and community in farmed insects

Led by: Gertje Petersen

WG3 engages intently with the wider animal breeding community to explore interactive phenotypes as emergent properties of interactions within a community; harmonise the terminology regarding different types of environmental and community effects; and develop a harmonised approach for modelling environmental variation in genetic evaluations.

Interactions between insects and their environment, irrespective of whether insects are reared in housed systems, present one of the biggest challenges in the measurement of performance and the accurate prediction of breeding values. This is made even more complex by the high degree of interaction within insect communities. While there are definitely some areas of classical animal breeding that we can learn from, especially in aquaculture species, pigs and poultry, insects come with their own additional challenges in the form of parasitoid interactions of symbiotic microbes. - Working Group 3 will need more input from specialists in the field of parasitoids and microbiota to be able to tackle these issues, so if this is you, please consider joining!



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WG4: Breeding objectives

Led by: David Deruyttern

WG4 connect researchers and industry partners with the aim to gather information on the traits collected in insect breeding programs and define their economic importance in communication with the industry regarding current and future market needs; and gather information on the genetic architecture of the traits from the literature and coordinate future efforts to decipher more of the genetic basis for insect performance.

We had several virtual and one in person meeting. This ensured that the members of the WG are now more in line with the knowledge and started building the breeding objective network we can build on in the following years.

WG5: Phenotyping systems

Led by: Esther Ellen

WG5 connects researchers with the aim to revise existing practices for phenotyping across insect species and identify practices that could be transferred across species; exploit models already available for genetic evaluation with group -phenotyping and obtain the knowledge from non-insect species; develop general fitness indicators which can be used to monitor sustainability of farmed insect populations; and develop recommendation and best-practices for phenotyping in insect breeding programs.

Within WG5 "phenotyping systems" we have monthly meeti

During the monthly meetings we had presentations and discussions on certain topics: - Obstacles and suggestions of honeybee and insects for feed&food breeding programs with a focus on phenotyping. - Phenotypes that are currently measured and techniques used - Computer vision - Estimating genetic parameters for life-history traits in flour beetles - Highlights in-person workshop In may we have organized an in-person workshop in collaboration with WG4 and WG6. Currently, we are making an overview of all the phenotypes collected in the different insect species, and the different standard operating procedures to measure certain traits. We will use this overview to find new traits and to develop a phenotyping protocol.



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WG6: Estimation of breeding values

Led by: Sreten Andonov

WG6 connect researchers with the aim to collect, compare, and refine prediction models used across species; and coordinate efforts to integrate genomic evaluation models in insect breeding schemes.

Participation in WG6 is lower than expected, but this can be justified due to the very specific topic. However, we held four online seminars and one in-person meeting. We agreed

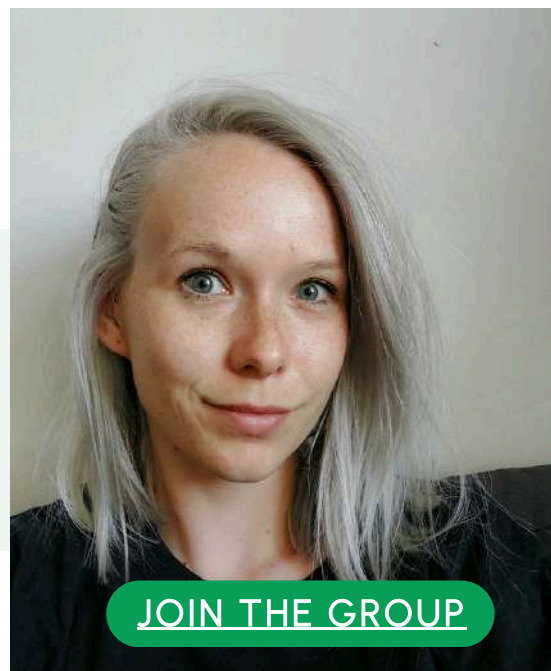
to write a paper describing breeding value examinations in insects. For EBV in honey bees, reproduction and the haploid-diploid system are unique, requiring modifications to the standard evaluation software through subroutines. We plan to integrate these subroutines into the F90 software, and initial steps have already been taken. Coordination meetings will be held in late August, and further details will be agreed upon during EAAP2024.

