Interrelationship of Big-Eyed Bugs (Hemiptera: Lygaeidae) and Southern Chinch Bugs (Hemiptera: Lygaeidae) in Florida Lawns[1,2]

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Abstract The southern chinch bug, *Blissus insularis* Barber, is the most important insect pest of St. Augustinegrass, *Stenotaphrum secundatum* (Walt.) Kuntze. Fifteen chinch bug infestations in St. Augustinegrass lawns in Florida were sampled by vacuuming. Additional vacuum samples were taken in 15 randomly selected St. Augustinegrass lawns. The big-eyed bug, *Geocoris uliginosus* Say, was the most frequent and abundant big-eyed bug found at the infestations. Data showed that big-eyed bugs (*Geocoris* spp.) were highly aggregated at chinch bug infestations. Furthermore, there was a significant positive correlation between numbers of chinch bugs and big-eyed bugs at chinch bug infestations showing that big-eyed bugs had a numerical predator response to increasing chinch bug populations.

Key Words Big-eyed bugs, Chinch bugs, St. Augustinegrass, *Geocoris*

St. Augustinegrass, *Stenotaphrum secundatum* (Walt.) Kuntze, lawns are grown throughout the southern United States because of their climatic adaptation and ability to tolerate full sun to moderate shade. The southern chinch bug, *Blissus insularis* Barber, is the most important insect pest of St. Augustinegrass (Crocker 1993). As many as six insecticidal applications per year have been used in Florida to control southern chinch bugs (Reinert 1978). The importance of this insect is emphasized by its ability to develop resistance to insecticides (Reinert and Portier 1983) and to overcome host plant resistance (Busey and Center 1987, Cherry and Nagata 1997).

Currently, there are few data on how southern chinch bugs interact with predators at the population level. Wilson (1929) and Kerr (1966) noted various natural enemies observed in the field, but data were not provided on frequency, abundance, and other factors. Reinert (1978) provided data on predators and pathogens of southern chinch bugs in Florida. Last, Cherry (2001a) reported on the interrelationship of ants and southern chinch bugs in Florida lawns. In spite of these earlier studies, major gaps remain in our understanding of how southern chinch bugs interact with other insects, especially at the population level, under field conditions.

Big-eyed bugs (*Geocoris* spp.) have been noted to be common predators of chinch bugs in turf in general (Potter 1998). More specifically, Reinert (1978) reported *G.*

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uliginosus Say and *G. bullatus* Say were predators of southern chinch bugs in Florida. During my field observations over several years, I have noted big-eyed bugs frequently at southern chinch bug infestations. However, currently we do not know the relative abundance of different big-eyed bug species at chinch bug infestations or how big-eyed bug populations are responding to southern chinch bug populations. Hence, my objectives were to determine the relative abundance of big-eyed bugs at southern chinch bug infestations and determine how big-eyed bugs are responding to chinch bug infestations at the population level.

Materials and Methods

Fifteen chinch bug infestations were sampled by vacuuming during May to August 2004 from urban lawns. Lawns were sampled from both commercial and residential lawns with no prior knowledge of insecticidal use. Five lawns were sampled in each of three contiguous counties (Miami-Dade, Broward, Palm Beach) located on the heavily urbanized southeastern coast of Florida. Infestations were found by looking for areas of yellow St. Augustinegrass and then visually examining the area for chinch bugs in the field. If chinch bugs were detected, a 1 × 1 m sample was taken at the infestation by vacuuming for 5 min using a modified Weed Eater Barracuda blower/vacuum (Poulan/Weedeater, Shreveport, LA). A second similar sample was taken 10 m from the infested area. This second sample was taken in green healthy-appearing grass where few chinch bugs would be expected because their populations are highly aggregated (Cherry 2001b). The use of a vacuuming technique for sampling southern chinch bugs has been described by Crocker (1993). After collection, samples were frozen for later counting in a laboratory. Chinch bug adults and nymphs were counted by microscopic examination, and big-eyed bugs (nymphs and adults) were removed and stored in alcohol for later taxonomic identification using Mead (2001). Frequency and relative abundance of big-eyed bugs at the infestations were determined. Correlations between total numbers of chinch bugs and big-eyed bugs at infestations were derived with Pearson's correlation analysis (SAS 1996). Numbers of chinch bugs and big-eyed bugs at infestations versus 10 m from infestations were compared with paired *t*-tests (SAS 1996).

