Effects of in-field floral resources on richness of natural enemies in horticultural food webs

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Developing effective sustainable alternatives to synthetic pesticides is one of the key challenges for modern horticulture. Naturally occurring parasitoids and predators can provide effective pest control in agro-ecosystems, however, their impact is often severely constrained by a lack of resources in these systems. Provision and manipulation of plants to enhance availability of shelter, pollen, nectar and alternative prey/hosts within the agroecosystem provides a strategy for enhancing the effectiveness of natural enemies for biological pest control. This study aims to investigate how horticultural food webs are modified by floral resources. A field experiment was undertaken at UFLA in which flight traps and direct foliar observations were used to determine richness and abundance of arthropod species in an organic lettuce crop diversified with Tagetes erecta patches. Lettuce plants were cultivated in three different development stages of T. erecta (pre-flowering, full flowering, late flowering). All data were analyzed using mixed-effects models and food webs were built for the three species of pest aphids sampled on lettuce plants during the experiment. The development stage of T. erecta strongly affected the food web. In the pre-flowering stage, aphids were associated on average with two specific natural enemies. During full and late flowering this number increased to 13 and 15 respectively. Average number of natural enemy species per plant was 0.37, 1.28 and 2.3 (pre-flowering, full flowering, late flowering respectively). Due to their polyphagous behavior, spiders were not included in this analysis, though their abundance and richness were not affected by the T. erecta. The presence of floral resources is shown to be a powerful tool to increase natural enemy diversity and abundance in field lettuce production, which also has wide effects throughout the arthropod community.

Key words: conservation biological control, parasitoids, predators.

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