IFFF Seminar - Wednesday, 1 March, 2023, 15:00-18:00; Seminar Room, SCHW-01/112

More than meets the eye: The prospects of Neoleucopis sp. as a biological control agent against Marchalina hellenica in Australia

Dimitrios Avtzis (Forest Research Institute - Hellenic Agricultural Organization Demeter)

Marchalina hellenica (Hemiptera: Marchalinidae), a sap-sucking scale insect endemic in Greece and Turkey, feeds mostly on pine trees (Pinus spp.) and has long been considered a beneficial species for pine honey production. Shortly after its invasion in new areas (Italy, Croatia, Australia), lacking its natural enemies, significant adverse effects were observed on hosts trees. Even though a preliminary study in Greece highlighted the silver fly Neoleucopis kartliana (Diptera: Chamaemyiidae) as the most abundant predator of M. hellenica among its natural enemies, it revealed the occurrence of other closely related species also feeding upon M. hellenica. Therefore, subsequent studies aimed at unraveling the identity of all Neoleucopis species complex in Greece and assessing their potential as biological control agents against M. hellenica. To that, we screened several populations of Neoleucopis spp. throughout Greece using DNA barcoding and assessed their distribution and relative abundance under different M. hellenica infestation levels. Our results suggest that a Neoleucopis spp. complex is responsible for the suppression of M. hellenica in Greece, exhibiting considerable potential as biological control agents against M. hellenica. Nevertheless, further studies on the biology and prey-specificity of Neoleucopis spp. are essential to highlight the most suitable Neoleucopis species for the biocontrol of M. hellenica in the invaded areas.

Norway Spruce and *Ips typographus:* Insights into an important host tree – bark beetle system

Sigrid Netherer (IFFF-BOKU)

Temperature and drought are the main climate drivers of bark beetle outbreaks. Infestations of Norway spruce stands by the Eurasian spruce bark beetle, *Ips typographus*, depend on the attractiveness of host trees for pioneer beetles and the trees' capability to defend early attacks. Embracing the multitrophic relationships between Norway spruce, *I. typographus*, and its associated ophiostomatoid fungi, my talk is dedicated to the outcomes of a drought experiment in a mature Norway spruce stand focused on constitutive and induced tree defence. The results improve our understanding of bark beetle host choice and acceptance after landing on potential host trees in the early attack phase before epidemic mass infestation.

Bark beetles/ophiostomatoid fungi/Norway spruce interactions - from genes through olfactory communication to tree susceptibility

Anna Jirošová (Extemit-K, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague)

The study of beetles at the genetic level is based on knowledge of the complete genome of *Ips typographus*. We selected genes encoding the production of aggregation pheromones or the ability to detoxify resin that enables bark beetles to survive tree defence. We also searched for key metabolic genes and genes encoding perception proteins. We plan to use a new RNAi technique that will allow us to specifically silence the genes of interest and subsequently affect these features of the bark beetle or even kill the individual. To identify novel beetle biologically active compounds with repellent or attractant functions that could be useful in beetle management, we are screening the olfactory environment. The most potent attractant is the beetle aggregation pheromone, but compounds are also recruited from volatiles released by the mycelia of ophiastomatoid fungi inoculated by beetles into their galleries. Attractive, but also repelling compounds are emitted by the host Norway spruces. Screening is carried out using chemical ecology techniques. To establish the susceptibility of stressed Norway spruces to bark beetle attacks were carried out two experiments in which spruces were subjected to sudden stress. In 2020, four artificial clear-cuts were created to expose the trees to sudden sun radiation. Later, in 2021, five roofs were built on a large area of the research forest to prevent rainwater income for selected trees. Our aim is to determine whether and by what mechanism physiological and biochemical changes in spruces exposed to a sudden stress (drought or solar radiation after clearcutting) make them more vulnerable to bark beetle attack.