

Inaugural studies of the life history and predator/prey associations of *Heringia calcarata* (Loew) (Diptera: Syrphidae), a specialist predator of the woolly apple aphid, *Eriosoma lanigerum* (Hausmann) (Homoptera: Eriosomatidae)

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Abstract

The life history of the aphidophagous syrphid fly, *Heringia calcarata* (Loew), a specialist predator of woolly apple aphid, *Eriosoma lanigerum* (Hausmann), was studied in Virginia from 2001 to 2003, under field and laboratory conditions. Pronounced differences in the chorionic sculpting of eggs of *Eupeodes americanus* (Wiedemann), *Syrphus rectus* Osten Sacken, and *H. calcarata* were documented. These differences can be used to separate these aphidophagous hover flies. Gross morphological descriptions of all life stages of *H. calcarata* were reported and the duration of the developmental period of all life stages was quantified. The phenology and relative abundance of *H. calcarata* was studied in the field using water pan traps, sticky traps, emergence traps, sentinel trees, and destructive sampling of aphid colonies. Sentinel trees with woolly apple aphid colonies were most effective for phenological studies, and showed that female *H. calcarata* were present in apple orchards from April through September. Emergence traps revealed that *H. calcarata* adults emerge from the duff or soil beneath apple trees.

Prey specialization of *H. calcarata* on woolly apple aphid was studied using no-choice and choice feeding bioassays and oviposition patterns in the field. Feeding studies compared the consumption of three, temporally sympatric aphid pests of apple: spirea

aphid, *Aphis spiraecola* Patch, rosy apple aphid, *Dysaphis plantaginea* (Passerini), and woolly apple aphid. Compared with spirea aphid or rosy apple aphid, a pure diet of woolly apple aphid resulted in significantly higher larval survivorship and weight, and a significantly shorter developmental period. Naïve, neonate larvae exhibited a marked preference for woolly apple aphid. Weekly counts of hatched and unhatched syrphid eggs revealed that *H. calcarata* was present only in woolly apple aphid colonies, where it was the most abundant hover fly species. Our data indicate that *H. calcarata* is a specialist predator of the woolly apple aphid in the apple ecosystem in Virginia.