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ABUNDANCE OF BENEFICIAL AND HARMFUL INSECTS IN PLUM ORCHARDS IN POBORU COMMUNE ECOSYSTEMS

Stan Venera Daniela[1*], Dobre Marian[2], Mitrea Ion[3],
[1*]PhD University Of Craiova, Faculty Of Horticulture
[2]University of Craiova, Faculty of Agronomy
[3]University of Craiova, Faculty Of Horticulture
**Coresponding author. E-mail*: danielastan2022@yahoo.com

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ABSTRACT

Each ecosystem presents a certain entomofauna that has an important role in maintaining the biological balance during its existence, reducing the need to apply chemical treatments. This paper presents a synthesis of the results of experiments carried out in three years of research in the North-Eastern part of Olt County. The experiments were carried out in a plum orchard in the Poboru locality, located in the North-Eastern part of Olt County, with low hilly terrain and a moderate temperate-continental climate, with an annual average rainfall of 600-700 mm. During the period 2021-2023, Barber traps, yellow sticky traps and pheromone traps were placed. 6 harvests were carried out each year from May to September. The number of individuals identified was variable from one year to another, being influenced by the crop and environmental conditions.

INTRODUCTION

Plants, both cultivated and wild, have their pests. The largest number of these pests is insects. Due to the fact that they are very small, insects often go unnoticed, although their reproductive power can sometimes cause great damage. Research has been and is being continuously conducted on various species of harmful insects.

The attack of harmful insects decreases fruit production, their quality is inferior, and if not combated in time, they can lead to the destruction of trees.

Beneficial insects help perpetuate the species by pollinating flowers, without which fruits and seeds would not exist. They also provide food for many animals and birds, influencing the stability of food chains.

Plants would not survive without insects, they would not be able to reproduce, which would influence life on Earth. Research on insects has been carried out since ancient times, Aristotle and Pliny the Elder wrote since the 4th century BC.

In 2010, Reineke et al. used the *Cydia pomonella* granulovirus and infected the *Cydia funebrana* species, in order to control it and obtain organic plum production (Reineke et al. 2010).

In Poland, in 2011, Wojciechowicz-Żytko showed that among the colonies of Myzus ceresi there were also larvae of syrphids, but also of Coccinellidae insects, such as *Adalia bipunctata* and *Coccinella septempunctata*, which contributed to the reduction of Myzus ceresi colonies (Wojciechowicz-Zytko et al. 2011).

Negahban et al. in 2016, observed, following research conducted in Iran on monitoring the *Grapholita funebrana* species in plum plantations, using sex pheromone traps, that the *Grapholita funebrana* population differs depending on the area, generation, altitude and temperature recorded during its growth and development (Negahban et al. 2016).

In 2001, Bong & Yan discovered, in Korea, three species of Lepidoptera (Tortricidae), the genus *Cydia* Hübner (*Cydia curvivalva*) Liu et Yan, *Cydia trasias* (Meyrick) and *Cydia nigricana* Fabricius) and provided biological information about this species (Bong-Kyu Byun & Shan-Chun Yan 2001).

In 2010, Mihailov published the work "New Staphylinidae (Coleoptera: Staphylinidae) for the fauna of the Republic of Moldova", where 14 new species of coleoptera from the family Staphylinidae were described that were found in the forest area of the Republic of Moldova (Mihailov 2010).

In our country, studies on insects have been carried out since ancient times, especially following locust invasions, by Grigore Ureche and Miron Costin.

Since 1945, when conditions were created for entomological research, research on insects has been intense, and an inventory of insects in different ecosystems in the country was also carried out (Ionescu 1962).

In 2005, Zaharia (Ciucă), published the article "History of research on elaterid species (Coleoptera, Elateridae) in Romania" in which he describes the elaterids that have been identified from a morphological and ecological point of view and their habitats.

In 2010, Serafim & Chimisliu published the paper entitled "Contributions to the knowledge of the diversity of cerambycids (Coleoptera: Chrysomeloidea: Cerambycidae) from the fauna of Oltenia, Romania" in which they report Butnariu et al. published the article "Preliminary studies on plum plantations and entomofauna".