WG7: Dissemination and communication

Led by: [Jana Obšteter](#)

WG7 covers communication with the industry to identify present and future pain points as well as topics on which there is higher willingness to communicate and share experiences; managing Action's website and social media; communicating the results of this COST Action, and engaging with policy makers or organisations who represent sector interests to policy makers.

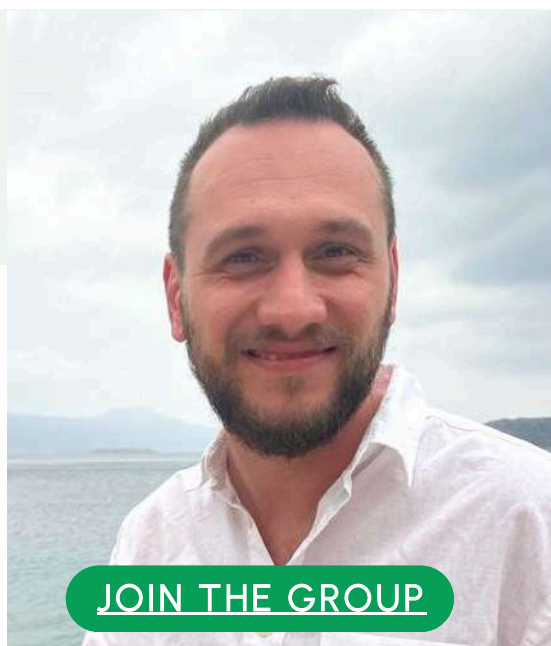
In the first 9 month of the Action, we had five online meetings with the members of WG7. During these month, we have set up social media channels on X, Instagram, LinkedIn, and Facebook. Through the channels, we have advertised Action's events, open calls for grants, and presented some labs. In the last month, we have also set up a google form to collect information about labs and people involved in the Action that we plan to present through our social media during the duration of the Action. We have also set up the website cost-insectimp.eu with information about the Action, news, and events, and set up smaller teams to prepare material for the website and the social media. On the last couple of meetings, we have also been working on preparing three infographics on basic breeding for insect farmers, importance of insects, and challenges of insect breeding. We are currently finalising the infographics and will release them as educational material in the next couple of months.



WG8: Inclusion and representation

Led by: [Mert Kükrer](#)

WG8 aims to ensure that the Action has a good gender balance and representation and inclusion of students and Early Career Investigators for training and upskilling opportunities; to provide representation, advocacy, and effective communication across potential language barriers for ITC researchers; to identify and close gaps around inclusion of "missing" target species; and to grow the insect breeding community bringing in new industry or academia partners.



Over the past year, Working Group has focused on expanding the Action community, enhancing inclusivity, and improving the representation of underrepresented countries and groups in the network. The group has met three times to discuss progress and future steps toward achieving these goals. The discussions covered the below topics:

- 1. Community Expansion:** WG8 made significant contribution in expanding the Action community in growing to 220 members from 39 countries by August 2024. Throughout the year, the

group targeted various underrepresented regions (including those from Asia, Africa, and Americas where insects are a part of the diet) and engaged stakeholders across different research fields. Specialist teams were established to address the species-wise gaps for Honey Bees, Black Soldier Flies, Yellow Meal Worms, and Super Worms. The WG prepared a Standard Invitation Letter to be distributed among potential Action members and a spreadsheet to track and follow up the individuals we got in contact with. ITC Conference Grant announcements have been communicated with EurBee and COLOSS networks.

2. **Inclusivity Awareness & Monitoring:** As the community grew, WG8 has been actively monitoring GGG (gender, generation, geography) balance within the Action. Current situation among membership (n=220) is as follows: 84 female members (38%), 105 young researchers and innovators (48%), 121 members from inclusiveness target, near neighbour, or other developing countries (55%). Member Countries not represented (n=10): Armenia, Cyprus, Georgia, Iceland, Ireland, Latvia, Luxemburg, Malta, Norway, and Ukraine. Near Neighbour Countries not represented (n=9): Algeria, Azerbaijan, the Faroe Islands, Jordan, Lebanon, Libya, Palestine, Syria, and Tunisia. Efforts included a proposal to organize a webinar on inclusiveness and resilience in bioeconomy, and discussing potential collaborators for the webinar within the academia.
3. **Industry Collaboration:** WG8 also sought to bridge the gap between academia and industry by recommending tandem speeches during workshops and online events to ensure knowledge transfer in both ways. The WG prepared a single-page introductory material for inclusion in the German Agricultural Society (DLG) International Newsletter, aiming to attract potential industrial partners. The WG members had four meetings with four companies to discuss their potential participation in the Action.

