

DERMAPTERA FAUNA OF THE ECOLOGICALLY MANAGED CHERRY ORCHARDS IN WESTERN TURKEY

Serdar Tezcan* and Petr Kocarek**

* Department of Plant Protection, Faculty of Agriculture, Ege University, 35100 Bornova, Izmir /TURKEY. E-mail: serdar.tezcan@ege.edu.tr

** Department of Biology and Ecology, University of Ostrava, Chittussiho 10, CZ-710 00 Ostrava / CZECH REPUBLIC. E-mail: petr.kocarek@osu.cz

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ABSTRACT: Four species, *Forficula auricularia* Linnaeus, 1758, *F. lurida* Fischer, 1853, *F. smyrnensis* Serville, 1839 and *Guanchia hincksi* (Burr, 1947), belonging to family Forficulidae (Dermaptera) were recorded in ecologically managed cherry orchards (*Cerasus avium* (L.)) located in Muradiye (Manisa) and Oren (Izmir), western Turkey. Specimens were collected mainly by fermenting bait traps and pitfall traps, and beating of the vegetation. *Forficula smyrnensis* was the most abundant species. It was recorded for the first time Manisa province, and *Guanchia hincksi* was recorded for the first time from Izmir province.

KEY WORDS: *Forficula*, *Guanchia*, *Cerasus avium*, Forficulidae, Dermaptera, fauna, Turkey.

To prevent the side effects of conventional agriculture to human health and environment, ecological agriculture applications have been initiated all over the world. In the last decade, its importance improved in Turkey and the application of ecological cherry production methods has been studied in a project in the important cherry production areas of western Turkey, during the years 1998-2000 (Tezcan et al., 2001). In this project, different types of traps and different collection methods were used in both the monitoring and the control of insects in these orchards. Among different insect groups, Dermaptera species collected by diverse methods were evaluated in this study.

MATERIAL AND METHODS

Material were collected in two ecologically managed cherry orchards in western Turkey: Muradiye (Manisa-Central province, 38°39'N 27°20'E) having 550 cherry trees and Oren (Izmir-Kemalpaşa, 38°28'N 27°36'E) having 160 trees (Tezcan et al., 2001). The insects were collected in 1998-1999. Sampling methods comprised A: beating (50 trees were beaten in each orchard) B: pitfall traps and C: fermenting bait traps were used.

Method A was repeated at one-week intervals. In the case of B, a total of 3 pitfall traps were placed in each orchard. Pitfall traps consisted of 250 ml cups buried in the soil in such a way that the lip of the trap would be at ground level. They were half filled with ethylen glycol and water mixture as 1:1 ratio. Traps were emptied in two weeks intervals from the beginning of April up to the end of October in 1998 and 1999, and in three

weeks intervals from the beginning of November 1998 to the end of March 1999. In the case of C, a total of 9 fermenting bait traps were hung to the branches of trees in each orchard. The traps were charged with a mixture containing wine (100 ml), water (900 ml), sugar (25 gr) and vinegar (25 ml) (Ulu et al., 1995). The traps were checked for the presence of insects at two-weeks intervals starting from mid-April until the end of December.

All insects were collected by the first author and were determined by the second author. All the material mentioned in this work is deposited in the collection of the Prof. Dr. Niyazi Lodos Entomological Museum (LEMT), Plant Protection Department, Faculty of Agriculture, Ege University, Izmir, Turkey and in the collection of P. Kocarek, Ostrava, Czech Republic.

RESULTS AND DISCUSSION

During the course of this study, a total of four species of Forficulidae were captured in the ecologically managed cherry orchards (*Cerasus avium* (L.)) located in Muradiye (Manisa) and Oren (Izmir), western Turkey (Table 1).

As shown in Table 1, three species of Forficulidae were recorded in Muradiye and in Oren, the number of recorded species was four. Three species were recorded in all two study orchards.

Among those, one species, *Forficula smyrnensis* Serville, 1839 was recorded for the first time from Manisa province, while one species, *Guanchia hincksi* (Burr, 1947) was recorded for the first time from Izmir province. 172 specimens (82.30%) were recorded in Muradiye as well as 37 specimens (17.70%) from Oren.

The total number of the collected specimens was 209; 50 of which were collected in 1998, and 159 in 1999. Among *Forficula*, *F. smyrnensis* was the dominant species followed by *F. lurida* Fischer, 1853 and *F. auricularia* Linnaeus, 1758 with percent dominance values of 64.59; 18.18 and 16.27%, respectively. *Guanchia hincksi* was recorded in Oren with two specimens (0.96%) in this study.

Using fermenting bait traps 140 specimens (66.99%) belonging to three species were collected, 10 specimens (4.78%) belonging to three species were collected by pitfall traps, and 59 specimens (28.23%) belonging to four species were collected by beating vegetation. Collection by fermenting bait traps were the most effective method for monitoring especially for *F. smyrnensis* in cherry orchards.

The number of specimens and species during two years' period sampling are given in Figure 1.

