Eliminating Fire Ants Improves Biological Control of Asian Citrus Psyllid

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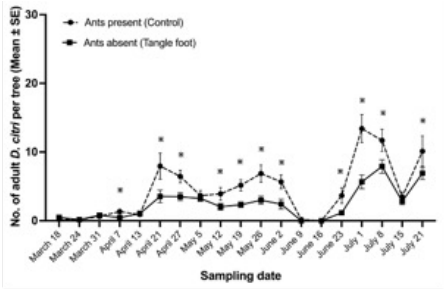

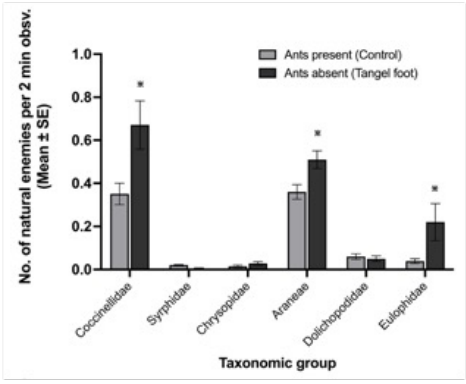

Fig. 1 A. Mean number (± SE) of Asian citrus psyllid observed on control (ants present) and Tanglefoot-treated (ants absent) trees. B. Mean number (± SE) of arthropods per taxonomic group observed visually per 2 min intervals in control (ants present) and Tanglefoot-treated (ants absent) trees. Coccinellidae are ladybeetles; Araneae are spiders; and, Eulophidae are Tamarixia wasps. Asterisks indicate significant differences between treatments at $P \leq 0.05$

Ants can be involved in mutualistic relationships with honeydew producing hemipterans in which ants provide protection against their natural enemies, and in return, hemipterans reward ants with honeydew. Such mutualism may affect population regulation of hemipterans by third trophic level predators. However, current knowledge regarding the effects of this food-for-protection mutualism of ants with Asian citrus psyllid (ACP), *Diaphorina citri,* in Florida is limited. Two treatments were established in replicated plots under field conditions in a citrus (var. 'Valencia') grove: 1) ants present, and 2) ants absent by exclusion with a tangle-trap sticky barrier deployed on the base of trees. Lower abundance of ladybeetles, spiders, and Tamarixia parasitoids and corresponding higher abundance of ACP, were recorded in trees with ants compared to that recorded in trees without ants as measured by direct visual observations and stem tap sampling (Fig 1A,B). In addition, ant-beetle behavioral interactions were directly investigated with three species of ants [*Solenopsis invicta* Buren, *Dorymyrmex bureni* (Trager), and *Brachymyrmex obscurior* Forei]. Predation of ACP nymphs by ladybeetle larvae was reduced on leaf flushes infested with *S. invicta* fire ants as compared with leaves without ants and this species caused significant direct mortality to larval beetles. Our results support the hypothesis that predation of ACP by natural enemies may be reduced in citrus groves colonized by *S. invicta* fire ants than in those where ant populations are suppressed. Furthermore, our results indicate that fire ants aggressively protect ACP nymphs on leaves from otherwise effective potential predators, such as ladybeetles. Collectively, these results indicate that fire ant suppression in citrus may improve biological control of ACP.

Funding

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