Butnariu et al. (2014), in which they presented data on the integrated control of plum pests, as well as control methods to reduce the damage caused by them.

Craioveanu et al., in 2024, in the work "Fauna of diurnal lepidoptera in the Buila-Vanturarita National Park", Cluj, presents an updated statistics of the lepidoptera existing in this park.

Research on beneficial and harmful insects is increasing because plants are constantly attacked by new individuals that easily adapt to new environmental conditions. (Craioveanu et al. 2024) on 156 species of Cerambycidae existing in the Oltenia area. (Serafim & Chimișliu 2010).

MATERIAL AND METHOD

The research was conducted in a private plum orchard in the Poboru locality.

To carry out their work on harmful and beneficial entomofauna, the biological material needed to be collected using Barber soil traps, yellow sticky traps and pheromone traps.

In April of each year during the period 2021 - 2023, 10 Barber traps, yellow sticky traps and pheromone traps were installed and 6 collections per year of entomological material from the Poboru ecosystem were carried out (Figure 1).

After collection, the biological material was cleaned, sorted and identified by groups, orders, classes, up to species level. This was done with the help of a binocular magnifier, a pocket magnifier, using determinants and guides (Panin 1951, Panin & Savulescu 1957, Mitrea et al. 2010, Perju 2012, Țucă 2012, Tălmaciu et al. 2004).

a b c

Figure 1. Traps for capturing different species of insects
a) Barber trap b) yellow sticky traps c) traps with pheromones

RESULTS AND DISCUSSIONS

The results obtained during the research period 2021 – 2023, in the orchard in the Poboru locality, showed that 7,451 specimens were identified, of which 4,473 were harmful insects (Table 1) and 2,978 were beneficial insects (Stan et al. 2022).

Regarding harmful species, most belong to the Order Lepidoptera (1,967 individuals), followed by species of the Order Hymenoptera (1,106 individuals), then the Order Coleoptera (954 insects) and the Order Homeoptera (446 specimens) (Figure 2).

From the graphic representation (fig. 2) it can be seen that the dynamics of harmful insects was higher in 2022 compared to 2021 and 2023. Thus, the Order Homoptera had 176 individuals in 2022 compared to 129 in 2021 and 141 in 2023. The Order Hymenoptera had 444 specimens in 2022, compared to 236 in 2021 and 426 in 2023.

The Order Coleoptera had 411 harmful individuals in 2022, compared to 164 insects in 2021 and 379 in 2023. The Lepidoptera order had 664 harmful specimens in 2022, while in 2021 it had 657 individuals, and in 2023 there were 646 insects.

Table 1

Harmful entomofauna collected during the period 2021-2023

Order/ Year	Year 2021	Year 2022	Year 2023	Abundance
Homoptera	129	176	141	446
Hymenoptera	236	444	426	1,106
Coleoptera	164	411	379	954
Lepidoptera	657	664	646	1,967
TOTAL / Year	**1,186**	**1,695**	**1,592**	**4,473**

