65 години
Аграрен университет - Пловдив, Научни трудове, т. LV, кн. 2, 2010 г.
Юбилейна научна конференция с международно участие
Традиции и предизвикателства пред аграрното образование, наука и бизнес
Agricultural University - Plovdiv, Scientific Works, vol. LV, book 2, 2010
Jubilee Scientific Conference with International Participation
Traditions and Challenges of Agricultural Education, Science and Business

ПАРАЗИТОИДИ ПО ОБИКНОВЕНАТА КРУШОВА ЛИСТНА БЪЛХА *CACOPSYLLA PYRI* L. (PSYLLIDAE) В БЪЛГАРИЯ – МОРФОЛОГИЯ И БИОЛОГИЯ

МАЗЕН БУФАУР, ВИЛИ ХАРИЗАНОВА, АТАНАСКА СТОЕВА

PARASITOIDS OF THE PEAR SUCKER *CACOPSYLLA PYRI* L. (PSYLLIDAE) IN BULGARIA – MORPHOLOGY AND BIOLOGY

MAZEN BUFAUR[1], VILI HARIZANOVA[2], ATANASKA STOEVA[2]
[1] Al-Swaida Agricultural Research Center, Syria
[2]Agricultural university – Plovdiv, 12 Mendellev Blvd., Plovdiv 4000, Bulgaria

Abstract

The pear sucker *Cacopsylla pyri* L. is a key pest of pear in Europe, including Bulgaria. Chemical control is usually not effective enough as the pests has become resistant to most of the registered insecticides. The need of alternative solutions drew researchers' attention on the regulating abilities of its natural enemies – predators and parasitoids. The aim of the present study was to search for parasitoid species and establish their potential as bio-control agents. In 2005-2008 in the central region of South Bulgaria two parasitoid on the nymphs *P. psylla* were found – *Trechnites psyllae* (Ruschka, 1923), *Prionomitus mitratus* (Dalman, 1820), and a hyperparasitoid *Pachyneuron muscarum* (Linaneus, 1758) (Pteromalidae, Pteromalinae). At 24°C the development time for *T. psyllae* from egg to adult was 21.96 and 19.6 days for females and males respectively and at 28°C - 14.81 and 13.35 respectively. The development time for *P. mitratus* at 24°C for females and males was 23.45 and 21.93 respectively. For both parasitoids females develop slower than males. Data is given about the morphology of the parasitoids.

Key words: biological control, pear sucker, parasitoids, pears, *Trechnites psyllae*, *Prionomitus mitratus*

INTRODUCTION

The pear sucker *Cacopsylla pyri* L. is a key pest of pear in Europe, including Bulgaria. It causes direct damage by sucking plant juices from buds, leaves, shoots and excreting "honey dew" on which saprophytic fungi develop. It also causes indirect damage by transmitting phytoplasma (Jensen et al., 1964). Chemical control is usually not effective enough as the pest has become resistant to most of

the registered insecticides. The need of alternative solutions drew researchers' attention to the regulating abilities of its natural enemies – predators and parasitoids. Parasitoids of *C. pyri* were reported from Poland: *T. psyllae, P. mitratus, Pachyneuron concolor, Psyllaephagus procerus* and *Secticlava cleone* (Jarowska et al., 1998; Olszak et al.,1999); France: *P.mitratus* and *T. psyllae*, with the hyperparasitoids *Dendrocerus psyllarum*, *Dilyta subclavata, Syrpophagus mamitus*, *Pachyneuron muscarum* and *P. aphidis*, (Atger, 1975; Armand et al.,1990; Lyossoufi et al., 1992); Switzerland: *P. mitratus* (Wille, 1950); Spain: *T. psyllae* (Avilla et al., 1992); Italy: *P. mitratus* (Priore, 1991). In Germany the parasitoids *P. mitratus* and *P.tiliaris* are reported with the hyperparasitoid *P. muscarum* (Novak, 1994). In Turkey Erler (2004) found *T. psyllae* (Encyrtidae), and two hyperparasitoids: *S. mamitus* and *Pachyneuron aphidis*. The aim of the present study was to search for parasitoid species in Bulgaria and evaluate their potential as bio-control agents.

