

# OBSERVATIONS ON THE STRUCTURE, DYNAMICS AND ABUNDANCE OF SPECIES OF EPIGEE COLEOPTERS IN ORCHARDS APPLE HAVING THE RANGE BETWEEN ROWS WITH HERBED BANDS

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## ABSTRACT

The observations were made in 2017 in a orchards apple plantation in Delesti – Vaslui area with the inter-line spacing in the form of grass strips, with the species *Bromus inermis* Leyss.

To collect the material, in 2017 it was used Barber soil traps which were installed in the orchard, on the grassy interval between the previously mentioned species. During the vegetation period, from April to September, the insects were also collected from the traps, retaining and determining the beetle species.

The material was collected periodically, at intervals of about 10-15 days, in total, 10 harvests. Among the collected species we mention: *Harpalus calceatus*, *Dermestes lanarius*, *Harpalus distinguendus*, *Anysodactylus signatus*, *Otiorrhynchus porcatus*, *Apthona euphorbiae*, *Malachius bipustulatus* etc.

## INTRODUCTION

The order Coleoptera includes species harmful to plants, as well as useful species, predatory species, such as those in the families: Carabidae, Coccinellidae, Staphylinidae, etc.

Chemical control, by using pesticides against animal pests has also had negative effects, namely: destruction of the natural biological balance, the emergence of resistant forms of chemicals used, environmental pollution, accumulation of toxic residues in soil and treated products, etc.

The use of zoophages, as a means of regulating pest populations, has emerged as a biological method of pest control and for which research is needed on the existence in different agricultural ecosystems of these species and the measures required to protect these species.

In this paper, some contributions are made to the knowledge of harmful and useful beetle species from an apple orchard in Delești Area, Vaslui County.

## MATERIAL AND METHOD

The Barber traps used were of the "wet" type, in which a solution of sodium chloride (Na Cl) was introduced in a concentration of 25%.

There have been used a number of 6 traps, which are installed on the grass surface at a distance of 8-10 m from each other. At each of the 10 harvests of the

material, the traps were emptied of all their contents (including soil particles, leaves, etc.) and the liquid was replaced with another, putting about 400 ml of solution in each trap.

The collection of the material from the Barber type soil traps was made at the following data:

Rec. I. 23.05.2017 Rec. VI. 29.07.2017  
 Rec. II. 08.06.2017 Rec. VII. 11.08.2017  
 Rec. III. 21.06.2017 Rec. VIII. 25.08.2017  
 Rec. IV. 03.07.2017 Rec. IX. 05.09.2017

Rec. V. 17.07.2017 Rec. X. 17.09.2017  
 The material thus collected was determined, on caps and on harvesters. (fig.1)

## RESULTS AND DISCUSSIONS

Regarding the species and the number of beetles collected, the situation is as follows:

### Harvest I – 23.05.2017

Trap 1: <i>Anysodactilus binotatus</i>	3
<i>Harpalus calceatus</i>	2
<i>Harpalus pubescens</i>	1
Trap 2: <i>Harpalus calceatus</i>	2
<i>Harpalus distinguendus</i>	3
<i>Harpalus pubescens</i>	2
Trap 3: <i>Harpalus calceatus</i>	2
<i>Harpalus distinguendus</i>	4
<i>Otiorrhynchus porcatus</i>	1
Trap 4: <i>Anysodactilus binotatus</i>	4
<i>Harpalus distinguendus</i>	2
Trap 5: <i>Harpalus calceatus</i>	3
<i>Harpalus pubescens</i>	4
Trap 6: <i>Harpalus calceatus</i>	1
<i>Harpalus griseus</i>	2
<i>Harpalus pubescens</i>	2

### Recoltarea II – 08.06.2017

Trap 1: <i>Anysodactilus binotatus</i>	7
<i>Harpalus calceatus</i>	9
<i>Harpalus griseus</i>	2
Trap 2: <i>Anysodactilus binotatus</i>	5
<i>Harpalus calceatus</i>	8
<i>Harpalus griseus</i>	5
<i>Malachius bipustulatus</i>	1
Trap 3: <i>Anysodactilus binotatus</i>	3
<i>Harpalus calceatus</i>	11
<i>Harpalus griseus</i>	4
Trap 4: <i>Anysodactilus binotatus</i>	2
<i>Harpalus calceatus</i>	13
<i>Harpalus griseus</i>	5
Trap 5: <i>Anysodactilus binotatus</i>	4
<i>Harpalus calceatus</i>	5
<i>Harpalus griseus</i>	3
Trap 6: <i>Harpalus calceatus</i>	8
<i>Harpalus griseus</i>	2
<i>Harpalus tardus</i>	1