HOW CAN YOU JOIN?

Working group (WG) member - The working groups perform the tasks required by the Action to fulfill the objectives of the network project plan, as described in the Memorandum of Understanding (**MoU**). To participate as a working group member, please **register at e-COST** and apply **here**. Your application will be assessed by the Working Group Leader and the Action Chair.



Be part of our Action!

Management Committee member - each COST Action can have up to 2 management committee members from each country. Contact us if you're interested to become one for your country!

Action Networking tools - COST Actions have been designed to maximise networking possibilities, featuring a wide range of tools and additional activities, which benefit individuals and wider research networks alike through strengthening research outcomes and community knowledge. We will offer several tools to be used, like:

- Conference grants
- Short-term Scientific Missions (STSM)
- Virtual Mobility (VM) Grants

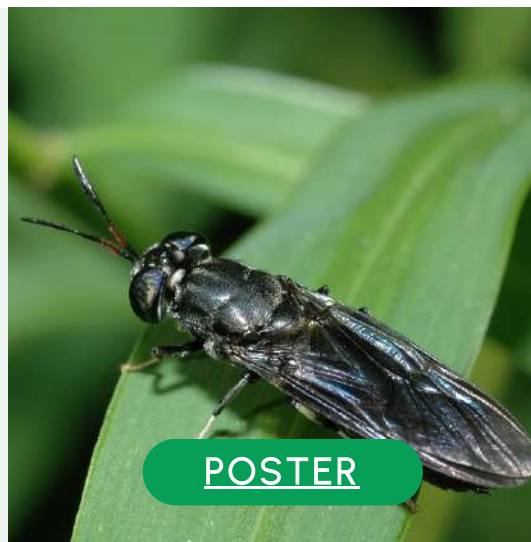
You can find more info [HERE](#). Contact us on gertje.petersen@laves.niedersachsen.de to find out which tools are open.

Awarded grants

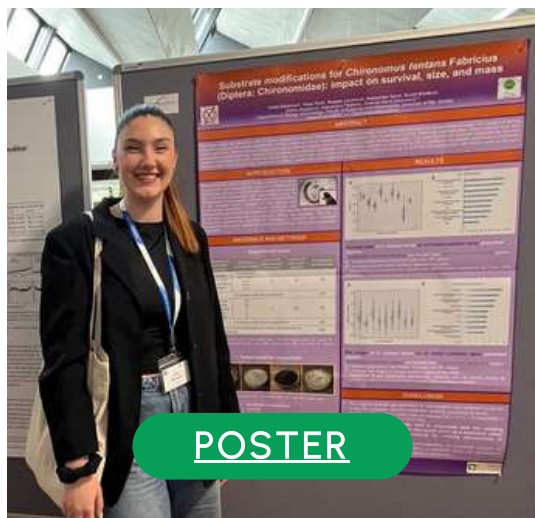
LUKA IRENEJ PECAN

INSECTA2024: Preliminary investigation of the chemical composition of black soldier fly larvae

Attending the conference represented a significant milestone for our research group, marking our inaugural public presentation on this particular topic. This event substantially heightened our visibility within the scientific community, allowing us to showcase our innovative methodologies and preliminary findings. .



POSTER



POSTER

MAŠA STOJANOVIĆ

INSECTA2024: Substrate modifications for Chironomus tentans Fabricius (Diptera: Chironomidae): impact on survival, size, and mass

Participating in INSECTA2024 motivated me to pursue research with even greater passion. Seeing the dedication of others reminded me of the importance of our work and the impact it can have on preserving biodiversity through clever and delicately developed bioeconomy solutions.

BARTOSZ GRODZKI

Insects to Feed the World: Reproductive system development and assessment in Hermetia illucens females (Diptera: Stratiomyidae)

Engaging with representatives from companies involved in insect farming and bioconversion opened avenues for applying our research findings to industrial processes. These conversations emphasized the practical applications of our work in improving the efficiency and sustainability of insect farming operations.



