

CIPROMED

Dissemination Activity Report

“Insects on the plate - Edible insects for food and feed”

Workshop

Joint activity of the ADVAGROMED and CIPROMED

PRIMA projects – 19 October 2023



Participating partners:

UNIVERSITY OF TURIN [UNITO]



UNIVERSITY OF THESSALY [UTH]



Workshop “Insects on the plate - Edible insects for food and feed”

During the **XII European Congress of Entomology [ECE2023]** [<https://ece2023.com>] that was held in Heraklion, Crete between 16 and 20 October 2023, two CIPROMED partners, particularly **University of Thessaly [UTH]** and **[University of Turin [UNITO]** jointly organized a workshop, in order to further promote CIPROMED and disseminate its concept, objectives and preliminary results. Particularly, the workshop was organized by Professor Laura Gasco [UNITO], Professor Christos Athanassiou [UTH] and Dr. Christos Rumbos [UTH] and was held on **Thursday, October 19, 2023** at **18.30** according to the ECE2023 program [<https://ece2023.com/workshops>] [Photo 1; Attachments 1 and 2].

The workshop was a joint activity of the PRIMA projects CIPROMED [PRIMA Call 2022, Section 1] and ADVAGROMED [PRIMA Call 2021, Section 2]. The aim of the workshop was to draw the attention of the entomological community to insects as food and feed and to present the state-of-the-art in the emerging sector of edible insects. The participants were introduced into the principles of insect farming, with focus on insect feedstocks, rearing conditions and technological requirements. The current advances on the use of insects in poultry diets and aquafeeds were also highlighted and current legislation and regulations that apply to insect production and processing were discussed.

Apart from taking over its organization, Laura Gasco [UNITO], Christos Athanassiou [UTH] and Christos Rumbos [UTH] participated into the workshop as speakers, as indicated in the workshop program [Photo 2; Attachment 3]. Apart from the above-




**ECE 2023
CRETE**
European Congress of Entomology

XII European Congress of Entomology

16-20.10.2023
Cultural Conference Center of Heraklion
Crete, Greece
www.ece2023.com

Organised by



Under the Auspices



HELLENIC REPUBLIC
Ministry of Rural Development
and Food



HELLENIC REPUBLIC
MINISTRY OF TOURISM



ΠΕΡΙΦΕΡΕΙΑ ΚΡΗΤΗΣ
REGION OF CRETE



MUNICIPALITY OF
HERAKLION



ΕΠΙΣΤΗΜΟΝΙΚΗ
ΕΝΩΣΗ ΕΝΤΟΜΟΛΟΓΩΝ
ΕΛΛΑΔΟΣ

ECE2023 - XII European Congress Of Entomology | 16-20.10.2023 | CRETE, Greece

17:00 - 17:15

OC330. Exposure to realistic levels of pesticide mixtures affect nesting performance, longevity and reproductive success in a solitary bee

Sergio Albacete González
Centre for Ecological Research and Forestry Applications (CREAF),
Spain

17:15 - 17:30

OC331. Evaluation of environmental stressors on the learning behaviour of honey bees

Elena Chierici
University of Perugia, Italy

17:30 - 17:45

OC332. Assessing bee exposure to pesticide residues in pollen from crop flowers, and bee collected pollen

Elena Zioga
Trinity College Dublin - Dublin City University, Ireland

17:45 - 18:00

OC333. Differences in sensitivity between Africanized *Apis mellifera* and *Melipona scutellaris* after exposure to fungicide pyraclostrobin

Caio Domingues
University of Maribor (UM), Slovenia - São Paulo State University (UNESP), Brazil

18:00 - 18:15

OC334. Multi-omics approach to assess honeybee adaptation in threatening habitats

Solenn Patalano
B.S.R.C 'Alexander Fleming', Greece

18:15 - 18:30

OC335. Climatic and geographic drivers of intra-specific turnover in honey bee subspecies compositions across space and time: insights from Gradient Forests and Generalized Dissimilarity Modeling

Mert Kükrer
Middle East Technical University, Ankar - Kilis 7 Aralık University,
Türkiye

18:30 - 20:15

WORKSHOP

Insects on the plate - Edible insects for food and feed
Organiser: Christos Rumbos, University of Thessaly, Greece
Hall 6: Creative Workshop

From ADVAGROMED to CIPROMED: two projects introducing insect farming in the MED region

Christos Athanassiou
University of Thessaly, Greece

Recent advances on insects as feed

Laura Gasco
University of Turin, Italy

Basics on insect production with focus on by-product-based feedstocks

Christos Rumbos
University of Thessaly, Greece

Insect defences: effects of diet composition on immune responses

Tedeschi Rosemarie
University of Turin, Italy

Market trends and potential





Yarali Paisios Ayse
MAGMA AGRO SA, Greece

18:30 - 19:00

Poster Session IV

Thu. 19 Oct 2023 - Oral

Photo 1. The workshop presented in the XII European Congress of Entomology [ECE2023] program.