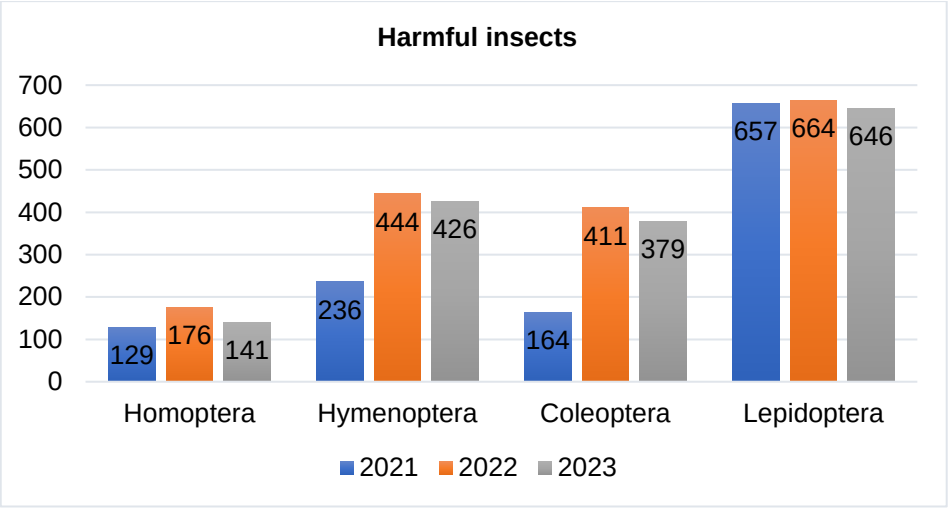

Figure 2. Graphic representation of harmful entomofauna in the period 2021-2023

Regarding useful species, most specimens belong to the Order Coleoptera (1,524), followed by the Order Hymenoptera (460), the Order Neuroptera (416), the Order Diptera (328) and the Order Dermaptera (250) (Table 2).

From the graph in figure 3, it appears that in 2022 the dynamics of useful insects was higher than in 2021 and 2023. Thus, the Order Dermaptera had 138 useful specimens, compared to 2023 with 112, and 2021 with 0 specimens (Stan et. al. 2022).

The order Hymenoptera had 207 specimens in 2022, compared to 108 specimens in 2021 and 245 in 2023. The order Coleoptera had 612 specimens in 2022, compared to 438 specimens in 2021 and 548 specimens in 2023.

The order Neuroptera had 154 specimens in 2022, compared to 132 specimens in 2021 and 130 specimens in 2023. The order Diptera had 124 specimens in 2022, compared to 101 in 2021 and 103 useful specimens in 2023.

Table 2

Useful entomofauna collected during the period 2021-2023

Period/Year	Year 2021	Year 2022	Year 2023	Abundance
Dermaptera	-	138	112	250
Hymenoptera	108	207	145	460
Coleoptera	438	612	548	1,524
Neuroptera	132	154	130	416
Diptera	101	124	103	328
TOTAL / Year	**705**	**1235**	**1,038**	**2,978**

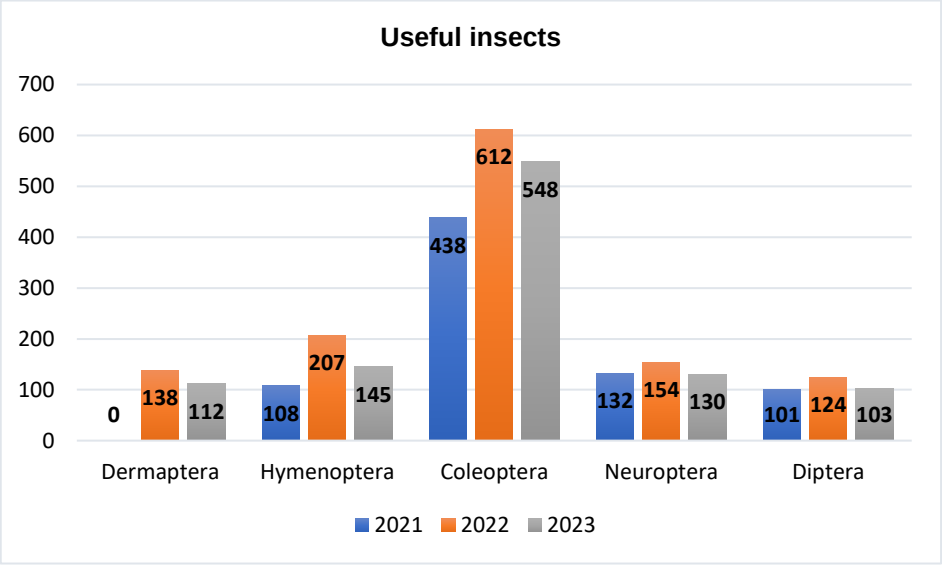

Figure. 3. Graphic representation of useful insects collected in the Poboru station

From the Poboru ecosystem, in 2021, 1891 specimens were collected, of which 1186 were harmful and 705 were beneficial, which were classified into 33 insect species, of which 21 were harmful and 12 were beneficial. During the period May-September, 6 harvests were carried out, the first was on 15.05.2021, and the last collection was on 17.09.2021. The harmful insects collected were: in May 157 specimens, in June 211, in July 242, in August 218, and in September 105. The beneficial insects collected in 2021 were: in May 114 individuals, in June 106, in July 231, in August 144, in September 110. Among the harmful species collected, the highest abundance was the species *Grapholita funebrana* Tr., Order Lepidoptera (657 specimens), followed by *Eurytoma schreineri* Schr, (121 specimens) and *Hoplocampa minuta* Christ (76 specimens) from the order Hymenoptera.

