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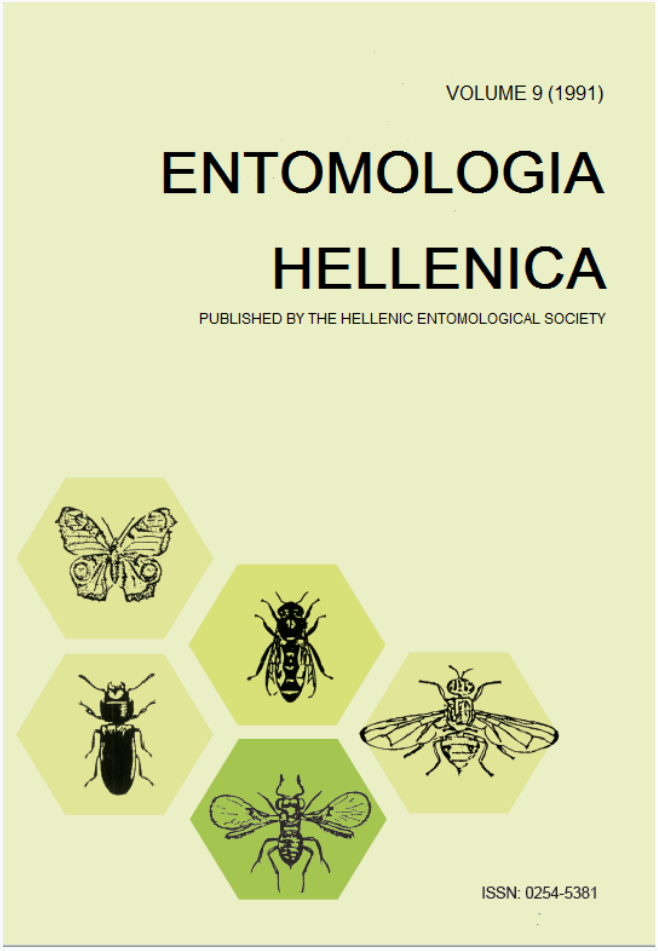

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First Record of *Frankliniella occidentalis* in Greece[1]

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The Western Flower Thrips (WFT), *Frankliniella occidentalis* Pergande (Thysanoptera: Thripidae), is a north american species. During the decades of 1970 and 1980 it spread to Europe and to other countries of the world. It was first found in Hawaii in 1972, in New Zealand in 1973, in South Korea in 1974, in Peru in 1977, in the Netherlands in 1983, in Denmark in 1985, in Germany, England, Canada, Japan, South Africa in 1986, and in France, Finland, Hungary, Spain, Switzerland in 1987 (Brodsgaard 1988, 1989, Krause 1987, Mantel & de Vrie 1988 a, b., Palmer 1989 b).

The WFT was first recorded in Greece on greenhouse sweet pepper in the area of Ierapetra, Crete, in the early February of 1988. The identification of the insect was done by the International Institute of Entomology (IIE). In the following year it spread in many greenhouse plants in the same area and all over Crete within the next two years, where it became one of the most important pests. Eversince the insect has been attacking many outdoor crops, such as beans, grape berries, strawberries, carnation etc and it has been found in other areas in continental Greece. There is speculation that the WFT was introduced to Crete with potted or cut flower plants.

The population of the WFT on greenhouse plants was found elevated in samplings done on greenhouse sweet pepper in 1988. Twelve random samplings of leaves and flowers, four from each, were examined. The samples were washed in the field with ethanol and collected in a bottle. Four sticky yellow plastic sheets (10 × 10 cm) were set up in the same greenhouse and kept for 48 hours. Examination of the samples and sheets indicated that 96,8% of the adults belonged to WFT. On the leaves there were found 531 ± 162.4 nymphs and adults, on the flowers 8 ± 3.7 and on the traps 265 ± 42.9 adults.

The adults of WFT are 2-3 mm long usually brown in color. They are rapidly dispersed to great distances and live mainly in the flower heads feeding on pollen. The males are usually smaller and darker than the females. The eggs are laid in the parenchyma of leaves, flower petals and fruits by a serrate ovipositor. There are two larval stages, a prenymphal and a nymphal stage. The two last stages (prenymphal and nymphal) are immobile and do not feed. They are usually found in the ground. Its life cycle lasts 44 days at 15°C, 21 at 20°C and 14 at 30°C. The longevity of females was found to be 70, 60 and 30 days at 15, 20 and 30°C respectively. The preoviposition period was 10 days at 15°C and three at 20 and 30°C. The number of eggs laid was closely related to the temperature and the host plant. The fecundity was 40 and 300 eggs per female at 15°C on radishes and chrysanthemum, 65 and 100 at 20°C on radish and bean respectively (Bryan and Smith 1956, Trichilo and Leight 1988).

