

N O T E

Relative Abundance of Exotic and Native Coccinellidae (Coleoptera) in Southeast Nebraska Alfalfa¹

James C. Kriz,² Stephen D. Danielson,³ James R. Brandle⁴ and Erin E. Blankenship⁵

Department of Entomology, University of Nebraska-Lincoln, Lincoln, Nebraska 68583-0816 USA

J. Entomol. Sci. 41(1): 84-86 (January 2006)

Key Words alfalfa, Coccinellidae, abundance, native, exotic, predators

The seven-spotted lady beetle, *Coccinella septempunctata* L., and the multicolored Asian lady beetle, *Harmonia axyridis* Pallas, are exotic Coccinellidae (Coleoptera) that are regularly encountered in southeastern Nebraska (Wright and DeVries 2000, J. Kansas Entomol. Soc. 73: 103-111; J. C. Kriz, pers. obs.). *Harmonia axyridis*, a native of eastern Asia, was first reported in an established population near Abita Springs, St. Tammany Parish, LA, in 1988 (Chapin and Brou 1991, Proc. Entomol. Soc. Washington 93: 630-635). It was hypothesized that the introduction was accidental through commerce in Louisiana and not from introduction for biological control (Day et al. 1994, Entomol. News 105: 244-256). *Coccinella septempunctata*, a native of Eurasia, was introduced for biological control several times and at a variety of locations across North America during the last century (Angalet et al. 1970, Environ. Entomol. 8: 896-901; Obrycki and Kring 1998, Annu. Rev. Entomol. 43: 295-321). As is the case with many exotic species there is concern that introduced lady beetles may be reducing or replacing populations of native species (Elliott et al. 1996, Oecologia 105: 537-544; Brown and Miller 1998, Entomol. News 109: 143-150; Colunga-Garcia and Gage 1998, Environ. Entomol. 27: 1574-1580; Michaud 2002, Environ. Entomol. 31: 827-835).

During the 2001-2003 growing seasons, alfalfa fields in Butler and Seward counties, NE, were sampled for predatory insects. Forty fields were sampled in 2001, 32 of the original 40 fields were sampled in 2002, and 21 of the remaining 32 fields were sampled during 2003. During the study, fields were removed because they were destroyed by the producer and planted to annual crops, fell below a threshold of 75% pure alfalfa, or they were eliminated for logistical reasons. Sampling was conducted

¹Received 04 March 2005; accepted for publication 16 September 2005.

²Kansas Biological Survey, University of Kansas, Lawrence, KS.

³Address inquiries (email: sdanielson@unl.edu).

⁴School of Natural Resource Sciences, University of Nebraska, Lincoln, NE.

⁵Department of Statistics, University of Nebraska, Lincoln, NE.

only when the alfalfa was dry, the air temperature was $\geq 15.5^{\circ}\text{C}$, and the canopy height was ≥ 15.0 cm. These guidelines for collection were similar to those used in previous similar studies (Kieckhefer et al. 1992, Great Lakes Entomol. 25: 15-23; Wright and DeVries 2000).

During 2001, fields were sampled by taking one hundred 180° sweeps along a randomly chosen transect using a 38-cm sweep net with a canvas bag. During 2002-03, sampling was conducted using four sets of fifty 180° sweeps along four randomly chosen transects using the same type of sweep net. An effort was made in all years to sweep as close to the ground as possible given the height of the alfalfa at the time of sampling. All samples were frozen, and the number and species of all adult Coccinellidae were recorded in all 3 yrs.

Six species of Coccinellidae were collected during the study. The native species collected included: the parenthesis lady beetle, *Hippodamia parenthesis* Say, the pink-spotted lady beetle, *Coleomegilla maculata* DeGeer, *Cycloneda* sp., and the convergent lady beetle, *Hippodamia convergens* Guerin-Meneville. The exotic species *H. axyridis* and *C. septempunctata* also were collected.

In 2001, *H. convergens* was the most abundant native species (6.15 beetles/100 sweeps) (Table 1). *Coccinella septempunctata* (2.43 beetles/100 sweeps) and *H. axyridis* (0.554 beetles/100 sweeps) were less abundant. During 2002, *C. maculata* was the most abundant native species (5.67 beetles/ 100 sweeps), whereas *C. septempunctata* (4.02 beetles/100 sweeps) and *H. axyridis* (0.287 beetles/100 sweeps) were less abundant. During 2003, the most abundant native species was *H. convergens* (7.51 beetles/100 sweeps) with 3.28 *C. septempunctata* and 0.227 *H. axyridis* per 100 sweeps.

To determine if the abundance of *C. septempunctata* and *H. axyridis* had increased in recent years, the data from this study were compared with historical data (Wright and DeVries 2000). Raw data from the historical study were converted into number of beetles per 100 sweeps for comparison (Table 1). In these comparisons, the numbers of native coccinellids we observed were very similar to those reported in the historical study (Table 1). However, numbers of exotic coccinellids appeared to be slightly greater in the recent study than in the historical report. Numbers of *C. septempunctata* were greater in all 3 yrs of our study than any 1 yr of the historical study

Table 1. A comparison of the data from this study to historical data. Abundance presented as insects per 100 sweeps

Species	Wright & DeVries 2000				Current Study		
	1992	1993	1994	1995	2001	2002	2003
<i>Hippodamia convergens</i>	2.90	2.10	7.33	4.50	6.15	5.61	7.51
<i>Coleomegilla maculata</i>	0.300	0.600	2.42	6.50	1.64	5.67	2.24
<i>Hippodamia parenthesis</i>	0.100	0.100	0.25	0	2.65	4.26	0.998
<i>Hippodamia tredicempunctata tibialis</i>	0	0	0.25	0	0	0	0
<i>Cycloneda</i> sp.	0.100	0.100	0	0	0.031	0.329	0.363
<i>Coccinella septempunctata</i>	0.200	2.10	1.08	2.00	2.43	4.02	3.28
<i>Harmonia axyridis</i>	0	0	0.083	0	0.554	0.287	0.227

(Table 1). *Harmonia axyridis* was represented in the historical study by a single beetle collected in 1994; however, we collected a mean of 122.7 *H. axyridis* annually, resulting in a peak collection of 0.554 beetles/100 sweeps in 2001 (Table 1).

We acknowledge that the increases seen in the abundance of the exotic lady beetles were not statistically significant and could not be interpreted as an indication of a trend of increasing abundance. However, the data show that both *C. septempunctata* and *H. axyridis* were collected more frequently in alfalfa between 2001-2003 than they were between 1992-1995. We further acknowledge that numerous biotic and abiotic factors could have influenced the abundance and collection rates of the Coccinellidae. However, given evidence from other areas of North America, the possibility exists that the abundance of exotic lady beetles could be increasing in the Midwest. Our data serve as a record of the current abundance of these exotic species and could be used for comparison with future studies examining the influence of exotic lady beetles on native species.

Acknowledgments

We gratefully thank the cooperating producers for allowing us access to the alfalfa fields, and Robert Wright and Terry DeVries for providing us with the raw data from their study and allowing us to present these data in this paper. This is contribution 18601 of the journal series of the Agricultural Research Division, University of Nebraska-Lincoln.