SESSION 21 - MULTITROPHIC INTERACTIONS IN TERRESTRIAL ECOSYSTEMS

Session 21-O6 - Effects of tree species richness and canopy closure on trapnesting insect community networks in a subtropical controlled tree diversity experiment.

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Plant diversity and site productivity shape the complexity of multi-trophic interactions. Trophic interactions can influence plant performance and community structure. Analyses of multi-trophic interactions are therefore crucial to understand the role of plant composition, diversity and extinction for ecosystem processes. Trap nests for cavity-nesting Hymenoptera are an ideal model system to study multi-trophic interactions. They provide the opportunity to directly observe cavitynesting bee communities interacting with plants as pollinators and wasp communities which as predators of herbivores and their antagonists indirectly affect plant consumption. Moreover, trap nests are a standardized tool to measure the complex interaction networks between insect hosts and parasitoids. The BEFChina, located in sub-topical south-east China, is the largest tree biodiversityexperiment. The experimental tree plantation includes 40 native tree species planted in 566 plots (25.83 x 25.83 m in size) in 2009 (Site A) and 2010 (Site B). To test Hymenoptera community responses to the planted tree diversity gradient, we installed two trap nests in each of 80 plots, 16 at each tree species richness level, with levels ranging from 1 to 2, 4, 8 and 16 species. In 2014/15, for 12 consecutive month monthly collection of hymenoptera nests yielded a total of 3500 nest from which 7000 hosts and parasitoid individuals hatched. With this data we measure species richness changes of trap-nesting bee, wasp and parasitoid communities along the tree species richness gradient. Moreover we construct interaction networks to identify how tree species richness affects network generality of hostparasitoid interactions. Additionally, using hemispherical pictures we assess the effect of canopy closure on bee and wasp communities with an expected shift of bee dominated to wasp dominated communities with decreasing understory sun exposure.

SESSION 22 - TREE GROWTH AND MULTITROPHY

Session 22-O5 - Temporal dynamics of host-parasitoid foodwebs in relation to spruce budworm outbreaks

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Most species are connected to others by complex networks of interactions. Many studies focus on static descriptions of foodweb structure, which may conceal functional relationships. Studies mechanistically describing food web dynamics across multiple years are extremely rare. Here, we quantitatively describe the dynamics of the host-parasitoid web associated to spruce budworm in forests of Eastern Canada over 13 years. Spruce budworm is one of the most devastating insect herbivores in forests of Eastern North America, with large, long-term density fluctuations. We show strong turnover of the diverse parasitoid community both within and across years. In consequence, parasitism rates during different life history stages showed contrasting relationships to budworm density. Overall parasitism rate on budworm was reduced during peak budworm density. Interaction rates of species indirectly linked to budworm changed depending on their life-history. Other herbivores tend to be weakly linked to budworm dynamics, due to the high specialization of herbivore-parasitoid interactions. Nevertheless, different indirect effects of budworm density on their parasitism rates were observed. In difference, the more generalized higher-order parasitoids link the dynamics of different primary parasitoids. Increased hyperparasitism rates during peak budworm densities might limit effects of primary parasitoids. We will discuss implications for the potential regulation of spruce budworm populations by different parasitoids: the most frequent parasitoid species are likely not the most important ones. In conclusion, studies of host-parasitoid foodwebs should more explicitly consider temporal dynamics and the temporal scope of their study in relation to population dynamics of species of concern.