TROPICAL DIVERSITY, ECOLOGY AND LAND USE

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abstracts:

SESSION 1-O7 - SPECIES INTERACTIONS AND ENVIRONMENTAL GRADIENTS

ANTS AT PLANT WOUNDS - THE RELEVANCE AND STRUCTURE OF AN UNDERESTIMATED FOOD WEB

Michael Staab, Felix Fornoff

Ants are abundant and functionally important arthropods in tropical and subtropical forests. The vast majority of vegetation-foraging ants were thought to be omnivorous, until studies of stable isotopes showed that those ants are essentially feeding as herbivores, mostly by visiting extrafloral nectaries and by tending Hemiptera for honeydew. Additionally, there are anecdotal records of wound feeding, i.e. the consumption of plant sap from wounds created by sucking or chewing herbivorous insects. However, to our surprise, no study has investigated and quantified wound feeding at the level of entire ant communities. We conducted over several years an exhaustive survey for wound-feeding ants in the experimental tree plantations of the BEF-China experiment, located in subtropical South-East China. In total, we observed wound-feeding ants on 23 out of 40 planted tree species. There was a strong bias towards Fagaceae species; 90% of all observations occurred on eleven species of Fagaceae, albeit Fagaceae species accounted for less than 50% of all surveyed tree individuals. Almost all trophobiotic ant species known from the study area were also found at wounds. Our data indicate that wound feeding is an unspecific, opportunistic and facultative behavior, as shown by null-model analyses and the low specialization (H2') and high complementarity (e^H) of plant-ant networks. Albeit less common by an order of magnitude when compared to trophobioses, feeding on wound sap might be an important but underestimated food source that contributes to fuel the diversity and abundance of vegetation foraging ants, for example in cases when herbivorous insects are abundant or trophobiotic Hemiptera are scarce. Interestingly, increasing tree diversity decreased the specialization while increasing the complementarity of plant-ant networks. Both effects were independent of network size and sampling effort, and support recent theoretical and experimental studies, which demonstrated a structuring and stabilizing effect of tree diversity on species interaction networks.

SESSION 1-O8 - SPECIES INTERACTIONS AND ENVIRONMENTAL GRADIENTS

TRI-TROPHIC INTERACTION NETWORKS IN AN EXPERIMENTAL TREE DIVERSITY GRADIENT IN UBTROPICAL CHINA

Felix Fornoff, Alexandra-Maria Klein, Michael Staab

Many ecosystem functions and services are altered by interactions between trophic levels, e.g. pollination, herbivory and predation. Plants, the most important primary producers and lowest trophic level of errestrial ecosystems are heavily affected by herbivores. In turn herbivores are suppressed by predators, but also supported by mutualisms like for example Hemiptera-tending ants, so-called trophobioses. Today forest ecosystems vary greatly in tree diversity ranging from planted monocultures to natural old growth forests with high tree diversity. Investigating tri-trophic interactions in forests of varying tree diversity and over longer timespans can help to increase understanding of the dynamics of multitrophic foodwebs; when and why foodwebs change in their interaction specialisation and generality affecting the stability and resilience of food web communities, as suggested by recent network studies.

We studied tri-trophic interactions between subtropical tree species, sap-sucking Hemiptera and their mutualistic interaction partners within both field sites (Site A and Site B) of the BEF-China Experiment in South East China. The experimental tree plantation included 40 native tree species from which 400 saplings were planted in each of 566 plots (25.83 x 25.83 m in size) in 2009 (Site A) and 2010 (Site B). Plot species richness levels range from 1 to 2, 4, 8, 16 and 24 species. Of 300 plots the central tree individuals (36, 36, 81, 144 & 144) of species mixtures (1, 2, 4, 8, 16 & 24, respectively) were sampled in summer 2011 and summer and autumn 2014 at Site A and in summer 2012 and summer and autumn 2014 at Site B. Sampling resulted in 32000 tree investigations and a total of 3500 observations of tri-trophic interactions over an increase in forest age (25, 49, 52, 61 and 64 months after planting). This large and long-term data set in combination with the BEF-China framework offers, for the first time, the unique opportunity to statistically test the effect of forest age and forest diversity on the specialization and complementarity and therefore food web stability of two connected trophic interactions. The data have the potential to reveal whether antagonistic and mutualistic networks concur in the direction and strength of their response to manipulations in tree diversity and how their response changes with increasing forest age.

SESSION 14-P2 - TROPICAL FOREST LANDSCAPES

BEE DIVERSITY RESPONSES TO LANDSCAPE COMPOSITION IN THE ANDES OF COLOMBIA

Catalina Gutierrez-Chacon, Alexandra-Maria Klein

Landscape composition has a great influence on the provision of ecosystem services such as crop pollination by bees, which seems to be enhanced by higher proportions of natural habitat in productive landscapes. However, bee diversity has been largely assessed in the productive matrix, and available information derives primarily from temperate countries with extreme levels of habitat loss. The aim of this study is to evaluate bee diversity in natural habitats in relation to its area and quality in a fragmented landscape in the Andes of Colombia. The study area is composed mainly by sub-Andean forests and grasslands for livestock. Bee diversity, vegetation structure and floral resources were recorded in 20 sites representing a gradient of natural habitat area within a 500 m radius. Bee sampling was carried out in forest edges along 150 m - transects using three methods: netting, pantraps (blue, yellow and white) and chemical baited-traps. Additionally, in order to assess the use of the grassland matrix by bees, they were collected in eleven 150 m-transects (100 m from any forests), by netting and pan-traps. A total of 2390 individuals were collected in forests and 879 in the grassland matrix. Bee assemblage in forest edges were dominated by the family Apidae (75%), particularly tribu Meliponini (48%), whereas in the matrix, family Halictidae was dominant (61%). Preliminary results indicate different responses to habitat quantity within the bee assemblage; Meliponini diversity show a positive relation with forest quantity whereas Halictidae diversity responds negatively. From the 63 species registered, 24 genera and at least 10 species were recorded for the first time to the study area, representing a significant knowledge contribution to the bee diversity and their ecology in Colombia and the Neotropical region.