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Release of Two Parasitoid Species for Biological Control of Citrus Blackfly in South Texas

J. Victor French, Robert L. Meagher, Jr.[1], and Kenneth L. Esau[2]
Texas A&I University Citrus Center
P.O. Box 1150
Weslaco, Texas 78596

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ABSTRACT

Disruption of the parasitoids, *Amitus hesperidum*, Silvestri and *Encarsia opulenta* Silvestri, resulted in a severe outbreak of citrus blackfly, *Aleurocanthus woglumi* Ashby, in Lower Rio Grande Valley (LRGV) citrus orchards during the 1988 and 1989 seasons. In efforts to regain biological control of citrus blackfly, an estimated 702,400 parasitoids were released or redistributed in 40 infested mid-LRGV orchards between June and November, 1989. Releases included both insectary-reared and field-collected *A. hesperidum* and *E. opulenta* received from Florida and field-collected *E. opulenta* received from Mexico. To augment imported parasitoids, leaves with parasitized citrus blackfly from two Brownsville-area orchards were redistributed and accounted for 70% of all *A. hesperidum* and *E. opulenta* released.

The citrus blackfly (CBF), *Aleurocanthus woglumi* Ashby, is a citrus pest of South Asian origin, but infestations have occurred in the Lower Rio Grande Valley (LRGV) of Texas in 1955 and 1971 (Smith et al. 1964, Hart et al. 1973). The first outbreak was on residential citrus and was eradicated in 1956; the second outbreak also initiated on residential citrus but soon spread to commercial orchards. Insecticide applications failed to give adequate control, but release in 1974 of laboratory-reared and field collected parasitoids, *Amitus hesperidum* Silvestri (Platygasteridae) and *Encarsia opulenta* Silvestri (Aphelinidae) reduced population densities below economic damage levels (Summy et al. 1983). Citrus blackfly population densities had remained stabilized under biological control until the mid 1980's. Five years after a severe freeze in December 1983, CBF densities again surged in mid-LRGV orchards while concomitant parasitoid densities were low. This report describes the release and redistribution of *A. hesperidum* and *E. opulenta* during the 1989 season to regain biological control of CBF.

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[1] Texas Agricultural Experiment Station, 2415 E. Highway 83, Weslaco, TX 78596.
[2] USDA, APHIS, Science and Technology, Rt. 3, Box 1000, Edinburg, TX 78539.

MATERIALS AND METHODS

Several parasitoid sources were utilized during 1989. Beginning June 28, air shipments were sent from a beneficial insect rearing facility in Gainesville, Florida, which was maintained by the Florida Department of Agriculture, Division of Plant Industry. These insectary shipments consisted of *A. hesperidum*, which were placed in wax cups and contained honey and water (1:1) as a food source, and were shipped in styrofoam containers (Fig. 1 a,b) (Hart et al. 1978). *E. opulenta* were field collected in the Linares-Montemorelos area of Nuevo Leon, Mexico and transported to the border. After inspection by USDA-APHIS-PPQ (Plant Protection and Quarantine), parasitoids were brought into the U.S. under a special permit at Hidalgo, Texas. The collections in Mexico were conducted under the auspices of Secretaria de Agricultura y Recursos Hidraulicos (SARH). Beginning in mid September, most *A. hesperidum* and all *E. opulenta* shipments from Florida were field collections. Parasitoids were collected in Haines City, Florida from CBF-infested trees carefully inspected for citrus canker. Cups containing parasitoids were taped to tree branches with foliage supporting heavy blackfly infestations. Releases were usually made during the early morning hours in a total of 27 LRGV orchards from June 28 to November 4, 1989.

To augment the releases of Florida and Mexico parasitoids, leaves with parasitized CBF from two Brownsville orchards were collected and redistributed into mid-LRGV orchards during September. Since parasitoids emerge from 4th stage CBF (pupae), leaves with a preponderance of this stage were selected and put into paper bags (ca. 50 leaves/bag). The bags were stapled shut and each day's collection of about 150 bags were transported in large coolers to the Texas A&I University Citrus Center insectary. The bags were placed in CBF-infested orchards by stapling them atarms length inside the canopy of the northwest quadrant of the tree (Fig. 2). A hole cut near the top of each bag allowed the emerging parasitoids to escape. A subsample of leaves from each day's collection were held for a 2-week period in the insectary to estimate the number of parasitoids released.

RESULTS AND DISCUSSION

An estimated total of 702,400 parasitoids were released or redistributed from CBF-infested orchards to 40 mid-LRGV orchards between June and November 1989 (Table 1, Fig. 3). There was a total of 39 parasitoid shipments from Florida and 4 shipments from Mexico. Additionally, over 900 bags of parasitized CBF-infested leaves were redistributed to 20 mid-LRGV orchards. Cup releases from laboratory-reared colonies and field-collected orchards in Florida comprised 31% of all *A. hesperidum* released. Cup release numbers of *E. opulenta* were similar from Mexico and Florida (44.7% and 55.3%, respectively), although 76.5% of all *E. opulenta* and 70% of the total parasitoids released during 1989 were via parasitized CBF-infested leaves from Brownsville.

