Scientific Papers. Series A. Agronomy, Vol. LXIV, No. 2, 2021
ISSN 2285-5785; ISSN CD-ROM 2285-5793; ISSN Online 2285-5807; ISSN-L 2285-5785

CONTRIBUTIONS TO THE KNOWLEDGE OF COLEOPTERS SPECIES EXISTING IN SOME WALNUT ORCHARDS

Ionel PERJU, Mihai TĂLMACIU, Nela TĂLMACIU, Monica HEREA

"Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine of Iasi,
3 Mihail Sadoveanu Alley, Iasi, Romania

Corresponding author email: monica28is@yahoo.com

Abstract

During the research period, at the Sarca stationary belonging to SCDP Iasi, were studied two walnut plantations, one represented a plantation in which was developed a technology that included the application of chemical treatments, and the other stationary was also represented by a walnut orchard in which no were applied methods of protection against diseases and pests. In order to estabilish the structure and the ecological parameters representative of the coleopters entomofauna from the two plantations, were placed six soil traps type Barber, which had as fixing liquid a salt solution (NaCl) in a concentration of 25%, but the method of tapping was also used. The material was harvested periodically, at intervals between 7 and 14 days, and at each collection the biological material from the traps was transferred from the trap to a gauze cloth, was labeled, and the fixing liquid was filled or replaced according to case. Larger, significant differences appear from one stationary to another, which indicates that the technology with the treatment scheme applied in vegetation has a great influence on the entomofauna in general.

Key words*: Coleoptera, walnut plantations, useful entomofauna.*

INTRODUCTION

Following the profound social and political transformations in the life of the country, agriculture registered significant successes, the level of production increased faster than the demographic growth.

The changes that took place in Romanian agriculture therefore demonstrated the possibility of rapidly increasing food resources.

Among the factors that contributed to obtaining higher and higher yields was the increasingly efficient protection of crops.

The study of coleopterological associations in assessing the degree of ecosystem alteration and in assessing climate change (Tălmaciu et al., 2016) is currently widely used and is justified by the fact that the Order Coleoptera has the following advantages prone to these studies: it is the largest and most widespread group in the entire animal kingdom; is represented by species in all types of terrestrial and aquatic habitats (except seas and oceans); the species covers all heterotrophic trophic categories in an ecosystem.

Based on their numerous presence and frequency in ecosystems, various mathematical models of the dynamics of some animals of economic interest could be constructed, principles and ways of forecasting and regulating the various dangerous pests in agriculture and horticulture could be developed.

The impact of pests on fruit plantations is the result of the interaction between a particular host /parasite system and local environmental and culture conditions (Baicu & Săvescu, 1978). Due to the expansion of organic farming, there have been changes in the spectrum of diseases and pests in agricultural crops, compared to a conventional system crop, where chemical treatments are applied.

MATERIALS AND METHODS

The collection of the biological material was done with the help of two methods, namely: were placed soil traps type Barber, but the method of threading (mowing with entomological net) was also used.

The method of traps type Barber was represented by 6 traps arranged in a row on the row of trees, and the samples were collected from June to September.

Barber traps are the plastic boxes with a volume of 800 ml that are placed into ground level. The boxes were buried carefully, so that

the edge of the trap was perfectly level with the ground, and the insects could easily penetrate (Tălmaciu et al., 2010).

In Barber soil traps, was used a 25% concentration salt solution as the fixing liquid. The fixing fluid has a great influence on the effectiveness of the traps and must have good preservative qualities to prevent the maceration of the captured individuals.

By placing at least 6 traps, all species of Coleoptera order can be collected to establish dominance in a biotope.

At each collection, the contents of each box were placed on a sieve lined with a gauze bandage to separate the insects from the fixative. The gauze with each sample was placed in labeled jars. After each collection, the trap was re-inserted into the soil and the fixing fluid was replaced. With the help of the entomological net, mowing is performed on the surface of the soil or plants (sewing method). The entomological net is a device that is composed of a metal frame in the shape of a circle or triangle with a diameter or side of 30 cm, which has attached a frustoconical mesh and a rod with a length of about 0.80 m.

During the research period, several threads were made in the two stations represented by the ecological walnut plantation and the conventional walnut orchard.

The material thus collected was placed in jars in which a cotton swab soaked in chloroform was introduced for the almost instantaneous killing of the collected entomofauna.

The biological material thus collected using the 2 methods was brought to the laboratory, then cleaned of plant debris and then identified and inventoried, down to the species level.

The collection of the material by these methods was done on the following the dates: 22.05.2019; 18.06.2019; 06.07.2019; 27.07.2019; 07.08.2019; 27.08.2019.

