

DISPERSAL OF *AMITUS HESPERIDUM* AND  
*ENCARSIA OPULENTA* RELEASED FOR THE  
BIOLOGICAL CONTROL OF CITRUS BLACKFLY  
IN SOUTH FLORIDA

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ABSTRACT

*Amitus hesperidum* Silvestri and *Encarsia opulenta* (Silvestri) dispersed rapidly from 3 release areas in south Florida in time required for the development of 2-3 generations. Wilton Manor, Melrose Park, and Coconut Creek, 3 areas within or near the city limits of Fort Lauderdale, comprised the dispersal-study areas. *Amitus hesperidum* (2500) and *E. opulenta* (400) were released in Wilton Manor; *A. hesperidum* (3400) and *E. opulenta* (300) were released in Melrose Park, and *A. hesperidum* (5000) plus *E. opulenta* (500) were released in Coconut Creek. Dispersal of up to 3.7 km was recorded for *A. hesperidum* and 1 km for *E. opulenta* within a time period allowing for no more than 3 generations of either species.

RESUMEN

*Amitus hesperidum* y *Encarsia opulenta* se dispersaron rapidamente desde tr3s areas en el sur de Florida en donde fueron liberados. Durante el tiempo de dispersion, 2-3 generaciones se pod3an haber desarrollado. Las comunidades de Wilton Manors, Melrose Park, y Coconut Creek, en la vecindad de Ft. Lauderdale fueron incluidas en el area de investigaci3n de la dispersi3n. *A. hesperidum* (2500) y *E. opulenta* (400) fueron liberados en Wilton Manor; *A. hesperidum* (3400) y *E. opulenta* (300) fueron liberados en Melrose Park; y *A. hesperidum* (5000) y *E. opulenta* (500) fueron liberados en Coconut Creek. La distancia de la dispersi3n fue hasta 3.7 km en el caso de *A. hesperidum* y 1 km en el caso de *E. opulenta* dentro del tiempo que permitir3a el desarrollo de no m3s que 3 generaciones de dichas especies.

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Following the discovery of citrus blackfly, *Aleurocanthus woglumi* Ashby in Fort Lauderdale in February 1976 by personnel of the Division of Plant Industry, the Florida Department of Agriculture, and federal and state regulatory agencies developed and implemented chemical control and containment strategies. There was no evidence of the presence of parasites in the citrus blackfly populations in Fort Lauderdale. Citrus blackfly had also been reported in Texas in 1971. The USDA, ARS had initiated a research program on citrus blackfly at the Citrus Insects Laboratory, Weslaco, Texas, under the leadership of W. G. Hart. A major effort of the Weslaco Laboratory involved biological control of citrus blackfly. Methodology for rearing citrus blackfly and citrus blackfly parasites in the laboratory had recently been completed (Sanchez R. M. et al. 1977). To attempt biological control of citrus blackfly in Florida, we began releasing *Amitus hesperidum* Silvestri and *Encarsia opulenta* (Silvestri) = *Prospaltella opulenta* Silvestri

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(Viggiani and Mazzone 1979) from the Weslaco Laboratory in April 1976. Introductions were continued through November 1976. Establishment of both *A. hesperidum* and *E. opulenta* was accomplished in Florida during 1976 (Hart et al. 1978). This report presents data on dispersal of these parasites from 3 designated release sites. Information on dispersal from other release sites was not obtained.

#### MATERIALS AND METHODS

Release sites were located in the Fort Lauderdale area and are identified as follows: Wilton Manor, Melrose Park, and Coconut Creek (Fig. 1a,b,c). Samples consisted of citrus blackfly pupae on 10 citrus leaves at each sample site. Selection of leaves was biased to those containing citrus blackfly pupae. Samples were examined under a binocular microscope. Unemerged citrus blackfly pupae (maximum of 10 pupae/leaf) were dissected to determine parasitism. Parasites were determined as being either *A. hesperidum* or *E. opulenta* based on the following characters: *A. hesperidum* larvae are blunt and compact; pupae are compact with little visible constrictions between the head, thorax, and abdomen. Mature pupae are black. The ovipositor does not extend beyond the tip of the abdomen. *E. opulenta* larvae are elongate with a tapering posterior. Pupae are elongate and narrow with definite constrictions between the head, thorax, and abdomen. Mature pupae are brown with a lighter colored thorax and front portion of the abdomen. The ovipositor projects beyond the tip of the abdomen. Release information and samples for each area are as follows: Wilton Manor—*A. hesperidum* (2,500) and *E. opulenta* (400) were released 7 April, 27 April, and 18 May. Dispersal survey samples (41) were collected 8-10 November within a 1.6 km<sup>2</sup> area. Two additional samples were taken ca. 3.7 km west of the release site (Fig. 1a). Melrose Park—*A. hesperidum* (3,400) was released 7, 8, and 27 April, 18 May, and 8 June. *E. opulenta* (300) was released 8 June. Dispersal samples (25) were taken 25 September within a 1.6 km<sup>2</sup> area around the release sites (Fig. 1b). Coconut Creek—*A. hesperidum* (5,000) and *E. opulenta* (500) were both released 22 June, and 21 July. Dispersal samples (45) were collected 7-8 March 1977 within an area of ca. 1.6 km<sup>2</sup> around the release site (Fig. 1c).