MATERIAL AND METHODS

Pear orchards in the region of Plovdiv, South Bulgaria, were surveyed in 2005-2008 for the presence of parasitoids of *C. pyri* from March to October. Adults were collected using beating tray. Leaves infested with nymphs were also collected and kept in plastic cages in the lab until emergence of psyllids and parasitoids. The dynamics of population density of the adult parasitoids was studied in unsprayed pear orchard at the experimental field of the Agricultural university-Plovdiv. At weekly intervals from March to October 50 beatings were made on beating tray and the adult parasitoids were counted and released back. The rate of parasitism was evaluated by using leaf samples of 100 leaves infested by nymphs of the pear sucker taken from the same unsprayed pear trees. The psyllid nymphs were counted, the leaves were placed in plastic cages and after that all the emerging adult parasitoids were counted too. The duration of life cycle was studied under lab conditions in plastic cages. Adults were released to lay eggs for one day on nymphs of *C. pyri* on the leaves of small branches, placed in small containers with water to keep them fresh. The emergence of adults was recorded.

RESULTS AND DISCUSSION

In the region of Plovdiv in 2005-2008 two parasitoids on the nymphs of *C. pyri* were found – *Trechnites psyllae* (Ruschka, 1923) (Encyrtidae, Encyrtidae) and *Prionomitus mitratus* (Dalman, 1820) (Encyrtidae, Encyrtidae) and one hyperparasitoid *Pachyneuron muscarum* (Linnaeus, 1758) (Pteromalidae, Pteromalinae). *P. mitratus* was reported for the first time in Bulgaria on nymphs of *Psylla pyrisuga* by Harizanov (1966).

T. psyllae and *P. mitratus* are with basic black color of the body. The pronotum is blue-green metallic. The two species could be distinguished by the color of the legs: in *T. psyllae* femur and tibia are yellow, with broad horizontal black band each, while in *P. mitratus* the first two pairs of legs are completely yellow and the hind legs are yellow with horizontal black band on the femur and the tibia. The

antennae are black for both sexes in *T. psyllae*, while in *P. mitratus* those of the females are black and those of the males are yellow, with much longer hairs (figures 1-4).