Insects on the plate - Edible insects for food and feed

This workshop is a joint activity of the PRIMA projects ADVAGROMED and CIPROMED that aims to present the state-of-the-art in the emerging sector of insects as food and feed. Participants will be introduced into the principles of insect farming, with focus on insect feedstocks, rearing conditions and technological requirements. The current advances on the use of insects in poultry diets and aquafeeds will be highlighted and current legislation and regulations that apply to insect production and processing will be discussed.

Speakers: Professor Athanassiou G. Christos

- Professor Gasco Laura
- Professor Tedeschi Rosemarie
- Dr. Rumbos Christos
- Dr. Yarali Paisios Ayse

Program:

- Short intro [10 min, Rumbos Christos]
- From ADVAGROMED to CIPROMED: two projects introducing insect farming in the MED region [15 min, Athanassiou Christos]
- Recent advances on insects as feed [15 min, Gasco Laura]
- Basics on insect production with focus on by-product-based feedstocks [15 min, Rumbos Christos]
- Insect defences: effects of diet composition on immune responses [15 min, Tedeschi Rosemarie]
- Market trends and potential [15 min, Yarali Paisios Ayse]
- Interactive Questionnaire on the basics on insect rearing [15 min]
- Hands-on activity: getting familiar with mealworms and the black soldier fly
- Tasting of insect-based products








Photo 2. The workshop program.

mentioned speakers, the speakers panel was composed of Professor Tedeschi Rosemarie from the University of Turin and Dr. Yarali Paisios Ayse from the company MAGMA Agricultural Inputs S.A.

The workshop started with a short introduction by Rumbos Christos [Photo 3], who did a short historical flashback of the exploitation of insects as food and feed, and referred to the pioneering publication of the Food and Agriculture Organization of the United Nations [FAO] in 2013 and the legendary conference 'Insects to Feed the World' (in May 2014) in the Netherlands, which both set the stage for the use of insects as food and feed. Christos Rumbos also referred to the main triggers for the use of insects as a nutrient source, namely the human population increase and the increase in the animal protein demand, which urge for the exploitation of alternative protein sources. In his presentation, Christos also shortly referred to the advantages of insects as nutrient source and the current legislative framework in the European Union.

Just after the introductory part, Christos Athanassiou gave a detailed overview of the two ongoing PRIMA projects, namely ADVAGROMED and CIPROMED [Photo 4]. Christos Athanassiou presented to the audience the aim and objectives of the two projects, which is the evaluation of alternative protein sources [insects in the case of ADVAGROMED, and insects, microalgae and legumes in the case of CIPROMED]. A short presentation of the results generated so far within the two projects was also given during this talk. Moreover, the future research activities planned for the implementation of the two projects were also described.



Photo 3. The introduction of the workshop by Rumbos Christos.



ADV agro MED **ECE 2023 CRETE** **CIPROMED**
European Congress of Entomology

**From ADVAGROMED to CIPROMED:
two projects introducing insect farming in the MED region**

Athanassiou G. Christos
Laboratory of Entomology and Agricultural Zoology, Department of Agriculture, Crop Production and Rural Environment, University of Thessaly, Greece

UNIVERSITY OF THESSALY Workshop
"Insects on the plate - Edible insects for food and feed"

XII European Congress of Entomology, Heraklion, Greece, 16-20 October 2023



Photo 4. Christos Athanassiou during his talk at the ECE2023 workshop.



Photo 5. Laura Gasco during her talk at the ECE2023 workshop.

The next talk was given by Laura Gasco [Photo 5], who presented the recent advances on insects as feed. Specifically, Laura presented the advantages of the use of insects as feedstock, emphasizing on the fact that insects is an ingredient that offers a lot more than just protein to farmed insects. In this talk, the legislative framework of the use of insects as feed was also analyzed.

