Entomol. Croat. 2011, Vol. 15. Num. 1-4: 123-129
Proceedings of the XXII Symposium Internationale Entomofaunisticum Europae Centralis

RANDOM COLLECTION OF TRUE BUGS (HETEROPTERA) BY CSALOMON ® VARb3 FUNNEL TRAPS AT THE JAZBINA SCIENCE EDUCATION STATION IN ZAGREB

Ivana PAJAČ & Božena BARIĆ

Department for Agricultural Zoology, University of Zagreb, Faculty of Agriculture,
Svetošimunska 25, HR-10000 Zagreb, Croatia
ipajac@agr.hr

Accepted: December 19th 2011

During the growing season of 2008, Csalomon® VARb3 funnel traps were used for the monitoring of Coleoptera: Cetoniinae species. The traps were baited with synthesized scent of flowers and ornamental fruit plants. Traps varied in the color of their attractive vanes (yellow, blue and a combination of these two colors). The experiment was conducted in a mixed plum and cherry orchard at a science and educational station Jazbina in Zagreb. The orchard is surrounded by oak trees and the ground cover is dominated by native vegetation. Among the primary Cetoninae target species, a total of 108 true bugs (Heteroptera) were caught on a random basis. The traps were checked 14 times in 2008, from April 19 until August 21. A total of 40 species of Heteroptera belonging to 12 families (Tingidae, Nabiidae, Anthocoridae, Reduviidae, Miridae, Lygaeidae, Berytidae, Alydidae, Coreidae, Rhopalidae, Plataspidae and Pentatomidae) were found.

According to the degree of frequency test, 36 species of true bugs were characterized as accidental species and 4 were characterized as accessory species. Analysis of the catch frequency by Csalomon® VARb3 funnel traps has shown that these traps, although not intended for trapping true bugs, can serve as an additional tool in the monitoring of Heteroptera species.

True bugs, Heteroptera, visual and olfactory traps, random collection

I. PAJAČ i B. BARIĆ: Slučajan ulov stjenica (Heteroptera) pomoću lovki Csalomon® VARb3 na pokusnom dobru Jazbina u Zagrebu. Entomol. Croat. Vol. 15. Num. 1-4: 123-129.

Tijekom vegetacijske sezone 2008. godine pomoću lovki Csalomon® VARb3 istraživane su vrste listorožaca (Coleoptera: Cetoniinae). VARb3 lovke su kombiniranog vizualno-olfaktornog tipa koje osim boje (žuta, plava i kombinacija žute i plave) kukce privlače i hranidbenim mamcem (sintetizirani miris cvjetova voćnih i ukrasnih biljka). Istraživanje je provedeno u voćnjaku

trešnje i šljive na pokusnom dobru Jazbina u Zagrebu. Voćnjak je prirodno zatravljen i okružen hrastovim drvećem. Tijekom istraživanja listorožaca (Cetoniinae) slučajno je ulovljeno i 108 primjeraka stjenica (Heteroptera). U istraživanoj vegetacijskoj sezoni 2008. godine praćenje listorožaca je trajalo od 19. travnja do 21. kolovoza te su u tom periodu lovke pregledane 14 puta. Determinacijom je utvrđeno 40 vrsta Heteroptera iz 12 porodica (Tingidae, Nabiidae, Anthocoridae, Reduviidae, Miridae, Lygaeidae, Berytidae, Alydidae, Coreidae, Rhopalidae, Plataspidae i Pentatomidae). Test konstantnosti pokazao je da 36 vrsta stjenica pripada slučajnim ili akcidentnim vrstama, dok 4 vrste stjenica pripadaju akcesornim vrstama. Analizom ulova vrsta stjenica pomoću Csalomon® VARb3 lovki utvrđeno je da iako lovke nisu namjenjene za ulov stjenica, ipak mogu poslužiti kao dodatni alat u njihovom praćenju.

