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Optimized spatial arrangement of insectary plants for arthropod pest management in vegetable production

Abstract

Integrated pest management is a sustainable approach that utilizes multiple strategies to minimize arthropod pest populations in crop production. Insectary plants, flowering plants that attract natural enemies, used in crop fields to boost natural enemy populations is a conservation biological control strategy. However, information on the effectiveness of different spatial arrangements of insectary plants in vegetable production is still limited. Therefore, this study aims to find the efficacy of various spatial arrangements of insectary plants within a crop field using pest pressure, and natural enemies as the study parameters. We conducted the experiment in Nashville, TN, in 2024 using buckwheat and sweet alyssum, as our previous research showed these two insectary plants could attract a diverse group of natural enemies compared to others. Using a randomized complete block design, we arranged the insectary plants with the main crop, green beans, in five different spatial arrangements. We used green beans without insectary plants as the control treatment. We took samples at three places within a plot: first 1.5m, 1.5-3m, and last 8.5-10m using different methods, including visual observations, beat sheet sampling, pitfall traps, flower collections, and yield assessment. Natural enemies like minute pirate bugs, big-eyed bugs, and ground beetles were found visiting the insectary plants and the adjoining crop plants. A significantly higher abundance of natural enemies was observed in the flowering plants (first 1.5m) and the adjacent main crop (1.5-3m). Using optimum field spacings to integrate insectary plants within crop plants can help control arthropod pests in vegetable production. 1.5m) and the adjacent main crop (1.5-3m). Using optimum field spacings to integrate insectary plants within crop plants can help control arthropod pests in vegetable production.