

## NOTE: First Record in Crete of *Hercinothrips femoralis* in Greenhouse Banana Plantations

E. Roditakis,<sup>1,\*</sup> L.A. Mound<sup>2</sup> and N.E. Roditakis<sup>1</sup>

In 2004 the banded greenhouse thrips, *Hercinothrips femoralis* (Reuter) (Thysanoptera: Thripidae), was recorded for the first time in greenhouse-grown organic banana in the area of Sitia (northeastern Crete). Banana fruits were severely damaged by the thrips infestation and a typical smoky-red discoloration of the fruit was observed. Pest control was poor using either high-pressure washing with potassium fatty acids, or commercially available thrips predators *Neoseiulus cucumeris* (Oudemans) (Acari: Phytoseiidae) and *Orius laevigatus* (Fieber) (Hemiptera: Anthocoridae). During 2005 *H. femoralis* was also found causing severe damage in conventional banana plantations in Arvi, the main banana-growing area of Crete.

**KEY WORDS:** *Hercinothrips femoralis*; banded greenhouse thrips; organic; banana; Crete; Greece.

Banded greenhouse thrips, *Hercinothrips femoralis* (Reuter) (Thysanoptera: Thripidae), is considered a cosmopolitan species (5,15,19). Originally from the African continent (11,12), *H. femoralis* is an important pest of ornamentals, greenhouse crops, sugar-beet and woody plants (8,16,17). Banded greenhouse thrips has been recorded on banana *Musa* sp. (Musaceae) in various parts of the world (5,7,13,14), although a closely related species, the banana thrips *Hercinothrips bicinctus* (Bagnall), is considered a more important banana pest (2,7,10). A smoky-red discoloration of the fruit, occasionally leading to skin cracks, has been described as a typical symptom of *H. femoralis* infestation (7).

Banana plantations on the island of Crete (southern Greece) occupy approximately 63 ha (Fig.1) and are considered a major crop in the Arvi (Vianos region) and Malia areas (data from the Banana Growers' Cooperative of Crete for the 2005–06 growing season). Locally grown bananas (varieties 'Giant Gavendish', 'Grand Nain' and 'Williams') are considered a high-value crop due to their superior quality and high market price (personal communication: G.

Grammatikaki, T.E.I. of Crete). Banana plants are cultivated mainly in tall plastic greenhouses and most of the growers practice conventional pest management. There are currently 4.8 ha of organic banana plantations in Crete, representing ~8% of the total area, with increasing interest in organic farming.

In September 2004, samples of damaged banana fruits originating from an organic banana greenhouse (0.4 ha) in the area of Sitia (northeastern Crete) were examined under a stereomicroscope. The fruits had the dark red discoloration typical of thrips infestation. Dark-brown adult thrips and nymphs were collected and stored in 70% ethanol. These specimens were subsequently identified as banded greenhouse thrips, *H. femoralis*, by the second author. This is the first time that *H. femoralis* has been recorded damaging bananas in Greece. No previous record of *H. femoralis* presence or pest status in Greece was found after an extensive literature review of international (Web of Science, Scopus, CABI-Horticulture, and AGRICOLA data bases) and national (Panhellenic Entomological Conference proceedings, *Entomologia Hellenica* [Journal],

Received Feb. 15, 2006; accepted May 8, 2006; <http://www.phytoparasitica.org> posting Sept. 17, 2006.

<sup>1</sup>Plant Protection Institute of Heraklion, National Agricultural Research Foundation, 71 003 Heraklion, Greece.

\*Corresponding author [Fax: +30-2810-245858; e-mail: e-roditakis@her.forthnet.gr].

<sup>2</sup>CSIRO Entomology, GPO Box 1700, Canberra, ACT 2601 Australia.

*Benaki Chronicles* [Journal]) publications.

In this particular greenhouse, typical symptoms of *H. femoralis* infestation had been observed sporadically in past years and the infestation was controlled using banana bunch high pressure washing with potassium fatty acids. However, in 2002 and 2003, thrips infestation was significant and water washes failed to control the pest. Commercially available thrips predators – *Neosieulus cucumeris* (Oudemans) (Acari: Phytoseiidae) and *Orius laevigatus* (Fieber) (Hemiptera: Anthocoridae) – (Koppert B.V., the Netherlands) were used for thrips control. Although *Orius* sp. and *Amblyseius* sp. are referred to in the literature as potential biocontrol agents of *H. femoralis* in interior landscapes (6), the results in this particular case were poor for reasons that could not be defined. Eventually, natural pyrethrum was used to eliminate the pest.

In a survey conducted during 2005, with the assistance of the Banana Growers' Cooperative of Crete, *H. femoralis* was collected in the area of Arvi (southern Crete) in a conventional banana greenhouse. Specimens were identified using the

digital identification key ThripsID (9). Typical thrips infestation symptoms had been observed in the past 3 years by numerous banana growers. Local agronomists report that *H. femoralis* infestation must be detected at an early stage; otherwise conventional insecticides fail to control the pest, resulting in substantial crop losses. Currently organic banana growers are using blue sticky traps for pest control (approx. 60 traps per 0.1 ha), but the efficacy of this method has not yet been evaluated.

It has been demonstrated that in tropical countries the extensive use of chemical insecticides in banana crops has been associated with adverse environmental effects (1,3) and severe toxic hazards for the health of banana workers (4,18). These days the public/market demand for quality products grown with environmentally friendly methods is strongly encouraging organic farming. Resolution of pest management problems like *H. femoralis* in banana plantations with alternative control methods is of particular importance for the promotion and adoption of such cropping systems.