Stjenice, Heteroptera, vizualno-olfaktorne lovke, slučajan ulov

Introduction

The suborder Heteroptera is the most abundant and biologically diverse group of insects with incomplete metamorphosis. Species of Heteroptera are characterized primarily by having the first pair of their wings divided into two areas (hence the name "Heteroptera," different wings), one part thickened and opaque and the other part membranous and usually transparent. Most true bugs are plant-feeders with well developed eyes and wings, although many variations and exceptions exist. Some species are of agricultural, veterinary, or medical importance. Heteroptera are a relatively small monophyletic group of approximately 37,000 described species with at least 25,000 yet to be described. Although they are arranged among 88 families, the classification will undergo changes in the future (Brambila & Hodges cit. Hoy, 2003).

Heteropteran fauna is relatively well explored in Croatia. Research into true bugs began with the work of Germar (1817) who recorded 24 species of Heteroptera in Dalmatia. In the early 19th century, Heteroptera were studied by Hensch, Apfelbeck, Langhoffer and Horváth (Pajač et al., 2010). However, there are no data about the study of Heteroptera fauna on Croatian territory in the early 20th century. The first serious research in the 20th century began with the work of Novak and Wagner (1951, 1955) in Dalmatia. In the second half of the 20th century Balarin published several papers on true bugs in the areas of Rijeka (1968), Dubrovnik and Ploče (1975) and northern Croatia (1974). In recent years, the fauna of true bugs was explored by Barić (1998) in northwestern Croatia, western Posavina and eastern Slavonia.

The main objective of this study was to investigate the faunistics of Cetoninae but also the faunistic composition of other insect groups randomly caught with the funnel traps. In this paper, however, we present only results dealing with true bugs, since they provide a valuable insight into the faunistics and richness of this insect group in northwestern Croatia.

Materials and Methods

During the growing season of 2008, Csalomon® VARb3 funnel traps were used for the monitoring of Cetoninae species. The traps were baited with synthesized scent of flowers and ornamental fruit plants. Traps varied in the color of attractive vanes (yellow, blue and a combination of these two colors).

The experiment was conducted in a mixed plum and cherry orchard at the Jazbina research and educational station in Zagreb. The research orchard (N 45°51' 30'', E 16°0'18'', SW exposition, 279 m a. s. l.) is situated in the northwest part of Croatia on the slopes of Medvednica (the municipality of Maksimir, Zagreb, Croatia). The orchard is surrounded by the oak trees and ground cover is dominated by native vegetation.

Among the primary Cetoninae target species, true bugs (Heteroptera) were caught on a random basis. The traps were checked 14 times in 2008, starting on April 19, until August 21. Caught true bugs were identified according to taxonomy keys (Stichel, 1955; Wagner, 1971; Kelton, 1982). The frequency of Heteroptera was calculated according to Balogh (1958) and the degree of frequency was calculated according to Tischler (1965).

Results and Discussion

During the growing season of 2008, in a mixed plum and cherry orchard at the Jazbina science and educational station in Zagreb, a total of 108 true bugs (Heteroptera) were caught on a random basis.

The taxonomic identification of true bugs showed that a total of 40 species of Heteroptera belonging to 12 families (Tingidae, Nabiidae, Anthocoridae, Reduviidae, Miridae, Lygaeidae, Berytidae, Alydidae, Coreidae, Rhopalidae, Plataspidae and Pentatomidae) were found. The most dominant families of true bugs were: Pentatomidae (38 specimens belonging to 10 species), Miridae (26 specimens belonging to 8 species) and Lygaeidae (18 specimens belonging to 7 species) (Tab. 1).

Arčanin and Balarin (1972) investigated true bug fauna in the same area in apple orchards over a period of four years (from 1968 to 1971) and found 24 species of true bugs belonging to 5 families. Although the original purpose of this investigation was not to monitor Heteroptera fauna, this research is a very good indicator of species richness of true bugs in the area of northwestern Croatia. The predatory *Deraeocoris ruber* was present in relatively large number (13 specimens) in the catch. This species is zoophagous/phytophagous and its hosts are: Aphididae, Heteroptera, Lepidoptera and Hymenoptera.

