OBSERVATIONS ON *GEOCORIS PUNCTIPES*  
(HEMIPTERA:LYGAEIDAE)  
OVIPosition SITE PREFERENCES

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*Geocoris punctipes* (Say) is a common insect predator in field crops throughout the southeastern United States and has been extensively studied as a potential biological control agent of a number of insect pests. The oviposition behavior of this predator and others of the genus *Geocoris* is not well known. McGregor and McDonough (1917) reported that *G. punctipes* eggs could be found deposited in mite colonies on the undersides of cotton leaves. Van den Bosch and Hagen (1966) observed this behavior for *Geocoris* spp. in California and added that eggs were also frequently found in the terminal growth of cotton plants. Tamaki and Weeks (1972) noted that eggs of *G. bullatus* (Say) and *G. pallens* Stål were often found in soil dust and the underside of sugarbeet leaves. They also observed that eggs were more abundant on potatoes and sugarbeets than on broccoli in interplant studies. Wilson and Gutierrez (1980) reported that *G. punctipes* and *G. pallens* deposited most of their eggs on the undersides of leaves in preference to other cotton plant parts. As part of a more comprehensive study to examine the influence of plants on the biology and ecology of *G. punctipes* in Florida soybean (Naranjo and Stimac 1985, 1987) observations were made on oviposition behavior in this predator. This note reports on oviposition site preferences demonstrated by *G. punctipes* females in laboratory experiments utilizing soybean, *Glycine max* (L.) Merr. (Bragg variety), and a complex of broadleaf weeds commonly associated with soybean in Florida.

One laboratory colony female, 5-10 days of age, was confined in a circular cage containing either two plants of one species or a combination of one soybean and one of ten weed species for a 24-hour period at 27°C. The cage (30cm x 15cm dia.) was constructed of fine mesh (7 divisions/cm) fiberglass screening and two petri dishes. The weeds examined were *Amaranthus hybridus* L., *Ammiobis artemisiifolia* L., *Bidens alba* L., *Cassia obtusifolia* L., *Chenopodium ambrosioides* L., *Crotalaria spectabilis* Roth, *Desmodium tortuosum* (Sw.) De., *Herbolaeria subaxillaris* (Lamb), *Richardia scabra* L., and *Solidago fistulosa* Mill. Prey (*Spodoptera frugiperda* (J. E. Smith) eggs) were individually attached to the underside of leaves in the cage. After the test period the predator was removed and the number and location of deposited eggs were recorded, including those on the cage itself. A total of 359 separate cages were examined.

Pooling all plant species, females deposited ca. 77.5% of their eggs on cage surfaces in preference to plant surfaces (Table 1). Eggs laid on cage surfaces were found on the screen mesh and in the juncture between the horizontal and vertical surfaces of the cage lids. Eggs were most often found deposited through the screen mesh onto the lid where these two surfaces overlapped. *G. punctipes* demonstrated specific site preferences when laying eggs on plant surfaces (Table 1). Close to one-half of the eggs laid on plants were deposited on undersides of leaves and a large percentage were laid on main stems. Relatively few eggs were laid on upper leaf surfaces, leaf petioles, or apical growing points.

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<table>
<thead>
<tr>
<th></th>
<th>Total eggs</th>
<th>% (cage and plant)</th>
<th>% (plant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem</td>
<td>72</td>
<td>6.9</td>
<td>30.8</td>
</tr>
<tr>
<td>Apex</td>
<td>7</td>
<td>0.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Petiole</td>
<td>32</td>
<td>3.1</td>
<td>13.7</td>
</tr>
<tr>
<td>Leaf:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>upper surface</td>
<td>12</td>
<td>1.2</td>
<td>5.1</td>
</tr>
<tr>
<td>lower surface</td>
<td>111</td>
<td>10.7</td>
<td>47.4</td>
</tr>
<tr>
<td>Cage</td>
<td>807</td>
<td>77.5</td>
<td>—</td>
</tr>
</tbody>
</table>