### Harvest III – 21.06.2017

Trap 2: <i>Harpalus griseus</i>	1
<i>Harpalus tenebrosus</i>	3
Trap 3: <i>Harpalus distinguendus</i>	3
<i>Harpalus pubescens</i>	1
Trap 5: <i>Harpalus distinguendus</i>	1
<i>Harpalus tardus</i>	1

### Harvest IV – 03.07.2017

Trap 2: <i>Anysodactilus binotatus</i>	2
<i>Harpalus calceatus</i>	3
Trap 3: <i>Anysodactilus binotatus</i>	3
<i>Aphthona euforbiae</i>	1
<i>Harpalus calceatus</i>	1
Trap 4: <i>Harpalus calceatus</i>	1
<i>Harpalus pubescens</i>	1
Trap 5: <i>Harpalus distinguendus</i>	5
<i>Harpalus pubescens</i>	1
<i>Metabletus truncatulus</i>	1

### Harvest V – 17.07.2017

Trap 1: <i>Anysodactilus binotatus</i>	3
<i>Acylophorus glaberrinus</i>	1
<i>Harpalus distinguendus</i>	2
Trap 2: <i>Anysodactilus binotatus</i>	4
<i>Harpalus calceatus</i>	3
<i>Harpalus distinguendus</i>	2
<i>Harpalus tenebrosus</i>	4
Trap 3: <i>Anysodactilus binotatus</i>	2
<i>Harpalus calceatus</i>	2
<i>Harpalus pubescens</i>	1
<i>Harpalus tenebrosus</i>	9
Trap 4: <i>Anysodactilus binotatus</i>	5
<i>Harpalus calceatus</i>	5
<i>Harpalus tenebrosus</i>	7
Trap 5: <i>Anysodactilus binotatus</i>	1
<i>Harpalus calceatus</i>	2
<i>Harpalus distinguendus</i>	3
Trap 6: <i>Dermestes lanarius</i>	2
<i>Harpalus calceatus</i>	1
<i>Harpalus distinguendus</i>	3