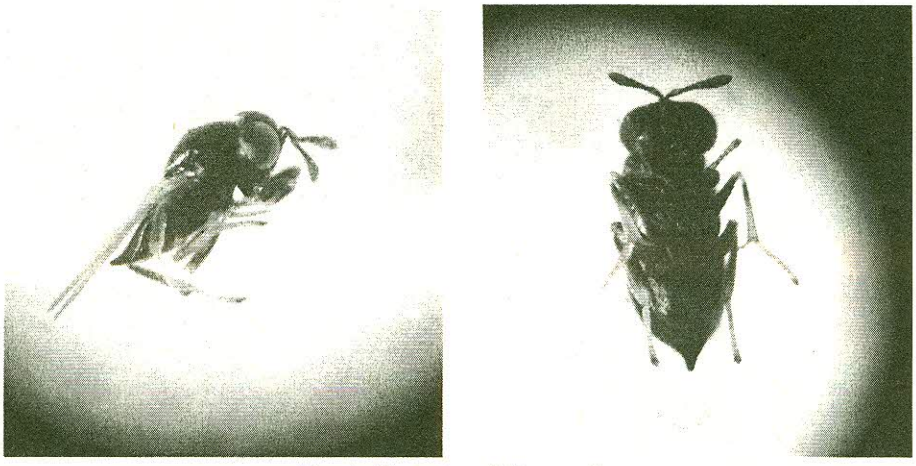

Fig. 1. Female of *T. psyllae*

Fig. 2. *Prionomitus mitratus* – male

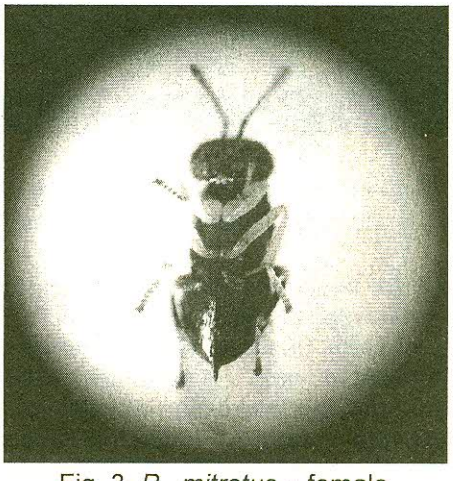

Fig. 3. *P. mitratus* – female

P. mitratus is bigger: body length 1.21 mm for females and 1.2 mm for males In *T. psyllae* there is significant difference in the body length between the sexes: 1.1 mm in females and 0.86 mm in males.

At temperature 24°C the development of the females of *T. psyllae* from egg to adults continues 21.96 days, and of the males – 19.6 days. At 28°C the development takes 14.81 and 13.35 days respectively. At 24°C the females of *P. mitratus* complete development for 23.45 days, and the males – for 21.93 days. The development for both species takes longer for the females compared to the males.

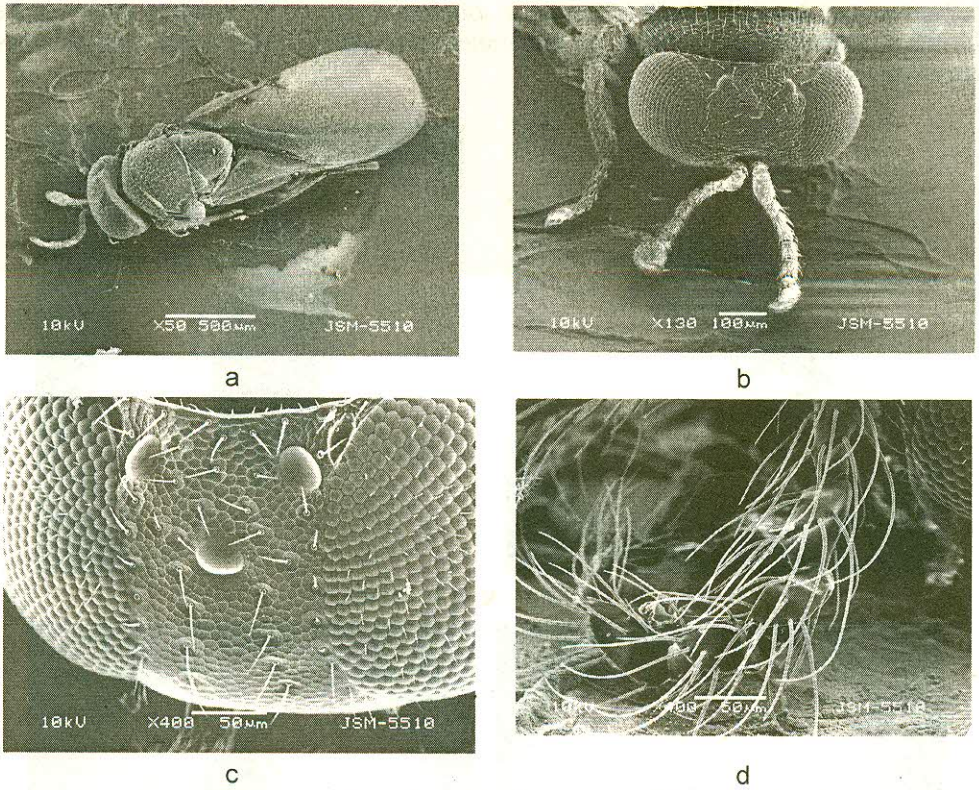

Fig. 4. Electron stereoscope photos of: a – adult of *T. psyllae*; b – head of *T. psyllae*; c- vertex of *P. mitratus*; d – antennae of male of *P. mitratus*

Under field conditions the two species have at least two generations per year and overwinter as developed larvae in the dead nymphs of the host. During the years of study adults of the parasitoids were captured from early spring (13 April 2007) to late autumn - 8 November 2006).