Additional vacuum samples were taken in 15 randomly selected St. Augustinegrass lawns not sampled previously to determine the overall abundance of big-eyed bugs in St. Augustinegrass lawns in general and compare this with big-eyed bugs present at chinch bug infestations. Lawns were sampled from both commercial and residential lawns with no prior knowledge of insecticidal use. Five lawns were sampled from each of the three previously listed counties. One vacuum sample as described previously was randomly taken in each lawn. After collection, big-eyed bugs and chinch bugs were stored and identified as noted previously. Number of big-eyed bugs and chinch bugs at the previously noted chinch bug infestations versus in random lawn samples were compared by *t*-test analysis (SAS 1996).

Results and Discussion

The frequency and abundance of big-eyed bugs at southern chinch bug infestations are shown in Table 1. *Geocoris uliginosus* was found more frequently and in greater abundance than the other species (*G. bullatus* and *G. punctipes* Say) combined. Crocker and Whitcomb (1980) studied the three big-eyed bug species in Table

Table 1. Frequency and abundance of big-eyed bugs at southern chinch bug infestations

Species	Frequency*	Abundance**	
		Total	% Relative
G. bullatus			
Adults	7	3	4.8
Nymphs	0	0	0
G. punctipes			
Adults	7	1	1.6
Nymphs	7	1	1.6
G. uliginosus			
Adults	60	39	61.9
Nymphs	40	19	30.2

* Frequency = percentage of all infestations in which found.

** Total abundance = number in all samples. % Relative abundance = (number divided by total number of all species) × 100.

1 in different habitats in Florida and reported that the three species did not tend to be abundant together in any given habitat. Interestingly, the clear predominance of *G. uliginosus* over the other two species in St. Augustinegrass in this study is consistent with the Crocker and Whitcomb (1980) study conducted in multiple habitats. Reinert (1978) reported that *G. uliginosus* was the most numerous and frequently encountered predator in Florida turf, although Mead (2001) reported *G. punctipes* to be the most abundant big-eyed bug in Florida and the southeastern United States. Reinert (1978) reported that *G. uliginosus* was a predator on all life stages of southern chinch bugs.

Significantly more southern chinch bugs ($t = 2.4$, 28 df, $P < 0.05$) were found at infestation sites versus 10 m from the infestations (Table 2). These data are consistent with Cherry (2001a) who reported that southern chinch bugs are extremely ag-

Table 2. Southern chinch bugs and big-eyed bugs at various locations relative to chinch bug infestations

	Distance from infestation*		
	0 m	10 m	Random yards*
Big-eyed bugs	4.2 ± 1.5	0.1 ± 0.1	0.1 ± 0.1
Chinch bugs	882.1 ± 354.9	11.8 ± 4.4	2.1 ± 0.9

* Means ± SE in 1 m^2 samples. N = 15 samples at each of three locations. See text for details of statistical analysis.

gregated in St. Augustinegrass. Also as expected, significantly more chinch bugs (t = 3.6, 28 df, $P < 0.05$) were found at infestations than in samples from randomly selected St. Augustinegrass yards.

Significantly more big-eyed bugs (t = 2.8, 28 df, $P < 0.05$) were found at chinch bug infestations versus 10 m from the infestations (Table 2). Also, significantly more big-eyed bugs (t = 2.8, 28 df, $P < 0.05$) were found at infestations than in samples from randomly selected St. Augustinegrass yards. Population densities of big-eyed bugs averaged 42× greater at chinch bug infestations than 10 m away or in random yard samples. These latter data clearly show that big-eyed bugs were highly aggregated at chinch bug infestations. Reasons for the aggregation of big-eyed bugs at southern chinch bug infestations are not known. However, Kessler and Baldwin (2004) have shown that attack of insect herbivores on the native tobacco plant, *Nicotiana attenuata* Torr. ex Watts., causes the plant to release volatile organic compounds which attract the big-eyed bug, *G. pallens*. Possibly, St. Augustinegrass damaged by southern chinch bugs is also attracting big-eyed bugs. Furthermore, correlation analysis showed that there was a significant positive correlation (r = 0.65, $P < 0.05$) between numbers of chinch bugs and numbers of big-eyed bugs at chinch bug infestations. These latter data show that as chinch bug populations increased, big-eyed bug populations also increased placing additional predation pressure on chinch bug populations. An increasing predator population with an increasing prey population is defined as a predator's numerical response due to increased predator reproduction and/or predator migration to the prey locations (Price 1997). Big-eyed bugs in this study showed this classical numerical predator response to increasing chinch bug populations as shown by the positive correlation between their populations.

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