

# 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

**Total Funding:** \$29,232

*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.

We are monitoring wasp activity monthly on four sites on the Mississippi Gulf Coast where where *L. bicolor* is known to occur. Across all three years, wasps were active beginning in June and generally ending in November. Comparison of activity of foraging wasps on turf is comparable to foraging wasps on nectar sources. This suggests that the presence of wasps on nectar sources will indicate wasps foraging in turf. Wasps were not active at St. Andrews in 2008. This site was one of the first along the Mississippi coast where *L. bicolor* was detected.

In 2007 and 2008, we established a replicated garden of flowering herbaceous plants at the Coastal REC. The garden consists of four replicates of the 15 plant taxa arranged in 0.5 × 0.5 m plots. Between 1100-1300 h during peak flight, numbers of *L. bicolor* on flowering plants were recorded. Of all the species present and flowering, only two, *Pentas* and



Common garden experiment conducted in 2007 and 2008 to assess preference of *L. bicolor* for flowering ornamental plants

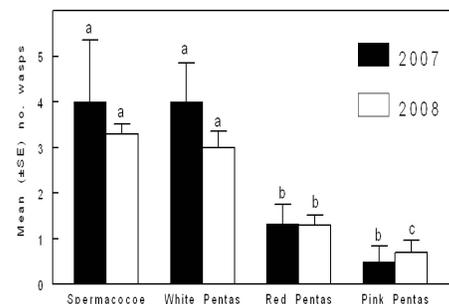
*Spermacoce*, were visited by *L. bicolor*. White pentas was readily foraged upon by *L. bicolor* and numbers of wasps were comparable to *Spermacoce*. Among pentas, white-flowered pentas was significantly different from either pink or red-flowered pentas.

In 2007, both red and pink flowered pentas were comparable, however, they were significantly different in 2008. There may be volatiles or ultraviolet visual cues recruiting wasps to these flowers. In 2008, attempts to observe recruitment to flowers or host mole crickets under controlled conditions in a wind tunnel were unsuccessful.

In 2007 and 2008, diel activity of *L. bicolor* was studied by monitoring wasp activity on flowers of blooming plots of *Spermacoce verticillata* and white-flowered *Pentas lanceolata*. These plots were part of the garden experiment previously described. This study was conducted from August 7-10, 2007 and October 9-11, 2008 when wasp populations were abundant enough to collect data. The number and sex of wasps on flowering plants in 8 plots in the garden were taken hourly from 0500-2000 h each day.

In both years, wasps begin actively foraging about 2-3 hours after sunrise to near dusk. Sunrise, and not temperature, likely triggers activity. Air temperatures in August when wasps became active were 27-28 C, whereas wasps were active when air temperatures were 18.3 C in Oct. Males and females are present throughout the day with females being more transient. Populations were more clearly male-biased in October than in August samples. It is generally thought that *L. bicolor* flowers are male-biased, but these data suggest that may depend on time of year. At certain times during the August 2007 observations, numbers of male and females were almost equal.

In May and June, plots were



Numbers of wasps recorded on plants in the common garden experiment. Data from 6 days in 2007 and 10 days in 2008 during the peak of activity were selected and analyzed. Only four taxa, two species, were observed with wasps. There were significantly more wasps on *Spermacoce* and the white-flowered pentas than either of the other two flowering pentas in both years.

established on a local golf course (Great Southern Golf Course) and at the Coastal REC. The objective was to determine if proximity to pentas could increase parasitism of mole crickets. Plots of flowering plants were established in the center of 11-m transects. Once wasps were active on the flowers, containers of mole crickets would be buried in the ground at 1, 3, and 5 meters from the center. Unfortunately, wasps were not present in the flowering plots during July, August, or September.

## 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*. Attempts to assess the impact of nectar sources on parasitism were not successful in 2008 and will be repeated in 2009.