RESULTS AND DISCUSSIONS

By applying the Barber trap method in the ecological walnut orchard (Table 1), following the 6 harvesting from the summer of 2019, were captured 123 specimens belonging to a number of 34 species of coleopters (Panin, 1951; Reitter, 1908;)

Table 1. The coleopteran fauna from the ecological walnut plantation collected by the soil trap type Barber method in the Sârca stationary in 2019

Order	Name of species	No of harvesting						Total samples
		I	II	III	IV	V	VI	
Coleoptera	1.*Harpalus pubescens* Müll	10	3	9	17			39
	2.*Harpalus tenebrosus* Dej	3	16	9	2	8	1	39
	3.*Harpalus calceatus* Duft.	11	1	5	10	2	9	37
	4.*Harpalus distinguendus*	11	1	12	2	3	3	32
	5.*Hister quadrimaculatus* L.	4	1	4			2	11
	6.*Pterostichus cupreus* L.	1		8	1			10
	7.*Dermestes laniarius* Illig.	1	2			2	3	8
	8.*Aphthona euphorbiae* Sch		2	4		1	1	8
	9.*Harpalus aeneus*		1	2	1	1	1	6
	10.*Agriotes ustulatus* Schall		1	3		1	1	6
	11.*Metabletus truncatelus* L		1	4		1		6
	12.*Anisodactylus binotatus* F			1		1	4	6
	13.*Otiorhynchus kollari* Gyll.	1		2			2	5
	14.*Otiorhynchus fuscipes* O.		2	2		1		5
	15.*Coccinella 7 punctata* L.		2				3	5
	16.*Opatrum sabulosum* L.	2		1		1		4
	17.*Rhizophagus politus* Hel.	1		1			1	3
	18.*Amara aenea* Deeg		1			1	1	3
	19.*Cyaniris cianea* F		1			2		3
	20.*Anthicus humeralis* Geb.		2				1	3
	21.*Anthicus floralis* L	1		1			1	3
	22.*Psylliodes affinis* Payk			1			2	3
	23.*Pteryngium crenatum* Gyll	1		1				2
	24.*Ceuthorynchus obsoletus*		2					2
	25.*Apion apricans* Herbst		2					2

	26.*Apion virens* Herbst		1	1				2
	27.*Nebria brevicollis* F			1		1		2
	28.*Tachyusa constricta* Erich			2				2
	29.*Oxypora vittata* Mär			1			1	2
	30.*Tachyporus abdominalis* F			2				2
	31.*Pentodom idiota*			1		1		2
	32.*Quedius cinctus* Payk		1					1
	33.*Chrysomela marginata* L		1					1
	34.*Longitarsus gracilis* Kuts.			1`				1
Total samples		47	44	78	33	27	37	266

In 2019 the species with largest number of sample collected were*: Harpalus pubescens and Harpalus tenebrosus* (39 samples), *Harpalus calceatus* (37 samples), *Harpalus distinguendus* (32 samples), *Hister quadrimaculatus* (11 samples), *Pterostichus cupreus* (10 samples), *Dermestes laniarius* and *Aphthona euphorbiae* (8 samples); *Harpalus aeneus , Agriotes ustulatus, Metabletus truncatelus, Anisodactylus binotatus* (6 samples); *Otiorhynchus kollari, Otiorhynchus fuscipes, Coccinella 7 punctata* (5 samples). In the case of the following species, the number of specimens collected is between 1 and 5: *Opatrum sabulosum, Rhizophagus politus,Amara aenea, Cyaniris cianea, Anthicus humeralis, Anthicus floralis, Psylliodes affinis, Pteryngium crenatum, Ceuthorynchus obsoletus, Apion apricans, Apion virens, Nebria brevicollis, Tachyusa constricta, Oxypora vittata, Tachyporus abdominalis, Pentodom idiota, Quedius cinctus, Chrysomela marginata* and *Longitarsus gracilis*.

In the conventional (chemical treated) walnut orchard (Table 2), following the 6 harvesting from the summer of 2019, were captured 118 specimens belonging to a number of 6 species. (Gaetan, 1990 ; Panin, 1951; Reitter, 1908; Rogojanu & Perju, 1979).