G. punctipes also demonstrated preferences for specific plant species (Naranjo and Stimac 1987). Soybean, and to a lesser extent, Florida pusley, *Richardia scabra*, were preferred over the other plants examined. Fairly dense compliments of trichomes characterize the surfaces of both of these plant species. This feature was particularly pronounced in the Bragg soybean variety examined here. Eggs laid on soybean were consistently laid beneath and not atop the dense trichomes on leaves and stems. Furthermore, closer inspection of soybean plant surfaces under a dissecting scope revealed that, except for apical growing points, preference for particular plant sites (Table 1) appeared to be related to trichome density. In comparison to other sites trichomes appeared to be denser on soybean leaf undersides, stems and apical growing points. As a final observation it is interesting to note that small cotton balls are an excellent oviposition substrate for laboratory rearing. Qualitatively, this substrate shares the characteristics of preferred plant sites.

The observations presented above suggest that female *G. punctipes* respond in a thigmotactic (tactile) manner to stimuli provided by the topography of oviposition surfaces. The large percentage of eggs laid on cage surfaces indicate that these surfaces may have provided a more appropriate stimulus than available plant surfaces. The preference of females for plants such as soybean and Florida pusley is consistent with the surface characteristics of these plants. Tamaki and Weeks (1972) noted that *Geocoris* spp. eggs were frequently found in soil duff. Such a heterogeneous substrate could easily provide the necessary tactile stimulus.

Eggs laid on soybean stems and leaf undersides and cage surfaces were often difficult to locate suggesting that the oviposition behavior observed here may represent a means of concealing or otherwise making eggs less vulnerable. Staten (1970) found high rates of parasitism of *Geocoris* eggs by *Teilonomus* spp. in California. However, in general very little is known about natural enemy or environmentally induced mortality in *Geocoris*. Whether the oviposition behavior exhibited by *G. punctipes* is an adaptation for enhancing egg survival is yet to be demonstrated but it does suggest that knowledge of plant surface characteristics may be important when attempting to encourage populations of this predator in the field.

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**References Cited**


PIT DISPERSION IN ANTLION LARVAE (NEUROPTERA: MYRMELEONTIDAE): IS COMPETITION IMPORTANT?

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Antlion larvae of the genus Myrmeleon (Neuroptera: Myrmeleontidae) forage by pit trapping. Insects fall into these pits and are captured and eaten by the antlion buried in the soil at the bottom of the pit. As sit and wait predators, antlion larvae have only a limited number of ways of increasing their foraging success; pit relocation may be one such way. Recently there has been some discussion of the relocation and dispersion of antlion larvae pits (Heinrich and Heinrich 1984, Simberloff et al. 1978, Griffiths 1980a, McClure 1976, Wilson 1974), but there is little agreement as to the relative importance of the causal factors. Griffiths (1980a), Wilson (1974) and McClure (1976) claim that antlions relocate their pits in response to food limitation. Heinrich and Heinrich (1984) argue that intraspecific competition for prey is only influential over long time periods, and within a shorter time frame, microclimatological factors such as soil temperature and moisture can better account for pit dispersion. If pits are located in an area with warm, dry soil, antlion foraging success may be enhanced since antlions in these environments can spend more time foraging than can conspecifics with pits in shaded, moist areas (Griffiths 1980b), since dry soil is energetically easier to toss (Lucas 1982). Simberloff et al. (1978) also mention food limitation as a possible factor affecting pit dispersion, but argue that data are too scant to be conclusive, and that prey limitation probably is not a motivating factor in pit spacing since antlion larvae can survive without food for several months at a time. Rather, they claim that microclimatological factors and sandthrowing during pit maintenance are more influential in the spacing of antlion larvae pits. The aim of this study is to investigate the relative importance of food limitation and microclimatological factors on antlion pit dispersion.

This study was conducted during the dry season at the Archbold Biological Station, Highlands County, Florida from 24 March–4 April 1986. Myrmeleon carolinus Banks larvae were collected from a 100m area along the western firetrail from pits of uniform size (2 cm radius). Since pit size is correlated with owner size (Wheeler 1930, Wilson 1974, Wilson