

N O T E

Density-Dependent Responses of Natural Enemies to Soybean Aphid (Hemiptera: Aphididae) Populations¹

D.R. Kandel², K.J. Tilmon, and T.L. Shuster

Plant Science Department, South Dakota State University, SAG 345, Box 2207A, Brookings, South Dakota 57007 USA

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The soybean aphid, *Aphis glycines* Matsumura (Hemiptera: Aphididae), was introduced into the United States in 2000 and quickly became an important pest of soybean throughout much of the North Central United States (Ragsdale et al. 2011, Annu. Rev. Entomol. 56: 375–399; Venette and Ragsdale 2004, Ann. Entomol. Soc. Am. 97: 219–226). Studies on its interactions with host plants, natural enemies, and pesticides including seed-applied insecticides have been conducted (Hill et al. 2004, Crop Sci. 44: 98–106; McCarville and O’Neal 2013, J. Econ. Entomol. 103: 1302–1309; Ragsdale et al. 2011; Rutledge et al. 2004, Ann. Entomol. Soc. Am. 97: 240–248).

Surveys of natural enemies in the United States have shown a complex community of predators, parasitoids, and pathogens attacking soybean aphid (Ragsdale et al. 2011). Among them, generalist predators have demonstrated a significant impact (Costamagna and Landis 2006, Ecol. Appl. 16: 1619–1628; Fox et al. 2004, Environ. Entomol. 33: 608–618; Ragsdale et al. 2011) and, in many experiments, show strong top-down control of the soybean aphid (Costamagna and Landis 2006; Costamagna et al. 2007, Ecol. Appl. 17: 441–451; Costamagna et al. 2013, PLoS One 8: 1–10). Influential predators attacking soybean aphids include the coccinellids *Harmonia axyridis* Pallas (Coleoptera: Coccinellidae), *Coccinella septempunctata* L. (Coleoptera: Coccinellidae), *Hippodamia convergens* Guerin-Meneville (Coleoptera: Coccinellidae), *Hippodamia variegata* Goeze (Coleoptera: Coccinellidae), *Coleomegilla maculata* DeGeer (Coleoptera: Coccinellidae), *Orius insidiosus* Say (Hemiptera: Anthracoridae), *Chrysoperla carnea* Stephens (Neuroptera: Chrysopidae), *Aphidoletes aphidimyza* Rondani (Diptera: Cecidomyiidae), *Leucopis* spp. (Diptera: Chamaemyiidae), and various species of Syrphidae

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²Corresponding author (email: devi.kandel@sdstate.edu).