Table 2. The coleopteran fauna from the conventional walnut orchard collected by the soil trap type Barber method in the Sârca stationary in 2019

Order	**Name of species**	**No of harvesting**						**Total samples**
		I	II	III	IV	V	VI	
Coleoptera	1.*Opatrum sabulosum* L.	1	1	21		1	3	27
	2.*Harpalus aeneus*			3	6		8	17
	3.*Coccinella 7 punctata* L.			8			4	12
	4.*Harpalus pubescens* Müll		3	7	2			12
	5.*Aphthona euphorbiae* Sch			4		1	1	6
	6.*Amara crenata* Deeg		1		4		1	6
	7.*Harpalus azureus* F.		2	2		1		5
	8.*Harpalus calceatus* Duft.		4	1				5
	9.*Anthicus floralis* L			1	1		2	4
	10.*Chrysomela marginata* L			1			2	3
	11.*Dermestes laniarius* Illig.			1		2		3
	12.*Microlestes maurus* Sturm				1		2	3
	13.*Ophonus sabulicola* Panz				1	2		3
	14.*Pteryngium crenatum* Gyll			2			1	3
	15.*Nebria brevicollis* F			1		1		2
	16.*Oxypora vittata* Mär	1	1					2
	17.*Pentodom idiota*			1		1		2
	18.*Apion virens* Herbst			1				1
	19.*Otiorhynchus ovatus* L.	1						1
	20.*Pterostichus nigrita* L.	1						1
Total samples		4	12	54	15	9	24	118

In 2019 the species with largest number of sample collected were*: Opatrum sabulosum,* (27 samples), *Harpalus aeneus* (17 samples), *Coccinella 7 punctata and Harpalus pubescens* (12 samples), *Aphthona euphorbiae* and *Amara crenata* (6 samples);. *Harpalus azureus* and

Harpalus calceatus (5 samples); *Anthicus floralis* (4 samples), *Chrysomela marginata, Dermestes laniarius, Microlestes maurus, Ophonus sabulicola* and *Pteryngium crenatum* (3 samples), *Nebria brevicollis, Oxypora vittata* and *Pentodom idiota* (2 samples) and *Apion virens*, *Otiorhynchus ovatus, Pterostichus nigrita* (2 samples).

The situation of the collections with beating method in the walnut eclogical orchards, in 2019 was as follows:

At the first collection on 22.05.2019, we identified: 16 species of coleopters with 50 samples,with the highest abundance the species were registered: *Meloe variegatus, Longitarsus anchusae, Mordella maculosa, Apion nigritarse, Apion fuscirostre, Longitarsus anchusae andMordella maculosa.*

At the second collection on 18.06.2019, there were registered: 13 species of coleopters with 38 samples, with the highest abundance the species were registered: *Ceutorhynchus napi, Apion fuscirostre, Ceutorhynchus troglodytes, Apion fuscirostre* and *Meligetes flavipes.*

At the third collection dated 06.07.2019, were registered only 2 species with 2 samples, and these were: *Cantharis lateralis* and *Meligetes flavipes.*

At the fourth collection on 27.07.2019, we were identified: 8 species of coleopters with 19 samples, the species with the highest abundance were registered: *Ceutorhynchus napi, Apion nigritarse, Cantharis lateralis* and *Longitarsus ochroleucus.*

At the fifth collection on 05.07.2019, we were identified: 5 species of coleopters with 13 samples, these species registered were: *Meloe variegatus, Ceutorhynchus napi, Apion nigritarse, Malachius bipustulatus* and *Apion apricans.*

Table 3. Entomofauna from the ecological apple orchard collected by the sewing method in the stationary Sârca in 2019

Order	Name of species	No of harvesting						Total samples
		I	II	III	IV	V	VI	
Coleoptera	*Mordellistena parvula* Gyll	2					1	3
	Meloe variegatus Don	5				1		6
	Longitarsus anchusae Payk	5						5
	Hippodamia variegate obverse punct. Goeze	3	2					5
	Mordella maculosa Nae	5	2					7
	Ceutorhynchus napi Gyll.	1	3		4	7		8
	Apion vicinum Kirby	3			2			5
	Apion nigritarse Kirby	5	2		3	1		11
	Apion fuscirostre Fa	6	3					9
	Haltica oleracea Linnaeus	1						1
	Longitarsus ochroleucus Mar		1				2	3
	Longitarsus anchusae Payk	5						5
	Hippodamia variegate obverse punct. Goeze	3					8	11
	Cantharis lateralis L	2	2	1	3		1	9
	Apion vicinum Kirby	3						3
	Ceutorhynchus troglodytes Germar		5					5
	Apion ebenimum		2		1			3
	Apion fuscirostre F		4					4
	Meligetes flavipes Sturm		9	1				10
	Baris artemisiae Herbst		2		1			3
	Longitarsus ochroleucus		1		3		1	5
	Aphtona cyparissiae Koch				2			2
	Malachius bipustulatus L.					3		3
	Rhyncolus truncorum Ger						1	1
	Apion apricans Herbst					1		1
	Apion atomarium Kirby						1	1
	Mordela aculeata L						3	3
	Ootypus globulossus Walt						1	1
	Psylliodes affinis Payk						1	1
Total samples		50	38	2	19	13	20	142