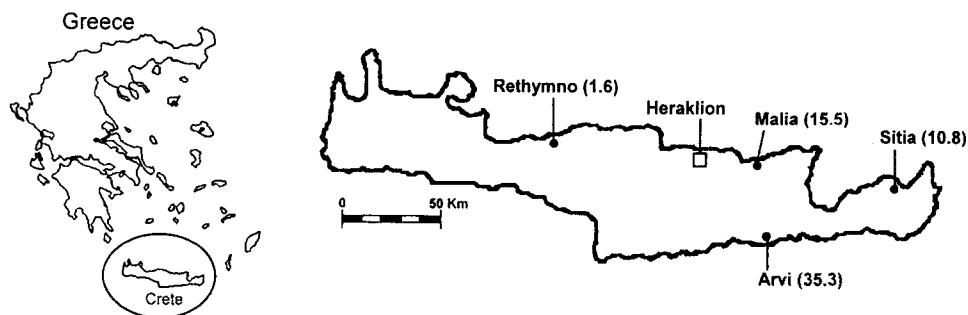


Fig. 1. Banana plantations on the island of Crete according to the Banana Growers' Cooperative of Crete for the 2005–06 growing season. Cultivated hectares in the respective region in parentheses. Heraklion City as a gray square. Map on the left: the island of Crete in relation to mainland Greece.

#### ACKNOWLEDGMENTS

We would like to thank Mr. G. Dretakis, banana grower; Mr. C. Malios, Board member of the Banana Growers' Cooperative of Crete; and Mrs. A. Christodoulaki, agronomist, for their assistance. We would also like to thank anonymous reviewers for their valuable comments.

## REFERENCES

1. Castillo, L.E., Ruepert, C. and Solis, E. (2000) Pesticide residues in the aquatic environment of banana plantation: Areas in the North Atlantic zone of Costa Rica. *Environ. Toxicol. Chem.* 19:1942-1950.
2. Childers, C.C. (1997) Feeding and oviposition injuries to plants. in: Lewis, T. [Ed.] *Thrips as Crop Pests*. CABI, Oxon, UK. pp. 505-537.
3. Diaz-Diaz, R., Loague, K. and Garcia-Hernandez, J.E. (1998) Leaching potentials of four pesticides used for bananas in the Canary Islands. *J. Environ. Qual.* 27:562-572.
4. Henriques, W., Jeffers, R.D., Lacher, T.E. Jr. and Kendall, R.J. (1997) Agrochemical use on banana plantations in Latin America: Perspectives on ecological risk. *Environ. Toxicol. Chem.* 16:91-99.
5. Houston, K.J., Mound, L.A. and Palmer, J.M. (1991) Two pest thrips (Thysanoptera) new to Australia, with notes on the distribution and structural variation of other species. *J. Aust. Entomol. Soc.* 30:231-232.
6. Jacobson, R.J. (1997) Integrated pest management (IPM) in glasshouses. in: Lewis, T. [Ed.] *Thrips as Crop Pests*. CABI, Oxon, UK. pp. 639-666.
7. Lewis, T. (1997) *Thrips as Crop Pests*. CABI, Oxon, UK.
8. Marullo, R. (2003) *Conoscere i Tisanotteri. Guida al Riconoscimento delle Specie Dannose alle Colture Agrarie*. Edagricole, Bologna, Italy.
9. Moritz, G., Morris, D. and Mound, L. (2001) *ThripsID - Pest Thrips of the World*. ACIAR and CSIRO Publishing, Collingwood, Vict., Australia.
10. Morton, J. (1987) Banana. in: Morton, J. [Ed.] *Fruits of Warm Climates*. Florida Flair Books, Miami, FL, USA. pp. 29-46.
11. Mound, L.A. (1966) The genus *Hercinothrips* (Thysanoptera) with one new species. *Ann. Mag. Nat. Hist.* 13:243-247.
12. Pintureau, B., Lassablière, F., Khatchadourian, C. and Daumal, J. (1999) Parasitoïdes oophages et symbiotes de deux thrips européens. [Eggs parasitoids and symbionts of two European thrips.] *Ann. Soc. Entomol. Fr.* 35:416-420 (French, with English abstr.).
13. Rey, F. (2002) Rouille argentée des bananes martiniquaises: distribution et méthode de lutte. [Silver rust of bananas in Martinique: distribution and methods of control.] *Fruits (Paris)* 57:3-10 (French, with English abstr.).
14. Simon, S. (1993) Pests of bananas in the French West Indies. *Infomusa* 2:8.
15. Tommasini, M.G. and Maini, S. (1995) *Frankliniella occidentalis* and other thrips harmful to vegetable and ornamental crops in Europe. *Wagening. Agric. Univ. Pap.* 95-1:1-42.
16. Tusnadi, C.K. and Nemstoth, K.K. (1992) A barna üvegházi tripsz (*Hercinothrips femoralis* Reuter; Thysanoptera: Thripidae) új tápnövényei Magyarországon. [New host plants of *Hercinothrips femoralis* Reuter (Thysanoptera, Thripidae) in Hungarian greenhouses.] *Növényvédelem* 28:495-499 (Hungarian, with English abstr.).
17. University of Florida. Thrips. <http://woodypest.ifas.ufl.edu/thrips.htm>
18. Wesseling, C., Keifer, M., Ahlbom, A., McConnell, R., Moon, J.-D., Rosenstock, L. et al. (2002) Long-term neurobehavioral effects of mild poisonings with organophosphate and n-methyl carbamate pesticides among banana workers. *Int. J. Occup. Med. Environ. Health* 8:27-34.
19. Wilson, T.H. (1975) A monograph of the subfamily Panchaetothripinae (Thysanoptera: Thripidae). *Mem. Am. Entomol. Inst. (Gainesv.)* 23.