

Predator sensing by plants: Consequences for tri-trophic interactions

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ABSTRACT

Tri-trophic interactions between plants, herbivores, and herbivore natural enemies are key drivers of ecosystem functions and determine yield in agriculture. Evidence is accumulating that plants perceive the presence of herbivore natural enemies and respond to it. Yet, it remains unknown how relevant the response is for multitrophic interactions. In this study, we investigated how the maize response to the presence of entomopathogenic nematodes (EPNs), predators of root herbivores, affect the performance and behaviour of root and leaf herbivores under laboratory and field conditions. Upon exposure to EPNs, maize plants exhibited changes in the metabolomic profiles of root exudates, root-, and leaf tissues. Additionally, a prior exposure of maize plants to EPNs altered the distribution of the stem borer *Ostrinia nubilalis* in the field. Preliminary assays suggest that these shift in herbivore population dynamic relies on changes in female oviposition site selection, but not on larval performance. We discuss the potential adaptive value of the plant response and how the interplay between plants and natural enemies of herbivores and may help to increase the efficiency of EPNs as a biocontrol agent.

Keywords: Tri-trophic interactions, Belowground herbivory, Aboveground herbivory, Entomopathogenic nematodes, plant defence