The mode of reproduction of WFT has not been investigated well. According to Brodsgaard (1989) the females start reproducing without the presence of males and the sex ratio of progeny was about 1 male: 6 females. Our observations has shown that the sex ratio was 1 male: 9 females on greenhouse cucumbers and melons in the spring.

The WFT has a great variety of host plants (219) including cultivated and weed species such as cotton, vines, glasshouse plants, bulbous plants, apple trees, cacti etc. (Boehmer 1989, Brodsgaard 1989, Mantel and de Vrie 1988 a, b, Palmer 1989 a, b). Characteristic symptoms of the insect activity are the silvering or browning of the underside of leaves, leaf and fruit deformities. A safe identification can only be carried out in the laboratory. The main symptoms of heavily attacked plants by WFT that we observed were the yellowish folliage, necrotic spots on leaves, leaf and fruit deformities and scabs on fruits. Most of the crop losses were observed on sweet peppers (60-80% fruit scab), cucumber (long fruit varieties; yellowing of leaves, scabs on fruits and deformities 80-90%),

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carnations (flower discoloration 60-90%), roses (flower abnormal openning 60-80%), zerbera (flower abnormalities and discoloration 50-90%) and grape berries (fruit scab 40-60%).

According to Sakimura (1972) there are three genetic variants; the light, intermediate and dark brown form. Presently the light and intermediate forms have been found in Europe while the dark one is rare (Mantel & de Vrie 1988 b). In Crete we found the first two forms.

The mechanical damage of leaves and fruits caused by the ovipositor of WFT has been associated with fungal and bacterial disease outbreaks (Bailey 1935). An outbreak of the bacterium *Pseudomonas viridiflava* (Burkholder) Dowson on the leaves of melon and cucumber, heavily attacked by WFT, has been recorded in Crete during the last two years (Goumas and Roditakis, unpublished data). Moreover, WFT is the predominant vector of TSWV (Tomato Spotted Wilt Virus) (Cho *et al.* 1989). Epidemics caused by TSWV in *Dahlia, Sinningia, Lycopersicon, Tagetes* and *Cyclamen* were assossiated with population outbreaks of WFT in commercial greenhouses in Ontario, Canada in 1985 (Allen and Broadbent 1986, Allen and Matteoni 1988). Viral infection of tomato and lettuce had been observed previously in Hawai in the 1960's (Cho *et al.* 1989). This virus has recently caused severe damage on field grown tomato, fruits and leaves, in the neighbourhood of tobacco plants in Nothern Greece (Katis and Avgelis 1991).

The biological control of *F. occidentalis* with *Amblyseius* spp. has not been succesful in many cases while its integrated control is under investigation (Brodsgaard 1989, Gillespie & Ramey 1988). A promising evidence of the effect of natural control in Crete was obtained when 12 small potted cucumber plants, heavily infested by WFT, were exposed outdoors in June for 60 days. A rapid establishment of the mirid predator *Macrolophus caliginosus* and numerous unidentified species, belonging to the genera *Nabis* and *Orius,* that controlled completely the WFT within 20-30 days, was observed. This is an indication of the possible role of beneficials for the population management of WFT.

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KEY WORDS: western flower thrips, first record, *Frankliniella occidentalis,* Thysanoptera, Thripidae, Crete, Greece.

Πρώτη αναφορά του θρίπα *Frankliniella occidentalis* στην Ελλάδα

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ΠΕΡΙΛΗΨΗ

Ο θρίπας της Καλιφόρνιας *Frankliniella occidentalis* Pergande διαπιστώθηκε για πρώτη φορά να προσβάλλει την πιπεριά θερμοκηπίου το 1988 στην Ιεράπετρα. Τα επόμενα δύο χρόνια εξαπλώθηκε σε όλες τις περιοχές θερμοκηπίων της Κρήτης προκαλώντας σοβαρές ζημιές. Εξαπλώθηκε επίσης και σε υπαίθριες καλλιέργειες κηπευτικών και ανθέων (φασολιά, κολοκυθιά, γαρυφαλλιά, ζέρμπερα, τριανταφυλλιά κλπ.), αλλά και σε γειτονικά αμπέλια.

Επειδή είναι φορέας ενός σοβαρού ιού, του κηλιδωτού μαρασμού της τομάτας (TSWV), η παρουσία του εγκυμονεί σοβαρό κίνδυνο για τις καλλιέργειες. Η έξαρση των προσβολών του βακτηρίου *Pseudomonas viridiflava* που παρατηρήθηκε στην περιοχή Μεσσαράς συνδέεται στενά με την παρουσία του θρίπα της Καλιφόρνιας. Ενας σημαντικός αριθμός ιθαγενών αρπακτικών που ανήκουν στα γένη *Macrolophus, Nabis* και *Orius* ήλεγξε αποτελεσματικά τον θρίπα την θερινή περίοδο στο ύπαιθρο σε φυτά και γλάστρες.