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The effects of mullein plants (*Verbascum thapsus*) on the population dynamics of *Dicyphus hesperus* (Heteroptera: Miridae) in tomato greenhouses

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Abstract

The response of *Dicyphus hesperus* Knight (Heteroptera: Miridae) to whitefly populations in tomato greenhouses was measured in the presence and absence of mullein (*Verbascum thapsus* L.) as an alternative host plant. The dynamics of the *D. hesperus* population on tomato (*Lycopersicon esculentum* Mill.) and on mullein plants were followed through an entire growing season. In houses with mullein plants, more predators occurred on mullein when whitefly density was low on tomato. A mark-release-recapture experiment where rabbit IgG was used as an external marker showed that *D. hesperus* adults moved from mullein plants to tomato plants. *D. hesperus* was always more abundant in houses with mullein than in the houses with tomato plants alone. Movements between tomato and mullein plants are discussed as a strategy to optimize predator foraging. The use of mullein as an alternative host plant may contribute to the establishment of *D. hesperus* and help to preserve the predator population when prey on tomato crops is scarce.

Keywords: *Dicyphus hesperus*; *Trialeurodes vaporariorum*; Predatory Heteroptera; Generalist predators; *Verbascum thapsus*; Alternative host plant; Omnivory

1. Introduction

The influence of plant diversity on the population dynamics and biological control efficacy of predators and parasitoids of insect pests in agroecosystems has been widely discussed (Altieri and Letourneau, 1984; Andow, 1991; Russell, 1980; Sheehan, 1986). The *enemies* hypothesis (Root, 1973) predicts that a higher abundance of natural enemies should occur in polycultures compared to monocultures, which should, in turn, result in a greater reduction of herbivore populations in polyculture habitats. Problems with insect pests have been attributed in some cases to the reduction of faunal and floral diversity (Altieri and Letourneau, 1984). The greater availability of pollen and nectar in diversified habitats than in simple habitats has been reported as a factor that may enhance populations of predators and parasitoids (Andow, 1991; Root, 1973).

Predators may also derive nutrients from digestion of plant sap and cells, as is the case for many omnivorous Heteroptera (Cohen, 1996). This has not previously been considered as a factor that could render diversified environments more suitable for generalist predators than simple ecosystems. Plant feeding may not only allow omnivorous predators to survive in the absence of prey, but also may enhance their fitness when they feed on prey (Coll, 1998; Naranjo and Hagler, 1996). Trophic switching from prey to plant feeding can be considered to be an adaptive strategy of predatory Heteroptera, allowing them to switch between niches (Cohen, 1996).

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