The third presentation, held by Christos Rumbos [Photo 6], was about two really important aspects of insect production, namely insect nutrition, and particularly the use of side-streams as insect feedstocks, and insect genetic material, which is also a really important parameter which attracts more and more attention. In both cases, the yellow mealworm, a quite famous insect in the world of insects for food and feed, *Tenebrio molitor*, was used as a case study. In the first part of the talk, Christos tried to give an answer to the question which side-streams and by-products can be valorized through insect rearing and can be bioconverted to insect protein through insect production. Specifically, the restrictions in EU level on the feed which may be given to 'farmed insects' intended for human consumption or for animal feed use were analyzed, namely it was stressed that, with few exceptions, only materials of vegetal origin can be fed to farmed insects. Issues like the availability, the locality and the seasonality of the used side-streams were also addressed.

Rosemarie Tedeschi gave the next talk on the effects of diet composition on immune responses and insect defences [Photo 7]. Particularly, Rosemarie analyzed the role of antimicrobial peptides in the insect immune responses, and described how genes associated with the insect defences can be up- or down-regulated by the insect diet.



Photo 6. Christos Rumbos during his talk at the ECE2023 workshop.



Photo 7. Rosemarie Tedeschi during her talk at the ECE2023 workshop.

The last talk of the workshop was given by Ayse Yarali Paisios [Photo 8]. In her talk, Ayse gave the market perspective for this emerging sector, i.e. the insect industry,

and presented the different business models that occur in the sector. She also presented the new hub on insect as food and feed that is currently constructed by MAGMA Agricultural Inputs S.A. in Chania, Crete, and is expected to further boost the growth and development of the sector in Greece in the following years.