At the sixth collection on 27.08.2019, we were identified: 10 species of coleopters with 20 samples, the species with the highest abundance were registered: *Mordellistena parvula, Longitarsus ochroleucus, Hippodamia variegate obverse punct., Cantharis lateralis, Longitarsus ochroleucus, Rhyncolus truncorum, Apion atomarium, Mordela aculeate, Ootypus globulossus* and *Psylliodes affinis.*

The situation of the collections with sewing method in the walnut eclogical orchards, in 2019 was as follows:

At the first collection on 22.05.2019, we identified: 16 species of coleopters with 50 samples, with the highest abundance the species were registered: *Baris analis, Baris lapidii, Cantharis plaudosa.*

At the second collection on 18.06.2019, there were registered: 7 species of coleopters with 17 samples, with the species registered were: two species of genus *Subcoccinella, Epuraea pygmaea, Malachius bipustulatus, Longitarsus anchusae, Ceutorhynchus napi and Epuraea pygmaea*.

At the third collection dated 06.07.2019, were not registered specoes of coleopers.

At the fourth collection on 27.07.2019, we were identified: 4 species of coleopters with 19 samples, the species with the highest abundance registered were: *Apion urticarium, Longitarsus anchusae, Phyllotreta atra, Ceutorhynchus napi, Apion apricans* and *Agriotes* sp.

Table 4. Entomofauna from the treated apple orchard collected by the sewing method in the stationary Sârca in 2019

Order	Name of species	No of harvesting						Total samples
		I	II	III	IV	V	VI	
Coleoptera	*Baris analis* Olivier	6						6
	Baris lapidii Germar	5						5
	Cantharis plaudosa Fa	2						2
	Subcoccinella 24punct. var. *saponariae* L.		2					2
	Subcoccinella 24punct. var. *4 notata* L.		2					2
	Epuraea pygmaea Gyll		3					3
	Malachius bipustulatus L		2					2
	Longitarsus anchusae Payk		3		4			7
	Phyllotreta atra Fabricius				2	3		5
	Ceutorhynchus napi Gyll.		2		3			5
	Apion apricans Herbst				3	6		9
	Apion urticarium Herbst				7	2		9
	Agriotes sp.				1			1
	Apion vicinum Kirby						8	8
	Apion nigritarse Kirby						16	16
	Apion laevigatus Kirby						5	5
	Rhinomias forticornis Boh					14		14
	Monotoma picipes Herbst						10	10
	Coccinella 7 punctata L						1	1
	Lixus ascanii L						5	5
Total		13	17	0	19	25	45	117

At the fifth collection on 05.07.2019, we were identified: 4 species of coleopters with 13 samples, these species registered were: *Rhinomias forticornis, Apion urticarium, Phyllotreta atra* and *Apion apricans*.

At the sixth collection on 27.08.2019, we were identified: 6 species of coleopters with 45 samples, the species with the highest abundance were registered: *Apion vicinum, Apion nigritarse, Apion laevigatus, Monotoma picipes, Coccinella 7 punctata* and *Lixus ascanii.*

CONCLUSIONS

In the environmental conditions that influenced the walnut plantations cultivated in the two technological systems (conventional and

ecological) during 2019, with the help of the two collection methods (threading and Barber type soil traps) following the 6 harvests have established the following:

With the help of the Barber method, most species of beetles were collected from the ecological walnut orchard, and the number of specimens also collected in this lot was 266.

In the chemically treated experimental group, the number of coleoptera species was 20, and the total specimen was 118.

By applying the second method, sewing method with the help of the entomological file, we recorded that the largest number of specimens collected in the ecological group and was represented by 29 species, and in the chemically treated group the number of copies was 117 ce they belonged to a number of 20 species.

REFERENCES

Baicu, T., Săvescu, A. (1978). Combaterea integrată în protecţia plantelor, Editura Ceres, Bucureşti.

Chatened du Gaetan (1990). *Guide des Coleopteres d'Europe.* Délacrois et Niestlé, Paris.

Panin, I., (1951). *Determinatorul Coleopterelor dăunătoare şi folositoare din R.P.R.* Editura de Stat, Bucureşti.

Reitter, E. (1908). *Fauna Germanica. Die Käfer des Deutschen Reiches Band* I, Stuttgart.

Rogojanu, V., Perju, T. (1979). *Determinator pentru recunoaşterea dăunătorilor plantelor cultivate.* Editura Ceres, Bucureşti.

Tălmaciu, M., Mocanu, I., Herea, M., Talmaciu, N., Manole, L. (2016). *Observations on Invertebrates Fauna Encountered in Some Agricultural Crops*, Full Paper Proceeding NDMRP, Istanbul, (2), 119–129

Tălmaciu, N., Tălmaciu, M., Herea, M. (2010). Comparative research on the structure and abundance of beetles in some orchards. *Bulletin of University of Agricultural Sciences and veterinary medicine Cluj – Napoca, 67*(1), 156–164.