During our study we found nearly twice as many Heteroptera species as recorded in the study of Arčanin and Balarin (1972) which is understandable considering the catching method. Arčanin and Balarin (1972) used the Steiner beating method ("Klopfmetode"), in which the branches are knocked with a stick, and fal1ing insects collected in a net with an opening frame of 0.25 m^2. By using this method they caught only insects that live in apple orchards. In our study, using the funnel traps we have attracted true bugs from the orchard as well as from the surrounding area (forest). The largest number of true bugs collected within this study belong to families that normally inhabit the flowers, or the nectar of various plants serves as their supplementary food (Holtz et al., 2009; Torres & Boyd, 2009). Thus, the relatively high efficiency of funnel traps applied here in collecting true bugs is not surprising since the bait in traps contains floral scent (i.e. food attractant).

According to the degree of frequency test, 36 species of true bugs were characterized as accidental species and 4 were characterized as accessory species (Tab. 1).

Table 1. List of caught Heteroptera species, the number and the frequency of specimens from scientific and educational station of Faculty of Agriculture ''Jazbina''

Family	Species	Number of caught speciments	Frequency (%)
Tingidae	Corythucha ciliata (Say, 1832)	1	7.69*
Nabidae	Himacerus mirmicoides (Costa, 1834)	2	15.38*
Anthocoridae	Orius laevigatus (Fieber, 1860)	6	30.77**

Table 1. - continued

Reduviidae	Pygolampis bidentata (Goeze, 1778)	1	7.69*
Miridae	Deraeocoris ruber (Linnaeus, 1758)	13	15.38*
	Adelphocoris lineolatus (Goeze, 1778)	2	15.38*
	Capsodes gothicus (Linnaeus, 1758)	1	7.69*
	Capsus ater (Linnaeus, 1758)	2	15.38*
	Closterotomus norwegicus (Gmelin, 1790)	2	15.38*
	Lygus pratensis (Linnaeus, 1758)	3	30.77**
	Halticus apterus (Linnaeus, 1758)	2	7.69*
	Omphalonotus quadriguttatus (Kirschbaum, 1856)	1	7.69*
Lygaeidae	Cymus claviculus (Fallén, 1807)	1	7.69*
	Geocoris erythrocephalus (Lepeletier & Serville, 1825)	5	38.46**
	Platyplax salviae (Schilling, 1829)	1	7.69*
	Metopoplax origani (Kolenati, 1845)	1	7.69*
	Megalonotus chiragra (Fabricius, 1794)	8	15.38*
	Rhyparochromus validus (Horváth, 1875)	1	7.69*
	Rhyparochromus vulgaris (Schilling, 1829)	1	7.69*
Berytidae	Berytinus minor (Herrich-Schaeffer, 1835)	1	7.69*
Alydidae	Alydus calcaratus (Linnaeus, 1758)	1	7.69*
	Camptopus lateralis (Germar, 1817)	1	7.69*
Coreidae	Bathysolen nubilus (Fallén, 1807)	3	7.69*
	Coriomeris affinis (Herrich-Schaeffer, 1839)	2	7.69*
	Coreus marginatus (Linnaeus, 1758)	2	7.69*
	Spathocera laticornis (Schilling, 1829)	1	7.69*
Rhopalidae	Corizus hyoscyami (Linnaeus, 1758)	2	7.69*
	Rhopalus maculatus (Fieber, 1837)	1	7.69*
	Rhopalus parumpunctatus Schilling, 1829	1	7.69*
Plataspidae	Coptosoma scutellatum (Geoffroy, 1785)	1	7.69*
Pentatomidae	Carpocoris fuscispinus (Boheman, 1851)	1	7.69*
	Carpocoris pudicus (Poda, 1761)	3	7.69*
	Carpocoris purpureipennis (De Geer, 1773)	4	7.69*
	Dolycoris baccarum (Linnaeus, 1758)	16	30.77**
	Palomena prasina (Linnaeus, 1761)	1	7.69*
	Eysarcoris aeneus (Scopoli, 1763)	3	15.38*
	Stagonomus bipunctatus (Linnaeus, 1758)	2	7.69*
	Nezara viridula (Linnaeus, 1758)	4	15.38*
	Graphosoma lineatum (Linnaeus, 1758)	1	7.69*
	Tritomegas sexmaculatus (Rambur, 1839)	3	15.38*

* accidental species, ** accessory species

Analysis of the catch frequency by CSALOMON® VARb3 funnel traps has shown that these traps, although not intended for trapping true bugs, can provide a valuable insight into the faunistics of this group and can therefore serve as an additional tool in the monitoring of Heteroptera species.