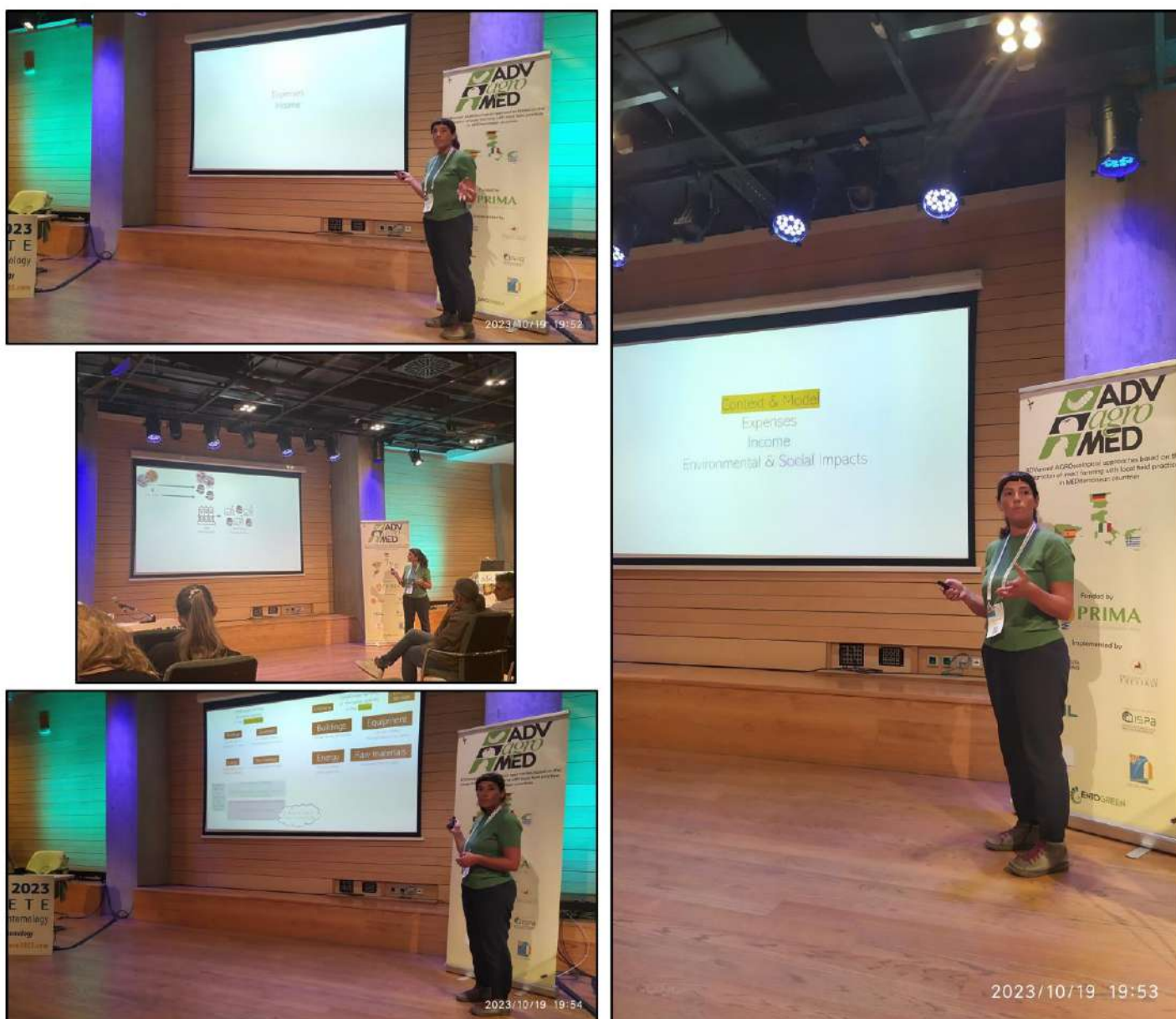


Photo 8. Ayse Yarali Paisios during her talk at the ECE2023 workshop.

After the talks, the organizers requested some feedback from the audience through an interactive questionnaire. Specifically, the participants were asked to join www.menti.com entering a specific code [21 22 589], in order to participate through their mobile phone to the questionnaire [Photo 9].



Photo 9. Participants were prompted to participate to the interactive questionnaire launched through “menti.com”.

Apart from some introductory questions [*“Which country are you joining us from?”*; *“Your current position is in Academia or in the private sector?”*], the participants were asked to describe which are, according to their opinion, the main strengths, weaknesses, opportunities and threats for insects as food and feed. The results of the interactive questionnaire during the workshop are shortly given below:

Which country are you joining us from?
35 responses



Photo 10. Responses during the interactive questionnaire to the question “Which country are you joining us from?”.

Briefly, most participants were from Greece and Italy [Photo 10], whereas the vast majority of them [86%] was, not surprisingly, coming from academia [Photo 11].

Your current position is in:

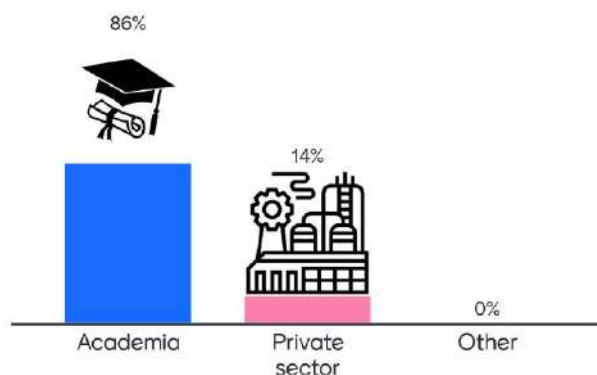


Photo 11. Responses during the interactive questionnaire to the question “Your current position is in academia or in the private sector?”.

What do you consider as the main STRENGTHS of insects as food and feed?

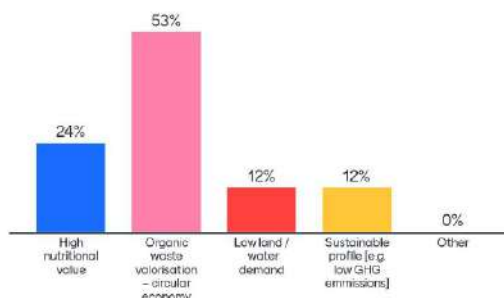


Photo 12. Responses during the interactive questionnaire to the question “*What do you consider as the main strengths of insects as food and feed?*”.

To the question, what do you consider as the main strengths of insects as food and feed, more than half of the participants [53%] answered that the main strength of the sector is the possibility to be integrated with circular economy strategies through the valorization of organic side-streams, wastes and by-products and their bioconversion by insects to protein [Photo 12]. One quarter of the audience [24%] considers the high nutritional value of insects as the main strength of the sector [Photo 12].

Regarding the main weaknesses of the sector, almost half of the participants [45%] think that the high market price in the main drawback of the use of insects as food and feed, whereas the other half [45%] considers the low consistence of the final product [whole insects, insect meals and oils] as the main disadvantage [Photo 13]

Which are the main WEAKNESSES of the use of insects as food and feed?

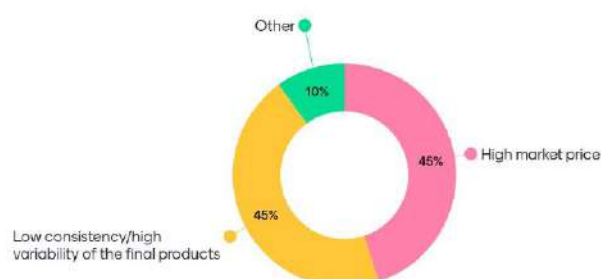


Photo 13. Responses during the interactive questionnaire to the question “*What do you consider as the main weaknesses of the use of insects as food and feed?*”.

