

Seasonal Life History and Suitability of Horticultural Plants as Nectar Sources for *Larra bicolor*, a Parasitoid of Mole Crickets in the Northern Gulf Coast

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Objectives:

1. Determine the seasonal life history of *Larra bicolor* in the northern Gulf Coast.
2. Determine the suitability of flowering plants as nectar sources for *Larra bicolor*.
3. Determine if incorporating wildflowers on golf courses will facilitate the establishment of *Larra* wasps on that site.

Start Date: 2006

Project Duration: three years

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Larra bicolor, an introduced ectoparasitoid of mole crickets, has spread into the northern Gulf region (Mississippi and Alabama) from where it was originally introduced (Florida). This creates an opportunity for golf course superintendents in this area to utilize this biological control agent. This project is the first empirical research on *Larra bicolor* conducted outside of Florida. Therefore, it is necessary to determine the seasonal flight period in the extended range of this wasp.

From 2006 to 2008, wasps were monitored on four sites in south Mississippi. Across all sites, wasps were generally active June through October with an additional month of activity in fall 2007. This seasonal activity of *L. bicolor* is similar to that reported from the Florida panhandle (Gadsden Co.). Wasps were observed on flowers from about 13 hours (0700 to 1900 h CST) in August and 9 hours (0900 to 1700 h CST) in October. During this study, sunrise and sunset were 0520 h and 1845 h (August), and 0600 and 1730 h (October), respectively. Sunrise, and not temperature, likely trigger activity.

Air temperatures in August when wasps became active were 27-28° C, whereas wasps were active when air tem-

peratures were 18.3° C in October. In August, a maximum of 14 females and 31 males were observed at once on flowers compared to 3 and 25, respectively, in October. Males were almost always present on flowers during the hourly observations. Females, however, were observed on flowers for distinct periods (3 to 9 hours) each day. Females spend their time mainly hunting for hosts only returning to flowers for nectar as needed.

In 2007 and 2008, we established a replicated garden of 16 plant taxa of flowering plants in 0.5 × 0.5 m plots arranged in a randomized complete block design. Only two taxa, Pentas and Spermacoce, were visited by *L. bicolor*. White pentas were readily foraged upon by *L. bicolor* and numbers of wasps were comparable to Spermacoce. Among pentas, white-flowered pentas were significantly different from either pink or red-flowered pentas. White and yellow are common colors attractive to day-active insects such as these wasps. However, there were several taxa in the garden with yellow and lighter colored flowers that went unvisited by *L. bicolor*. Volatiles likely determine wasp visitation to these flowers.

Attempts to trap or passively monitor this species have been previously unsuccessful. In fall 2008, an experiment was conducted using pan traps of various colors as attractants. Despite activity on adjacent flowers, wasps were not recorded in the traps. In 2009, trapping studies were conducted using phenylacetaldehyde (PAA) and floral extracts of Spermacoce and Pentas as lures. The objective was to verify the results of a previous study that demonstrated that *L. bicolor* could be trapped using PAA and floral volatiles as a way to collect specimens for research or to passively monitor the continued spread of *L. bicolor*.

Field plots containing white-



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flowered pentas have been established on four holes at Grand National Golf Club, Opelika, AL. These plants will serve as release points for *L. bicolor* on that course.

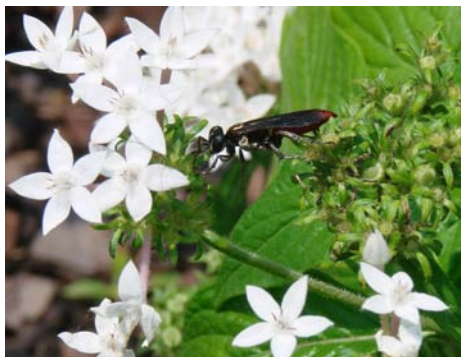
Wasps will be collected from golf course sites in Mobile and Baldwin Counties in Alabama and released on the flowers at dusk.

Due to heavy summer rains, wasps were unable to be collected in mass during August or September. Manual collection is slow and inefficient, but we anticipate release of four females (and males) per planting during October and

Summary Points

- *Larra bicolor* have a 4-5 month activity in the northern Gulf region to parasitize mole crickets. Wasps are active mostly during daylight hours. Although the impact of insecticides on *L. bicolor* have not been evaluated, turf managers wanting to conserve these biological controls should consider making insecticide applications later in the day as numbers of foraging wasps wane.

- In two trials, pentas, particularly white pentas, recruit equivalent numbers of *L. bicolor* as flowering *Spermacoce verticillata*. Wasps don't appear to be visually attracted to flowers, and experiments using volatile attractants are being conducted.



Adult *Larra bicolor* feeding on *Spermacoce* flowers.