

ABSTRACT OF THE DISSERTATION

The role of extrafloral nectaries in mutualisms, herbivory, and plant defense

of *Chamaecrista nictitans*

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Many plants secrete nectar from extrafloral nectaries (EFN), specialized structures that usually attract ants which can act as plant defenders. However, the outcome of many plant-ant interactions are conditional, varying with spatial and temporal setting. I experimentally tested nectar-mediated interactions on Chamaecrista nictitans (Caesalpineaceae) in old fields in New Jersey, USA. The main objective of this research was to evaluate the effect that plant patch characteristics (size, presence of ants, irrigation, surrounding vegetation, and location) had on the arthropod community of plant visitors and on plant fitness.

In these experiments, insect herbivore damage was low. Contrary to the protectionist hypothesis, ant defense was neither predictable nor always noticeably beneficial. Six ant species collected nectar from C. nictitans. The most common ants were Crematogaster lineolata, Dolichoderus plagiatus, and Formica pallidefulva nitidiventris. The specialist seed predator, Sennius cruentatus (Bruchidae), appeared to escape ant defense. Female beetles were able to oviposit despite the presence of numerous ants. Furthermore, EFN attracted many other visitors in addition to ants. These included parasitoid wasps, occasional herbivores, and jumping spiders (Araneae, Salticidae). Larger plant patches attracted more arthropods. Location of patches did not

significantly affect numbers of visitors. Ants and pollinators increased in patches with vegetation removed while parasitoid wasps declined. Herbivore numbers were not affected.

Previous research suggests that spiders are entirely carnivorous, yet jumping spiders (Metaphidippus sp. and Eris marginata) on C. nictitans collected nectar in addition to feeding on herbivores, ants, bees, and other spiders. In a controlled environment experiment, when given a choice between C. nictitans with or without active EFN, 86% of foraging spiders (Metaphidippus sp.) preferred plants with nectar. Chamaecrista nictitans with ants did not set significantly more seed than plants with ants excluded. In contrast, C. nictitans with resident jumping spiders did set significantly more seed than plants with no spiders—supporting a beneficial effect from these predators. Despite their low numbers on C. nictitans overall, jumping spiders may provide additional, unexpected defense to plants possessing EFN. Plants with EFN may therefore have beneficial interactions with other arthropod predators in addition to nectar-collecting ants.