References

ARČANIN, B. & BALARIN, I., 1972. Predatorske vrste Heteroptera zastupljene u fauni jabučnih nasada Hrvatske.- Acta entomol. Jugoslav. 8, 1-2: 11 – 21.

BALARIN, I., 1968. Prvi prilog poznavanju faune Heteroptera iz okolice Rijeke. - Inventarizacija biljnih bolesti i štetnika, Republ. sekretarijat za privredu SRH, Granična karatenska služba za zaštitu bilja, Zagreb, 1 (Nr.4): 46 - 84.

BALARIN, I., 1974. Fauna Heteroptera na krmnim leguminozama i prirodnim livadama u SRH. - Poljoprivredni fakultet Sveučilišta u Zagrebu, Doktorska disertacija, 308 str.

BALARIN, I., 1975. Prilog poznavanju faune Heteroptera područja Ploča i Dubrovnika. - Inventarizacija biljnih bolesti i štetnika na graničnim područjima, Republ. sekretarijat za polj, prehramb. ind. i šumarstvo, Granična karant. služba za zaštitu bilja, Zagreb, 3 (Nr.3): 39 - 67.

BALOGH, J., 1958. Lebensgemeinschaften der Landtieren. (2. Aufl.) Akademie-Verlag, Berlin, 560 pp.

BARIĆ, B., 1998. Fauna stjenica (Heteroptera) u intenzivnom uzgoju jezgričavih voćaka. Agronomski fakultet Sveučilišta u Zagrebu, Doktorska disertacija, 149 str.

GERMAR, F.E., 1817. Reise nach Dalmatien und in das Gebiet von Ragusa. Berichtigungen und Bemerkungen. Mag. Ent. 3: 414-416.

HOLTZ, A. M, DIAS DE ALMEIDA, G., FADINI, M. A. M., ZANUNCIO-JUNIOR, J. S., ZANUNCIO, T. V. & ZANUNCIO, J. C., 2009. Survival and reproduction of Podisus nigrispinus (Heteroptera: Pentatomidae) effects of prey scarcity and plant feeding. Chilean Journal of Agricultural Research 69(3): 468-472.

HOY, M. A., 2003. Insect Molecular Genetics, An Introduction to Principles and Applications, Second Edition, Academic Press, Elsevier Science USA, 606 pp.

NOVAK, P. & WAGNER, E., 1951. Prilog poznavanju faune Hemiptera Dalmacije (Hemiptera - Heteroptera). – Godišnjak Biološkog instituta u Sarajevu 4 (1): 59-80.

NOVAK, P. & WAGNER, E., 1955. II. Prilog poznavanju faune Hemiptera Dalmacije (Hemiptera - Heteroptera). Zaštita bilja 30, Dodatak Prilozi entomofauni Jugoslavije: 1-10.

PAJAČ, I., BARIĆ, B. & MILOŠEVIĆ, B., 2010. Katalog stjenica (Heteroptera: Miridae) Hrvatske. Entomol. Croat. 14 (1-2): 23-76.

STICHEL, W., 1955. Illustrierte Bestimmungstabellen der Wanzen. Volumen 1-2, 3 & 4, Hermsdorf Berlin, 2071 pp.

TISCHLER, W., 1965. Agrarökologie. Gustav Fischer Verlag, Jena, 499 pp.

TORES, J. B. & BOYD, D. W. 2009. Zoopytophagy in Predatory Hemiptera. Braz. Arch. Biol. Technol. Vol. 52, 5: 1199-1208.