As a useful species, the highest abundance was the *Syrphus ribesii* species – with 101 specimens, and the lowest was the *Bombus spp.* species with 18 specimens. In 2022, 2930 individuals were harvested from the Poboru orchard, of

which 1695 were harmful insects and 1235 were useful, classified into 36 insect species, of which 23 were harmful species and 13 were useful species.

The harvests of harmful species were carried out as follows: in May there were 221 individuals, in June 337, in July 372, in August there were 391, in September 374 specimens.

The useful species were collected in stages, in May 165 insects, in June 243, in July 273 individuals, in August 253 individuals, and in September 301 useful insects.

The highest abundance, among the harmful species, was the *Eurytoma schreineri* Schr. with 99 specimens, and the lowest *Ruguloscolytus rugulosus* Ratz. with 44 specimens, and among the useful species, the highest abundance was the *Apis mellifera* L. species with 166 individuals, and the fewest individuals were the *Calosoma inquisitor* L species with 30 individuals. In 2023, 2630 specimens were harvested from the Poboru ecosystem, of which 1592 were harmful and 1038 were beneficial insects, when 38 species were identified, of which 25 were harmful and 13 were beneficial.

The collections of harmful insects took place between April and September, as follows: in April 121 specimens, in May 293 individuals, in June 379, in July 423, in August 268 and in September 108 specimens. Regarding beneficial insects, the harvests were carried out as follows: in April 86 specimens, in May 175, in June 227, in July 253 individuals, in August 205, in September 92 specimens.

Among the harmful species, the highest abundance was the *Hyphantria cunea* species with 113 specimens, and the least abundant was the *Capnodis tenebrionis* species with 35 specimens. The highest abundance, among the beneficial species, was the *Coccinella septempunctata* species with 140 individuals, and the fewest individuals, 24, were the *Bombus spp*. *Latreille* species.

CONCLUSIONS

During 2021-2023, research was carried out in the Poboru ecosystem, in a plum orchard, regarding harmful and beneficial insects, starting from April to September. Entomological traps (Barber traps, yellow sticky traps and pheromone traps) were placed for the research and 6 harvests were made annually.

In this stationary station during the research period, the highest value of harmful entomofauna collected was in 2022 (2930 individuals), being correlated with the highest average annual temperature (14.0 °C), followed by that recorded in 2023 (2630 individuals) at an average annual temperature (13.67 °C), and the lowest value of 1891 specimens was achieved in 2021, when the average annual temperature was 13.10 °C.

REFERENCES

Bong-Kyu Byun and Shan-Chun Yan. 2001. Three Species of the Genus Cydia Hü bner (Lepidoptera: Tortricidae) New to Korea. 0(4): 273-276 (2001) Korean J. Appl. Entomol. Pp 273 -279.

Butnariu G., Tălmaciu M., Hamburdă S. B. 2014. Preliminary studies on plum plantations entomofauna, Lucrări Științifice – vol. 57 (2), seria Agronomie: 167 – 169.

Craioveanu C., Craioveanu O. 2024. The Diurnal Lepidoptera Fauna in Buila-Vânturarița National Park: OneSeason Survey, Entomologica romanica 28: 1-7. file:///C:/Users/user/Downloads/56_2001_ThreeCydiaHubnerNewKorea.pdf

Ionescu M.A. 1962. Entomologie. Edit. de Stat Did. Ped., București, pag.5 -14.

Mihailov I. 2010. Stafilinide (Coleoptera: Staphylinidae) noi pentru fauna Republicii Moldova (II), Muzeul Olteniei Craiova. Oltenia. Studii și Comunicări Științele Naturii. Tom. 26, No. 2: 148-150.