<i>Tachyporus hypnorum</i>	1	In variant 1, a number of 21 species of beetles were collected, totaling 338 specimens. The beetle species collected in this experimental variant are:
<b>Harvest VI – 29.07.2017</b>		
Trap 1: <i>Cianirys cianea</i>	1	<i>Acylophorus glaberrinus</i> , <i>Agriotes ustulatus</i> , <i>Anysodactilus binotatus</i> ,
<i>Harpalus pubescens</i>	3	<i>Aphthona euforbiae</i> , <i>Cianirys cianea</i> ,
<i>Pteryngium crenatum</i>	1	<i>Dermestes lanarius</i> , <i>Harpalus aeneus</i> ,
Trap 2: <i>Harpalus calceatus</i>	3	<i>Harpalus calceatus</i> , <i>Harpalus distinguendus</i> , <i>Harpalus griseus</i> ,
<i>Harpalus pubescens</i>	5	<i>Harpalus pubescens</i> , <i>Harpalus tardus</i> ,
Trap 3: <i>Harpalus calceatus</i>	2	<i>Harpalus tenebrosus</i> . <i>Tachyporus hypnorum</i> ,
<i>Harpalus pubescens</i>	10	<i>Malachius bipustulatus</i> , <i>Metabletus truncatellus</i> , <i>Mordela aculeata</i> ,
<i>Pteryngium crenatum</i>	1	<i>Otiorrhynchus porcatus</i> , <i>Pteryngium crenatum</i> ,
Trap 4: <i>Harpalus calceatus</i>	4	<i>Rinomias forticornis</i> and <i>Longitarsus tabidus</i> .
<i>Harpalus pubescens</i>	6	- at harvest Ia, a number of 38 beetle specimens were collected:
<b>Harvest VII – 11.08.2017</b>		<i>Anysodactilus binotatus</i> , <i>Harpalus calceatus</i> ,
Trap 2: <i>Harpalus aeneus</i>	4	<i>Harpalus distinguendus</i> , <i>Harpalus griseus</i> , <i>Harpalus pubescens</i> ,
<i>Harpalus pubescens</i>	3	<i>Otiorrhynchus porcatus</i> ;
<i>Harpalus tenebrosus</i>	2	- at the alla harvest, a number of 98 beetle specimens were collected:
Trap 3: <i>Harpalus calceatus</i>	9	<i>Anysodactilus binotatus</i> , <i>Harpalus calceatus</i> ,
<i>Harpalus griseus</i>	1	<i>Harpalus distinguendus</i> , <i>Harpalus griseus</i> ,
<i>Harpalus tenebrosus</i>	7	<i>Harpalus pubescens</i> , <i>Otiorrhynchus porcatus</i> ;
<i>Rinomias forticornis</i>	1	- at the third harvest, a number of 10 beetle specimens were collected:
Trap 4: <i>Harpalus calceatus</i>	1	<i>Harpalus distinguendus</i> , <i>Harpalus griseus</i> ,
<i>Harpalus tenebrosus</i>	9	<i>Harpalus pubescens</i> , <i>Harpalus tardus</i> ,
<i>Longitarsus tabidus</i>	1	<i>Harpalus tenebrosus</i> ;
<i>Rinomias forticornis</i>	1	- at the 4th harvest, a number of 18 beetle specimens were collected:
Trap 5: <i>Harpalus calceatus</i>	7	<i>Anysodactilus binotatus</i> , <i>Aphthona euforbiae</i> ,
<i>Harpalus griseus</i>	1	<i>Harpalus calceatus</i> , <i>Harpalus distinguendus</i> ,
<i>Longitarsus tabidus</i>	1	<i>Harpalus pubescens</i> ,
<i>Metabletus truncatellus</i>	1	<i>Metabletus truncatellus</i> ;
<b>Harvest VIII –25.08.2017</b>		- at the 5th harvest, a number of 63 beetle specimens were collected:
Trap 5: <i>Agriotes ustulatus</i>	1	<i>Acylophorus glaberrinus</i> , <i>Anysodactilus binotatus</i> ,
<i>Harpalus calceatus</i>	1	<i>Dermestes lanarius</i> , <i>Harpalus calceatus</i> ,
<i>Aphthona euforbiae</i>	1	<i>Harpalus distinguendus</i> ,
Trap 6: <i>Harpalus calceatus</i>	3	<i>Harpalus pubescens</i> ,
<i>Aphthona euforbiae</i>	1	<i>Harpalus tenebrosus</i> , <i>Tachyporus hypnorum</i> ;
<i>Harpalus distinguendus</i>	2	- at the 6th harvest, a number of 36 beetle specimens were collected:
<b>Harvest IX –05.09.2017</b>		<i>Cianirys cianea</i> , <i>Harpalus calceatus</i> ,
<b>Harvest X –17.09.2017</b>		<i>Harpalus pubescens</i> , <i>Pteryngium crenatum</i> ;
Trap 3: <i>Anysodactilus binotatus</i>	1	
<i>Harpalus calceatus</i>	4	
<i>Harpalus distinguendus</i>	4	
Trap 4: <i>Harpalus calceatus</i>	1	
<i>Harpalus griseus</i>	3	
<i>Harpalus tardus</i>	2	
<i>Mordela aculeata</i>	1	

On harvests, the situation is as follows:

-at the 7th harvest, a number of 50 beetle specimens were collected: *Harpalus aeneus*, *Harpalus calceatus*, *Harpalus griseus*, *Harpalus pubescens*, *Harpalus tenebrosus*, *Longitarsus tabidus*, *Metabletus truncatellus*, *Rinomias forticornis*;

-at the 8th harvest, a number of 9 beetle specimens were collected: *Agriotes ustulatus*, *Aphthona euforbiae*, *Harpalus calceatus*, *Harpalus distinguendus* ;

- at the ninth harvest, no specimen was collected;

- at the 10th harvest, a number of 16 beetle specimens were collected: *Anysodactilus binotatus*, *Harpalus calceatus*, *Harpalus distinguendus*, *Harpalus griseus*, *Harpalus tardus*, *Mordela aculeata*;

It is found that the largest number of beetles (98 specimens) was collected at the second harvest, while at the last harvest of the ninth no specimens were collected.