In 2006 the population denstity of both species was low in June, July and August varying from 0.1 to 0.6 individuals per 10 beatings for *T. psyllae* and 0.1 to 0.7 for *P.mitratus* fig. 5). In September until mid-October the population density increased and reached a maximum on 11 October for *T. psyllae* (3.9 adults/10 beatings) and on 30 September for *P. mitratus* (2.7 adults/10 beatings). During almost the whole period the population density of *T. psyllae* was higher than the one of *P. mitratus* (fig. 5). In general the dynamics of the population density of the two parasitoids follows the one of the nymphs of *C. pyri*. The peaks of the dynamics of parasitism follow the peaks of the population desnity of the nymphs 4-5 instar of the host.

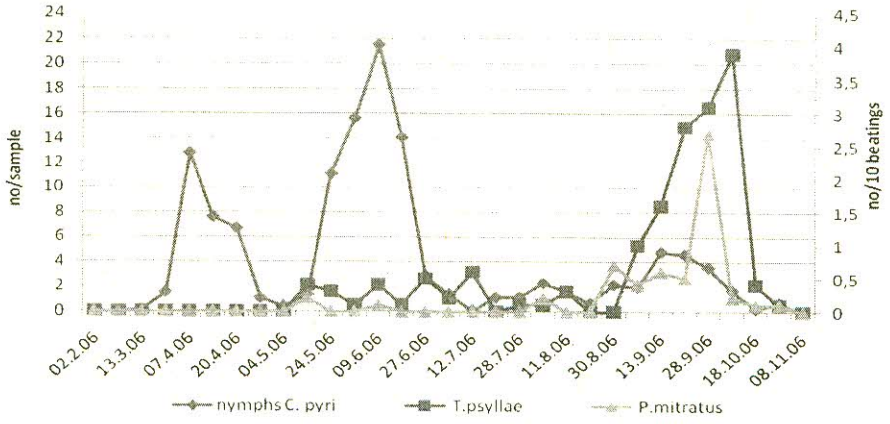

Fig. 5. Dynamics of the population density of the adults of *T. psyllae* and *P. mitratus* in unsprayed pear orchards in the region of Plovdiv in 2006

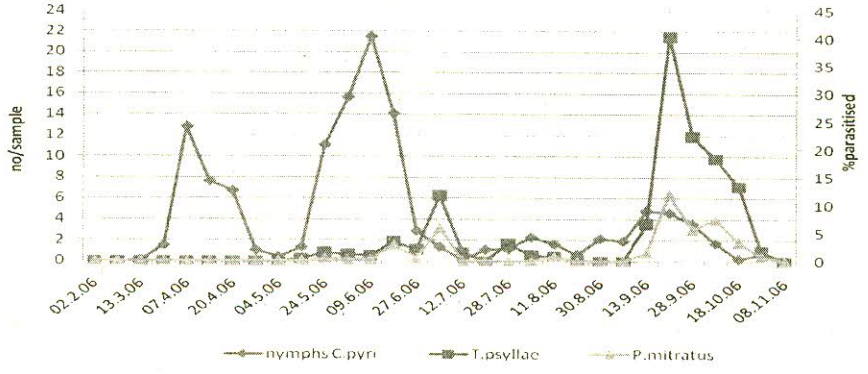

Fig.6. Rate of parasitism on *T. psyllae* and *P. mitratus* on nymphs 4-5 larval istar of pear sucker in the region of Plovdiv in 2006