POSTER

GEORGIA BALIOTA

*The 75th EAAP Annual Meeting: Comparative larval growth of *Alphitobius diaperinus* populations on various substrates*

The feedback I received, along with the insightful discussions that followed, not only refined my current research but also opened up new avenues for exploration, particularly in knowledge transfer between breeding systems. These interactions contributed to a growing recognition of the importance of genetics and breeding in insect farming. As a result, I am now exploring potential collaborative research projects, particularly in the areas of sustainable farming practices and genetic improvements for farmed insects.



PRESENTATION



POSTER

HELENA VIRIĆ GAŠPARIĆ

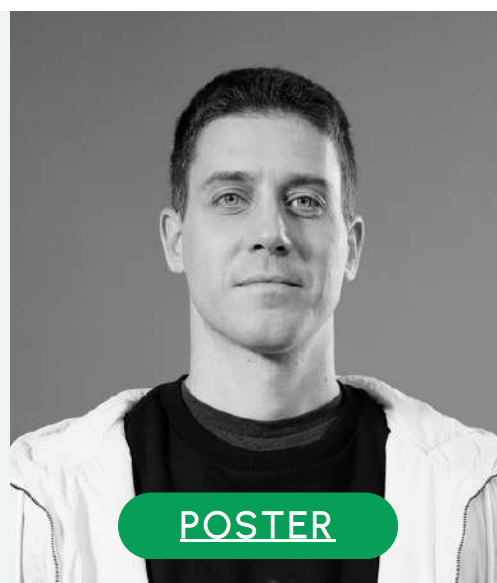
*IICE2024: Unravelling the wing shape variation of the destructive greater wax moth (*Galleria mellonella*) in Croatia*

The presentation provided an excellent platform for sharing research outcomes and methodologies with other colleagues from around the world. For instance, the exchange of ideas with researchers from China was particularly fruitful. They expressed a strong interest in applying the findings from this study to their local context, where *Galleria mellonella* also poses a significant threat. The prospect of adapting the Croatian model of studying wing shape variation to other regions could lead to broader international collaborations and comparative studies.

SLOBODAN DAVIDOVIĆ

*EURBEE 10 Congress: High-resolution mtDNA-based phylogeny of honey bees (*Apis mellifera carnica*) from Serbia*

During the event, I had the opportunity to meet Dr. Grace McCormack, a leading expert in the field of honey bee genetics who is also interested in researching free-living honey bee colonies. In addition we discussed about the joint proposal for the COST action in which we will create a network of all researchers from Europe who are interested in free-living honey bees.



POSTER

Future events

EAAP Conference, Athense (GR)

29 – 31th January 2025



It is our pleasure to announce the EAAP Insect genetics conference named Insect Genetic IMProvement, IMPLementation, IMPact, that will take place 28th - 31st January 2025 in Athens.

As seen from the name, the Insect-IMP is heavily involved in the organisation of this conference! Although the conference is not in our organisation, we are organising three training schools at the conference. The training schools will be held in the afternoon of the 30th January.

1. Crash course on quantitative genetics

Dr Ewa Sell-Kubiak

In the training school, we will cover the basics of the key topics in quantitative genetics, such as sources of variation in nature, the use of mixed models and their genetic components, heritability and repeatability, breeding values, and touch upon breeding objectives. The training school is aiming keep the audience engaged through some interactive elements.

2. Population simulation

Dr Gregor Gorjanc

This 4-hour introduction course to the AlphaSimR package will guide participants through the fundamentals of simulating breeding programs. Attendees will learn how to set up and run breeding simulations. Specifically, this introduction course will include simulating DNA, setting trait genetic architecture, obtaining genetic

values and phenotypic values, working with multiple population objects, selecting individuals, modelling complex breeding programmes, and evaluating selection strategies. The course will cover key functions of AlphaSimR, practical examples, and a flavour of real-world breeding simulations. By the end of the session, participants will gain hands-on experience in modelling and optimizing breeding programs using the AlphaSimR package. After this course, the participants will be able to start their bespoke simulations.

3. Dissemination given by EAAP

MC meeting and WG meeting in Slovenia

Somewhere in spring



Let's keep in touch!