Mitrea I., Stan C., Ţucă O. 2010. Entomologie generală, Edit. Reprograph Craiova.

Negahban M., Sedaratian-Jahromi A., Ghanee-Jahromi M., Haghani M. 2016. Monitoring of an Iranian population of Grapholita funebrana TreiTschke, 1835 (Lepidoptera: Tortricidae) using sex pheromone traps: An applicable procedure for sustainable management. Band 37, Heft 14: 241-252 ISSN 0250-4413 Ansfelden, 4. Januar 2016.

Panin S., Savulescu N. 1957. Fauna Republicii Populare Române – Insecta Coleoptera, Edit. Academia Republicii Populare Romane, Bucuresti.

Panin S. 1951. Determinatorul coleopterelor daunatoare si folositoare din R.P.R. Edit. de Stat. Bucuresti.

Perju T. 2012. Organisme animale fitofage daunatoare plantelor cultivate si produselor agricole depozitate. Ed. Imprimeria Ardealului, Cluj Napoca.

Reineke A., Hauck M., Kulanek D. 2010. Infecția moliei fructelor de prun, Cydia funebrana (Lepidoptera: Tortricidae) cu Cydia pomonella granulovirus (CpGV). I n: Ecofruit. A 14-a Conferință Internațională privind pomicultură ecologică. Proceedings for the Conference, Hohenheim, Germania, 22-24 februarie 2010. [ed. de Fördergemeinschaft O kologischer Obstbau e V]. Weinsberg, Germania: Fördergemeinschaft O kologischer Obstbau e.V. (FO KO). 145-148.

Săvescu A., Bărbulescu Al., Manolache F., Bobârnac B, Baniță E., Boguleanu Gh., Ionescu M.A., Manolache C., Dobreanu E., Balaj D, Kiss B, Gusic V., Mateias M.C., Roșca I., Cantoreanu M., Vasiliu L., Duvlea Il., Ionescu C, Perju T, Săpunaru T, Nica F., Constantinescu V., Ghizdavu I. 1982.Tratat de zoologie agricola. Dăunătorii plantelor cultivate - Vol. II, A. Edit. Academiei RSR.

Stan V.D., Dobre M., Mitrea I. 2022. The diversity of coleopterans (Coleoptera: Scarabaeidae, Scolytidae, Curculionidae, Rhynchitidae) from the plum ecosystems in Poboru location, Olt county. Analele Universitatii din Craiova, Seria Agricultura, Montanologie, Cadastru/Annals of The University of Craiova, Series Agriculture, Montanology, Cadastre. Vol. 52/2: 158-163.

Stan V.D., Dobre M., Mitrea I. 2022. The diversity of useful beetles from the Poboru orchard ecosystem, Olt county, Analele Universitatii din Craiova, Seria Agricultura, Montanologie, Cadastru/Annals of The University of Craiova, Series Agriculture, Montanology, Cadastre. Vol. 52/2: 164 -169.

Tălmaciu M., Tălmaciu N., Georgescu T. 2004. Structura, abundența și dinamica speciilor de Coleoptere din culturile de legume din cadrul fermei V. Adamachi, aparținând S.D. Iași, Județul Iași, Lucrări științifice, U.S.A.M.V. Iasi, seria Agronimie, Vol. 47: 530 – 533.

Țucă O. A. 2012. Grapholita funebrana TR. și Hyalopteris pruni Geofer. Specii periculoase din plantațiile de prun, Edit. Universitaria, Craiova.

Wojciechowicz-Zytko E. 2011. Syrphids (Diptera, Syrphidae) and coccinellids (Coleoptera, Coccinellidae) occurring in Myzus cerasi (F.) (Hemiptera) colonies on Prunus avium L, Published by the Polish Society for Horticultural Science since 1989, Folia Hort.23/1: 37-42.

Zaharia (Ciucă) L.G. 2005. Istoricul cercetărilor asupra speciilor de elateride (Coleoptera, Elateridae) din România, Complexul Muzeal de Ştiinţele Naturii “Ion Borcea” Bacău, Vol. 20: 76 –84.