

SFE² GfÖ EEF

Joint meeting, International Conference on Ecological Sciences

"Ecology and Evolution: New perspectives and societal challenges"

21-25 Nov 2022 Metz (France)



Ecology & Evolution: New perspectives
and societal challenges

PROGRAMME

Organized by :



& North Eastern France Labs in Ecology & Evolution



The Ecological Society of
Germany, Austria
and Switzerland



European
Ecological
Federation

Winter survival of honeybees' colonies: is it also a matter of nutrition?

How quality and diversity of pollen influence winter survival.

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Poster session

Theme:

- Agroecology/ecology of agroecosystems
- Landscape ecology
- Biodiversity and ecosystem functioning in a changing world

ABSTRACT

Winter is a time of high vulnerability for honeybee colonies. Foraging stops, and the colony must survive on food reserves, by producing heat necessary for maintaining the hive's minimum temperature and for brood resumption before spring. Very important and well-documented conditions for successful overwintering are the amount of honey stored during the foraging period, and the preventive treatments for diseases, particularly against varroa. However, there might be other factors, to date less studied and understood, that contribute to the survival of a colony. For example, the lack of essential proteins and lipids (nutrient deficiency) from the diet of honeybees can result in both individual and colony fitness reduction (e.g., limited body fat, brood depletion, larvae cannibalism). Also, the effects of stochastic processes linked to climate (e.g., high temperature during winter, extreme weather events etc.) might take part in the high mortality percentage of beehives during winter. When controlling for food reserves with artificial feeding and treating the colonies successfully against varroa, it is possible to focus on understanding at what level the surrounding land use (in terms of flower resources) and the climatic condition in different apiaries play a role in the overwintering of honeybees. For this purpose, we sampled pollen from 27 experimental apiaries during the foraging season, along with gradients of climate and landscape complexity (agricultural, semi-natural, and urban) in Germany, Greece, and France. Methods of analysis for our study will include metabarcoding to identify multiple plant species from mixed pollen samples, the quantification and qualification of fatty acid profiles with a modified FAME protocol developed in our laboratory, and protein content quantification (Bradford assay). Moreover, we are gaining data on temperature both inside and outside the hives, colony strength at different times during the seasons and bee fitness parameters. With the data collected we expect to link the overwintering of bees with the studied parameters, underlying the importance of flower resources and land use, but also to help us understand the effect of stochastic climatic events, more and more frequent with climate change.