Among those species, *F. auricularia* has been reported from conventional or integrated cherry orchards up to now by recent studies conducted by Ulu et al. (1995), Ulusoy et al. (1999) and Özder (1999). Dealing with insect fauna of ecologically managed cherry orchards in Turkey there was no record of Dermaptera.

Maher & Logan (2007) found that the European earwigs, *F. auricularia* are very sensitive to broad-spectrum insecticides and diazinon residues can kill earwigs for up to 17 days after spraying. Relatively high abundance of Dermaptera in ecologically managed cherry orchards probably depends on exclusion of any insecticides in these agroecosystems.

F. auricularia is one of the common and widely distributed species in Turkey, eurytopic with a strong tendency to synanthropy. The biology of this species is well known for a long time (see e.g. Behura, 1956). It has varied hosts consisting of plant and animal material. It is noted as both pest on cultural plants and also beneficial due to its carnivorous feeding habits. It is mentioned as predator on the larvae and eggs of some insect pests [e.g. *Chilo suppressalis* Walker, 1863 (Lepidoptera: Crambidae) (Moderraes Awal, 1997), *Cydia pomonella* (Linnaeus, 1758) (Lepidoptera: Tortricidae) (Glen, 1975), *Eriosoma lanigerum* (Hausmann, 1802) (Homoptera: Aphididae) (Helsen et al., 1998) or scale insects (Homoptera: Diaspididae) (Maher & Logan, 2007)]. The biology of *F. smyrnensis*, the most abundant species in this study, is less well known (Albouy & Caussanel, 1990; Kinal, 2006), but we can predict the similar feeding habits. Haas & Henderickx (2002) suggested that there are herbivorous feeding habits of the species, but their assumption is based on alimentary tract dissection of the only one specimen. *F. lurida* was observed as pest on many cultural plants (Moderraes Awal, 1997), but this finding contrasts with the results of Haas & Henderickx (2002) who suggested the carnivorous feeding habit is based on cuticle fragments of arthropods found in the gut contents of dissected of two specimens. The biology of *Guanchia hincksi*, species widely distributed through Turkey, is almost unknown due to small size and inconspicuous life. The feeding biology of these species needs further study.

Earwigs from the family Forficulidae are known to damage some cultural plants, but also have beneficial potential, because they are predators on some insect pests. The ecological function of earwigs in especially managed orchards is unknown, when according to current knowledge we can not determine the rate of their significance as predators of pests versus their own harmfulness. It is necessary to perform further study and experiment to uncover their importance in farming practise.

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Table 1. List of Forficulidae species collected in ecologically managed cherry orchards in 1998 and 1999: MD=Muradiye, OR=Oren; A: beating of vegetation, B: pitfall trap, C: fermenting bait trap.

Taxa	1998		1999		Collection methods			Sum	Dominance value (%)
	MD	OR	MD	OR	A	B	C		
<i>Forficula auricularia</i> Linnaeus, 1758	7	6	17	4	18	3	13	34	16.27
<i>Forficula lurida</i> Fischer, 1853	11	13	8	6	33	3	2	38	18.18
<i>Forficula smyrnensis</i> Serville, 1839 *	9	3	120	3	6	4	125	135	64.59
<i>Guanchia hincksi</i> (Burr, 1947) **	0	1	0	1	2	0	0	2	0.96
Total	27	23	145	14	59	10	140	209	100.00
%					28.23	4.78	66.99	100.00	
Number of species	3	4	3	4	4	3	3	3	

* The first record from Manisa province, ** the first record from Izmir province.

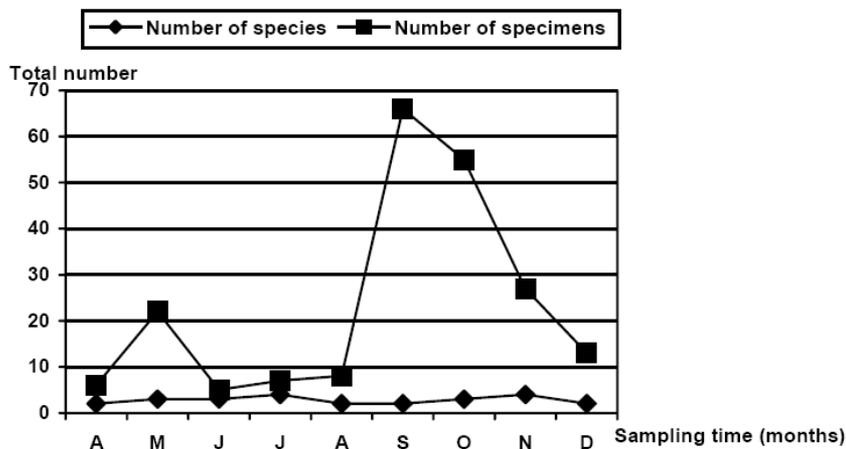


Figure 1. Total number of specimens and species during sampling period (A to D: April to December).