Participants identified the exploitation of non-feed insect-derived products, such as insect frass, as one of the main opportunities of the sector [35%], whereas the expansion of authorized substrates as insect feedstocks represents one more significant opportunity for insect production [30%] [Photo 14]. Lastly, the audience gave its feedback regarding the main threats for insect production. One quarter of the participants identified the restrictions of the legal framework as the main threat for the sector [25%], whereas 20% raised the safety issues that may arise with the use of insects as food and feed [Photo 15].

In your view, which are the main future OPPORTUNITIES for the insect sector?

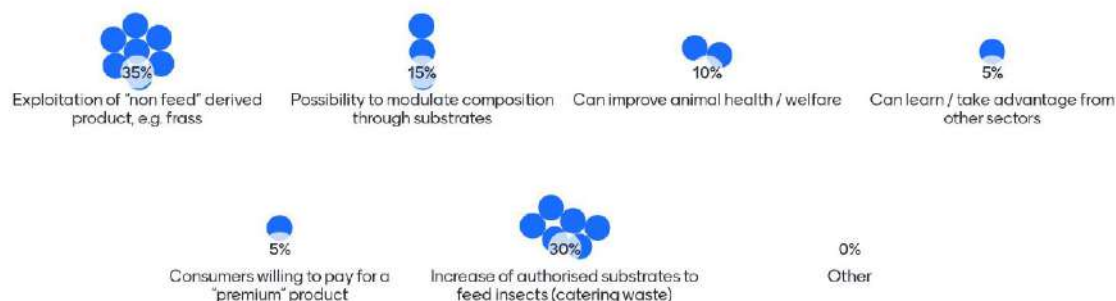


Photo 14. Responses during the interactive questionnaire to the question “*What do you consider as the main opportunities for the insect sector?*”.

In the last part of the workshop, participants had the opportunity to get familiar with the major edible insect species, namely the yellow mealworm, *Tenebrio molitor*, the black soldier fly, *Hermetia illucens*, the lesser mealworm, *Alphitobius diaperinus*, and the superworm, *Zophobas morio* [Photo 16]. Moreover, they had the opportunity to taste various insect-based food products, which were kindly provided by two companies, namely FUCIBO [<https://www.fucibo.com>] and Jiminis [<https://www.jiminis.com>] [Photos 9 and 17].

In your view, which are the main **THREATS** for the insect sector in the near future?

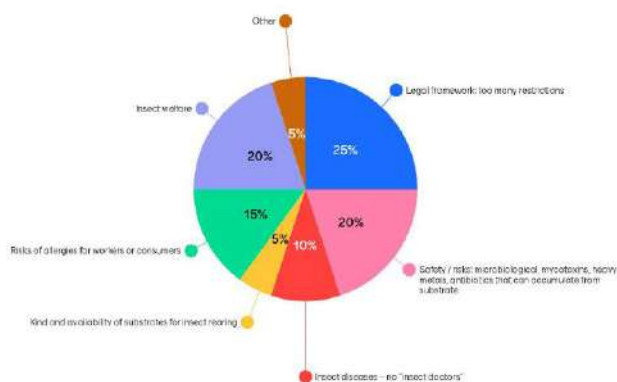


Photo 15. Responses during the interactive questionnaire to the question “*What do you consider as the main threats for the insect sector in the near future?*”.

In general, the workshop “Insects on the plate - Edible insects for food and feed” was marked by high attendance and interest by the ECE2023 attendees, as 60 participants registered for the workshop [Attachment 4; ECE2023 Workshop Registration form]. The interaction with the participants was a nice chance to spread the word about the advantages of the exploitation of insects as an alternative nutrient source, as well as the potential of valorizing agricultural side-streams and wastes as insect feedstocks.



Photo 16. The main edible insect species presented to the participants of the workshop.



Photo 17. Tasting of insect-based food products during the workshop.

To conclude, the workshop was a good opportunity for the partners of ADVAGROMED and CIPROMED to present both projects to the entomological scientific community and other relevant stakeholders. Apart from the talks, material [flyers etc.] relevant to CIPROMED and ADVAGROMED was available to the participants.

This workshop was supported by the EU-PRIMA program project CIPROMED (Prima 2022 - Section 1).