

# 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

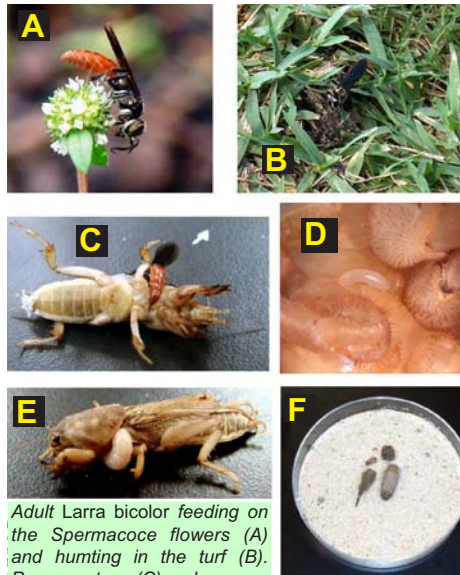
**Project Duration:** three years

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

*Larra bicolor*, an introduced ectoparasitoid of mole crickets, has spread into coastal Mississippi and Alabama from Florida where it was originally introduced. This creates an opportunity for golf course superintendents in this area to utilize this biological control agent. It is necessary to determine the seasonal flight period in the extended range of this wasp. We are monitoring wasp activity monthly on local golf courses where *L. bicolor* is known to occur. Alternatively, flowering plantings of ornamentals and *Spermacoce verticillata* on the grounds of the Coastal REC are monitored concurrently for wasps. Previous research from Florida indicates that flowering plants are important to the establishment of *Larra* on new sites. The primary nectar resource for this wasp is *Spermacoce verticillata*, a tropical weed naturalized in Florida. Other plants will be selected and screened for suitability for *L. bicolor*.

In 2007, we continued monitoring the season flight period of *L. bicolor* on local golf courses as well as at the research center. These sites were identified in 2006 and have been monitored monthly. It is clear there is variation from month to month on a particular site. The absence of adult wasps on a site may represent periods when larvae are more abundant and developing on mole crickets. It may also relate to the presence of mole crickets on those sites. Sites lacking recently or freshly damaged turf rarely have wasp activity. Drought conditions in 2006 and 2007 reduced surface activity of mole crickets in sparsely or non-irrigated turf.

In 2007, we established 15 taxa of flowering herbaceous plants at the Coastal REC for *Larra bicolor*. The garden con-



Adult *Larra bicolor* feeding on the *Spermacoce* flowers (A) and hunting in the turf (B). Prey are stung (C) and one egg (D) is laid per mole cricket. The larval wasp develops outside the mole cricket (E) and then consumes all soft body parts and spins a cocoon (F).

sists of four replicates of each of these arranged in 0.5 ~ 0.5-m plots. After planting, some of the plants were either not in flower during the peak of wasp activity or they died before we could evaluate them. The species that were present were evaluated by counting the number of wasps observed between 11 a.m. and 12:30 p.m. during the peak of flight.

Of all the species present and flowering, only two, pentas and *Spermacoce*, were visited by *L. bicolor*. Interestingly, pentas was readily foraged upon by *L. bicolor* even when *Spermacoce* was present. Among pentas, there were further differences. White-flowered pentas and *Spermacoce* were statistically similar as were the pink and red-flowered pentas. However, the white-flowered plant had significantly more wasps than the red or pink flowered plants. It is possible that flower color and morphology influence flower feeding, but nectar constituents likely explain differences in visitation in our study. For example, *L. bicolor* prefer

flowers with a sucrose:hexose ratio > 1 as reported in the literature.

Laboratory trials were conducted to determine longevity of wasps confined with either *Spermacoce* or pentas. *Spermacoce* and white-flowered pentas seedlings were potted in the spring and grown in the greenhouse. Potted plants were then transported to the Coastal REC and maintained until needed for experiments.

These trials were conducted in laboratory arenas large enough to accommodate a potted, flowering plant. One potted plant was placed into each arena. In Trial 1, a starvation treatment (wasps with no provision) was used in addition to the flower treatments. In Trial 2, a sugar-water treatment was used instead of the starvation treatment. Sugar water (0.1 M solution sucrose) was provided to wasps confined with mole crickets in the laboratory to observe parasitism. Wasps were observed every day for survival. Diet significantly influenced wasp longevity in Trial 1. Wasps fed pentas flowers lived longer than those fed *Spermacoce*. In Trial 2, the influence of diet was negligible. All three diets in this trial maintained wasps for about 4 days. These results suggest that pentas is as suitable for *L. bicolor* as *Spermacoce*.

## Summary Points

- Monthly monitoring of the flight period of *L. bicolor* continued in 2007 and will finish in 2008. Flight is first observed in late May and wasps were still active in late October and November.
- The ornamental *Pentas lanceolata* was found to be a host for *L. bicolor* in 2006. In a common garden field experiment, white-flowered pentas was visited as frequently as *Spermacoce*.
- Laboratory longevity tests also suggest that white-flowered pentas is equally suitable for wasp survival as *Spermacoce*.