Enemy-free space and the distribution of ants, springtails and termites in the soil of one tropical rainforest

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Abstract

The soil fauna of tropical rainforests is difficult to study because of its extreme species richness and taxonomic impediment. Studies of multi-taxon assemblages in the soil of tropical rainforests are relatively rare and studies of interspecific interactions, such as predation, even rarer. Here we attempt to infer prey predator interactions and enemy-free space from the faunal composition of 100 litter/soil samples obtained from Barro Colorado Island in Panama during the dry and wet seasons. We focused on assemblages of ants (assigned to categories of non-predators, potential and confirmed predators), springtails and termites, which were characterized by their Barcode Index Numbers. Overall in 0.2 m^3 of soil/litter we collected 2129 ants, 5592 springtails and 260 termites, which represented 80, 104 and 15 species, respectively. The faunal composition of confirmed ant predators was spatially coincident with that of Collembola. However, despite considerable seasonal shifts in the rank abundance of Collembola species, seasonal shifts of confirmed ant predators were low, resulting in a poor match of seasonal shifts between ants and their prey items. No location could be considered as being relatively free of ant enemies for springtails or termites, but the dry season supported higher prey-predator ratios than the wet season. We inferred only 4 possible prey-predator interactions, out of 7616 potential interactions in the study system. The relative dispersion of confirmed ant predators, which only weakly influenced springtail and termite assemblages, suggests low specificity in ant-prey interactions. This confirms that "brown food webs" may be structured by bottom-up effects rather than by top-down effects.

Keywords

BARRO COLORADO ISLAND

COLLEMBOLA

DNA BARCODING

FORMICIDAE

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