THE STATUS OF *BEMISIA TABACI* (HOM. : ALEYRODIDAE),
*TRIALEURODES VAPORARIORUM* (HOM. : ALEYRODIDAE)
AND THEIR NATURAL ENEMIES IN CRETE

A. A. KIRK (1), L. A. LACEY (1), N. RODITAKIS (2) & J. K. BROWN (3)

(1) European Biological Control Laboratory,
USDA/ARS, B.P.4168, Montpellier 34092, Cedex 5, France
(2) Plant Protection Institute,
P.O. Box 1802, Iraklion, Greece
(3) The University of Arizona,
Tucson, Arizona 85721, U.S.A.

The non «B» biotype of *Bemisia tabaci* (Gennadius) is recorded for the first time in Crete in 1992, in the north east and south east of the island. *Trialeurodes vaporariorum* (Westwood) is the predominant whitefly on plants in the north and west of the island. Three surveys of Crete were made in 1992 and 1993 for natural enemies of *B. tabaci* and *T. vaporariorum* and resulted in the collection of 4 species of *Encarsia*, (plus a number of species that are unidentifiable at this time), an *Eretmocerus* sp. (unidentifiable at this time) and a fungal pathogen, *Paecilomyces farinosus* (Dickson Ex Fries) Brown & Smith. *Encarsia adrianae* was identified from *T. vaporariorum*; which constitutes its most westerly distribution point and a new host record respectively. *B. tabaci* and *T. vaporariorum* were found on horticultural crops, ornamentals and weeds. Populations of both whitefly species were severely depleted on field hosts throughout the island during the winter of 1992/93. Climatic constraints, competition with *T. vaporariorum* in otherwise suitable niches, effective natural enemies and an observed low level of polyphagy may explain the present limited distribution of the non «B» biotype of *B. tabaci* in Crete.


Crete is situated in the Mediterranean Sea (Lat : 35 N; Long : 25 E), 200 km south of Athens and 250 km north of the Libyan coast. Habitats are many and varied, ranging from semi-alpine (2450 m) in the central mountain range, to semi-arid on the southern coast.

The production of early vegetables and fruit accounts for 40 % of the total Cretan economy. Much of the horticulture is practised under glass or in plastic tunnels totalling more than 20,000 ha. Major glasshouse crops are cucumbers, eggplant, tomatoes, peppers and melons and are heavily treated with pesticides.

*Bemisia tabaci* is recorded from mainland Greece (Mound & Halsey, 1978), Turkey (Segonca, 1975, 1982), southern Italy (Viggiani & Battaglia, 1983), Spain (Mound & Halsey, 1978), Egypt (Hafez, *et al.*, 1983) and Israel (Gerling, *et al.*, 1980).

Losses due to the « B » biotype of *B. tabaci* in California, Texas and Florida were put at about one billion $US in 1992 (Coppedge, pers. comm.). The « B » biotype of *Bemisia
*tabaci* is extremely polyphagous, with more than 900 host plants recorded (Cock, 1986), and appears to be resistant to many currently applied pesticides. As a result a five year US national programme of basic and applied research aimed at the control of *B. tabaci* was begun in 1991.

During the past 24 months extensive exploration for natural enemies of *B. tabaci* has been conducted by the European Biological Control Laboratory (EBCL), Montpellier, France, in Europe, the Middle East and western Asia. Crete was included in the survey program due to its extensive horticultural industry and unique location. Despite extensive exchange of plant material, *B. tabaci* had not been recorded from Crete.

This paper presents evidence obtained during collection trips made to Crete in June and November 1992, and May 1993, that *B. tabaci* does exist in Crete under greenhouse and field conditions but that it is not the «B» biotype. It also relates the status and distribution of *B. tabaci* to the presence of native predators, parasitoids, pathogens and the presence of mixed populations of *B. tabaci* and *T. vaporariorum*.

**METHODS AND MATERIALS**

**COLLECTIONS**

An extensive survey of a broad diversity of crops was conducted in glasshouses, plastic tunnels in urban settings and open fields at eight main sites in Crete during June and November 1992, and May 1993 (table 1). Plant leaves carrying parasitized Aleyrodidae nymphs were sent to the EBCL quarantine in France; the Animal Plant Health Inspection Service (APHIS) quarantine at Mission, Texas and the Agricultural Research Service quarantines at Stoneville, Mississippi and Newark, Delaware.

**EMERGENCE AND IDENTIFICATION OF MATERIAL**

Whitefly nymphs were treated and slides were prepared using a modified form of Martin's (1987) technique. These along with nymphs still attached to leaves were sent to Mr S. Nakahara (Systematic Entomology Laboratory, USDA, Beltsville, Maryland) for confirmation of identification.

Insect parasitoids reared from whitefly hosts, and predators were sent to Drs. M. E. Schauff, and R. D. Gordon, SEL, respectively for identification and deposited at Taxonomic Services Unit, SEL, USDA/ARS, Beltsville Agricultural Research Center, Beltsville, Maryland 20705, USA (References: 92-11163, 92-7450, 93-5696 and 93-3724).

**Pathogens**

During the first collection in June 1992, conditions were dry because rain had not fallen for several weeks. Under such conditions entomopathogenic fungi are rarely found in *B. tabaci*. The humidity in an eggplant crop inside an abandoned greenhouse on the southern side of the island, however, was found to be quite high. In addition to sooty mold normally observed on leaves and Aleyrodidae nymphs when there is an excess of honeydew, a high proportion of nymphs covered with a powdery white fungus were found. These nymphs were hand carried to EBCL in Montpellier. Unlike nymphs that were observed elsewhere infected by *Paecilomyces* species, these appeared to have been smothered by the fungus rather than invaded by it. The fungus was not found in the second round of collections in November 1992. It was isolated onto artificial medium (SDAY with chloramphenicol). Cultures were subsequently hand carried to Dr. R. Samson of the Centraalbureau voor Schimmelcultures, Baarn, The Netherlands for identification.