#### RESULTS AND DISCUSSION

Wilton Manor—*A. hesperidum* was recovered in 25 of 41 samples within the 1.6 km<sup>2</sup> area and in 1 of 2 samples ca. 3.7 km west of the release site. *E. opulenta* was recovered at the release site and in 7 samples outside the release site. Greatest distance for dispersal of *A. hesperidum* within this area was ca. 3.7 km. This dispersal occurred within 6-7 months after parasite releases. Melrose Park—*A. hesperidum* was recovered in 17 of 25 samples. The greatest distance for dispersal of *A. hesperidum* within this area was 0.8 km within 5 months of release. Living *E. opulenta* were not recovered in this area, but we did note emergence holes in citrus blackfly pupae smaller than those made by *A. hesperidum*. The observed presence of yellow meconium within the blackfly pupae was also indicative of *E. opulenta* (Smith et al. 1964). Coconut Creek—*A. hesperidum* was noted in 43 of 45 samples. Greatest distance for dispersal of *A. hesperidum* in this area was

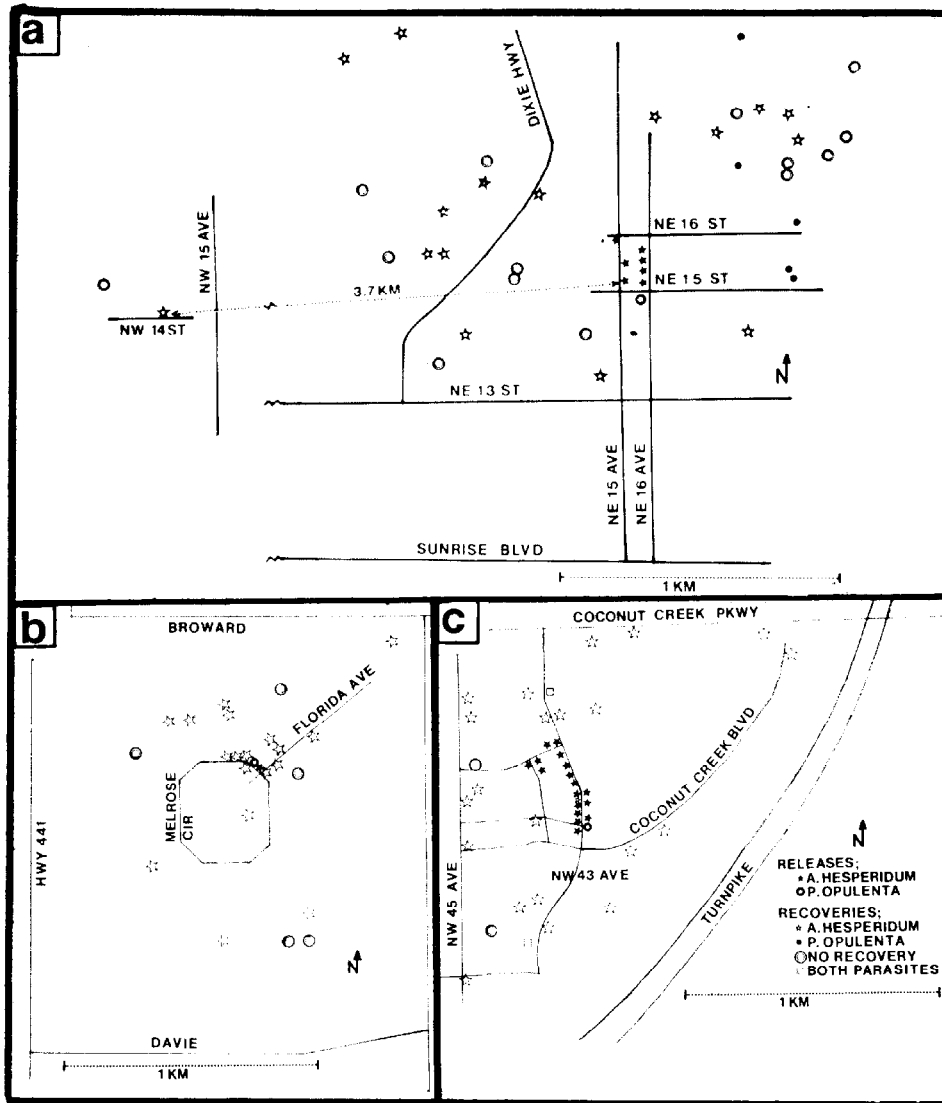


Fig. 1. Areas surveyed for dispersal of *Amitus hesperidum* and *Encarsia opulenta*. a) Wilton Manor, b) Melrose Park, c) Coconut Creek.

ca. 1 km within 9-10 months of release. *E. opulenta* was noted in only 2 samples in this area with the greatest distance being ca. 0.6 km.

Although these dispersal studies are limited, results in all 3 areas were comparable. Citrus blackfly appears to be able to complete 3.6-3.8 generations/year in south Florida (Dowell et al. 1981). Our samples were taken at a time when only ca. 2 generations of parasites could have developed in Wilton Manor and Melrose Park, and ca. 3 generations in Coconut Creek. Consistent recoveries of parasites in areas surrounding release sites plus the recovery of *A. hesperidum* at 3.7 km from the nearest release site in Wilton Manor demonstrates that citrus blackfly parasites dispersed from release points in an urban environment. Prior to our finding that *A. hesperidum* and *E. opulenta* disperse so readily, there had been some speculation that these

parasites would disperse slowly from tree to tree or from one area to another. It is also of interest that a high percentage of recoveries came from Coconut Creek where there was time for an additional generation to develop.

We were unable to obtain additional information on dispersal after late 1976 in Wilton Manor and Melrose Park and other release areas, as personnel from regulatory agencies began to disperse parasites by moving citrus leaves bearing parasitized citrus blackfly pupae throughout the infested area. This procedure was withheld from the Coconut Creek area until we had an opportunity to survey that area in March 1977.

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