Indigenous populations of both *A hesperidum* and *E. opulenta* were identified in two Brownsville orchards during a survey in early January 1989. After several parasitoid generations had occurred, these orchards became the "nursery locations" from which parasitized CBF-infested leaves were obtained for redistribution. Although the leaf collection and distribution was time consuming and labor intensive, this method expedited relocation of high numbers of parasitoids with limited mortality. The redistribution procedure would have been expanded to other orchard locations if not disrupted by a severe freeze that occurred December 21-26, 1989.

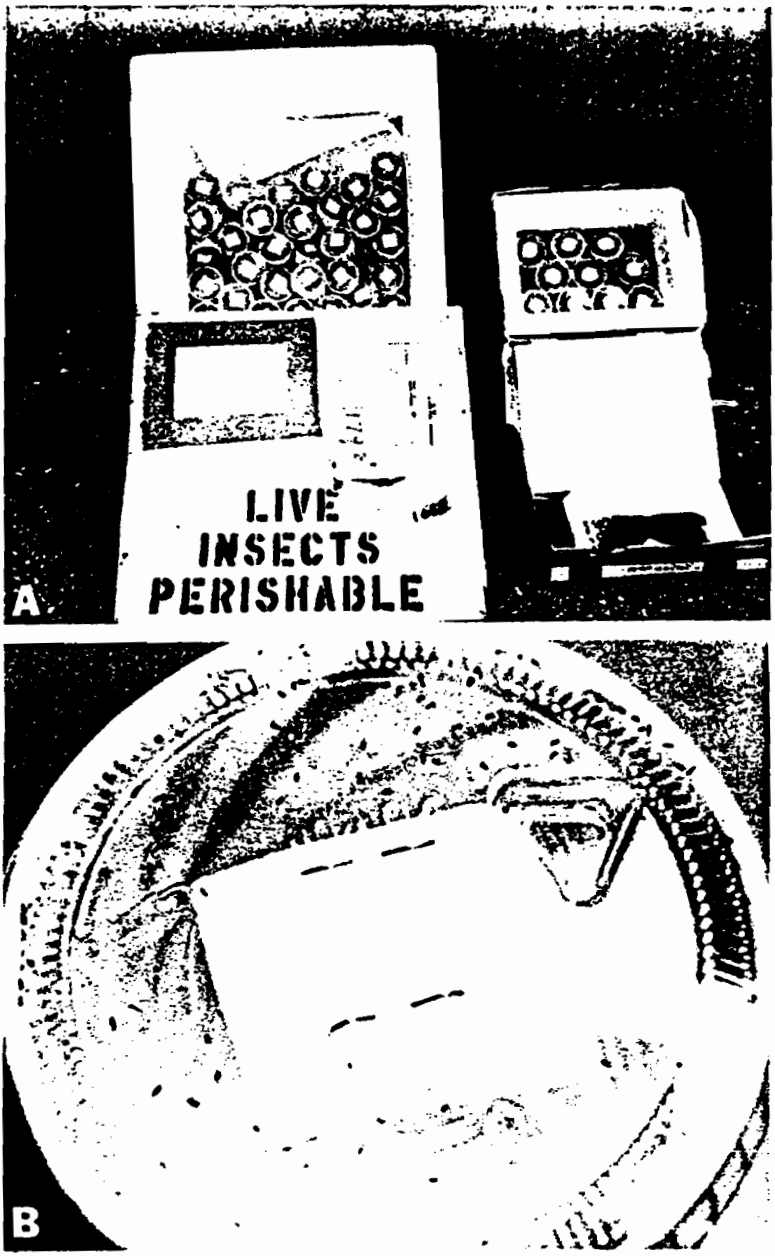

Fig. 1 A. Styrofoam containers used to ship parasitoids by air from a beneficial rearing facility in Gainesville, FL.
B. Wax cup containing the parasitoid *A. hesperidum* and paper pad with honey and water as a food source.

Fig. 2 Paper bag stapled in citrus tree and containing leaves with parasitized CBF. Emerging parasitoids escape through a hole cut near top of the bag.

Table. 1 Number of releases and redistributions of two parasitoid species against citrus blackfly in South Texas, 1989.

Parasitoid Species	Source	Estimated No. Released
Amitus hesperidum	Florida	180,450
	Brownsville*	402,190
		582,640
Encarsia opulenta	Mexico	12,600
	Florida	15,600
	Brownsville*	91,560
		119,760
Total parasitoids		702,400

* Parasitoids from Brownsville were redistributed by transferring parasitized-CBF leaves in paper bags.

Fig. 3 Citrus growing counties of the Lower Rio Grande Valley with arrows indicating blackfly parasitoid orchard release sites.

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