In June the peaks for the two parasitoids were recorded 25-30 days after the peak of the population density of the psyllid nymphs, while at the end of August when the average daily temperatures were higher, the development of the parasitoids was shorter and the peaks in their population density was recorded only 5-7 days after the one of the host The first parasitized nymphs in 2006 were found in mid-May at the same time for the two parasitoids. The rate of parasitism was higher for *T. psyllae* and varied from 0.1 to 41%. It is particularly high at the end of September (fig. 6). As a result of the parasitism especially of *T. psyllae* a gradual decrease of the population density of *C. pyri* after June was observed. According to Armand et al. (1990) the increase of the population density of the parasitoids and the rate of parasitism in autumn is due to the fact that for the two

species the second generation is more numerous. The hyperparasitoid *P. muscarum* was found in few occasions – less than 1% parasitism, and is not influencing significantly the rate of parasitism of the two primary parasitoids. The rate of natural parasitism observed in our study was not sufficient to regulate the population density of *C. pyri* but is valuable supplement to the complex of predatory insects.

REFERENCES

1. Харизанов, А. 1966а. Паразити и хищници по листни бълхи в България. ПРИРОДА, издание на българската академия на науките, София, книга 3: 91-98.

2. Armand, E; Lyoussoufi, A; Faivre d'Arcier, F; Rieux, R. 1990. Inter-relationships between the pear psylla Psylla pyri (L.) populations (Hom., Psyllidae) and its parasitoid complex in a sprayed orchard of southeastern France, Journal of Applied Entomology [J. APPL. ENTOMOL.]. Vol. 110, no. 3, pp. 242-252.

3. Armand, E., Lyoussoufi, A., Rieux, R., Faivre d'Arcier, F., 1992. Interrelationships between pear psylla populations and their parasitoid complex. Acta Phytopathologica et Entomologica Hungarica 27 (1-4), 1992, p. 73-76.

4. Atger, P. 1977. Le psylle du Poirier est-il un faux problem La Defenese des vegetaux 187, 310-316.

5. Avilla, J., Artigues M., Marti S., Sarasua M. J. 1992. Parasitoides de Cacopsylla pyri (L.) (= Psylla pyri (L.)) presentes en una plantación comercial de peral en Lleida no sometida a tratamientos insecticidas Bol. San. Veg. Plagas, 18: 133-138.

6. Erler, F. 2004. Natural enemies of the pear psylla (Cacopsylla pyri) in treated and untreated pear orchards in Antalya, Turkey. Phytoparasitica, 32(3): 295-304.

7. Jarowska, K., R.W. Olszak and R.Z. Zajak, 1998. Parasitation rate of the larvae of pear psylla (Cacopsylla pyri) in orchards with differing intensity of chemical control. Pomology and Floriculture, 96-100.

8. Jensen, D.D., W.H. Griggs, C.Q.Conzales & H. Schneider, 1964. Pear decline virus transmission by the pear psylla. Phytopathology 54:1346- 1351.

9. Lyossoufi, A., Armand, E., Rieux, R., D' Arcier, F.F., 1992. Population dynamics of the pear psylla (Homoptera: Psyllidae) and beneficials in a treated orchard in the south east of France. Acta Phytopathologica Entomologica Hungarica. 1992, 27:1-4, 413-417.

10. Novak, H. 1994. The influence of ant attendance on larval parasitism in hawthorn psyllids (Homoptera: Psyllidae), Journal Oecologia 99(1-2): 72-78.

12. Olszak, R.W., Jaworska, K., Zajac, R.Z., 1999. Pear sucker complex on pear in Poland – its importance, control and natural enemies. Bulletin OILB/SROP 22(7), p. 121-129.

13. Priore, R., 1991. Biological observations on the pear psyllid (Cacopsylla pyri L.) in Campania (1986-1988). Informatore Fitopatologico 41(3), p. 57-61.

15. Wille, H.P., 1950. Promotion sarb. Eidg. Tech. Hochsch. Zurich. Zurich p.113