The greatest **abundance** was the species: *Harpalus calceatus* (121 specimens), *Anysodactilus binotatus* (48 specimens), *Harpalus tenebrosus* (41 specimens), *Harpalus pubescens* (40 specimens), *Harpalus distinguendus* (34 specimens), *Harpalus tardus* (4 specimens). The other species had between 3 and 1 specimens (Table 1)

- **the constancy (C)** of the collected species had values between 2 and 30. The species with the highest values were constants: *Harpalus calceatus*, *Anysodactilus binotatus*, *Harpalus tenebrosus*, *Harpalus pubescens*, *Harpalus distinguendus*, *Harpalus griseus*. The most valuable values were 15 species.

The constancy- depending on the value of this indicator, the species are distributed in the following classes:

## CONCLUSIONS

1. The collection of epigee beetle species was done in 2017 in an apple

➤ 15 species are accidental with the value of the indicator between 1-25%,

➤ 3 accessory species with the value of the indicator between 25.1-50%,

➤ 2 species are constant with the value of the indicator between 50.1-75% (*Anysodactilus binotatus* and *Harpalus tenebrosus*),

➤ 1 species is euconstant with the value between 75.1-100% (*Harpalus calceatus*)

- **dominance (D)** according to the calculated percentage value, the species are distributed in the following classes:

➤ 14 species are sub-precedents with values of dominance below 1.1%;

➤ 1 species is receding and had values between 1.1-2% (*Harpalus tardus*)

➤ 1 species is dominant with a value in the range of 5.1-10.0% (*Harpalus griseus*);

➤ 2 species are eudominant with a value over 10%.

The ecological sign index (W) has had values greater than 1.00 to a number of 5 species. These were: *Harpalus calceatus* (9.3734), *Anysodactilus binotatus* (1.0139), *Harpalus tenebrosus* (1.1548), *Harpalus pubescens* (1.6905), *Harpalus distinguendus* (1.1960).

Depending on the calculated percentage value, the species are distributed in the following classes:

- accidental species with index values below 0.1%, there are 15 species of beetles;

- 2 species are accessories with values between 1.1-5.0% (*Harpalus distinguendus*, *Harpalus griseus*)

- 3 species are characteristic with values between 5.1-10.0%

- a species is characteristic with values over 10.0% (*Harpalus calceatus*).

orchard with the help of BARBER soil traps, of the "wet" type, having the interval between rows in the form of

grassy strips with *Bromus inermis* Leys species.

2. The traps operated from April to September inclusive, the material being collected periodically, at intervals between 10-15 days.

3. A number of 338 beetles belonging to 21 species were collected during the observations.

4. The species with the highest number of specimens collected were: *Harpalus calceatus* (121 specimens), *Anysodactylus binotatus* (48 specimens), *Harpalus tenebrosus* (41 specimens), *Harpalus pubescens* (40 specimens), *Harpalus distinguendus* (34 specimens), *Harpalus griseus* (29 copies).

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**Table 1**

**The structure and abundance of species collected in 2017**

No.	Species	ECOLOGICAL INDEX						
		A	C		D		W	
		%	%	Cl.	%	Cl.	%	Cl.
1.	Harpalus calceatus	121	80,95	C2	35,79	D5	28,9720	W4
2.	Anysodactilus binotatus	48	52,38	C1	14,20	D5	7,4380	W3
3.	Harpalus tenebrosus	41	71,42	C1	12,13	D5	8,6632	W3
4.	Harpalus pubescens	40	50,00	C1	11,83	D5	5,9150	W3
5.	Harpalus distinguendus	34	45,24	C1	10,05	D5	4,5466	W3
6.	Harpalus griseus	29	35,71	C1	8,57	D4	3,0603	W2
7.	Harpalus tardus	4	2,38	C1	1,18	D2	0,0281	W1
8.	Aphthona euforbiae	3	2,38	C1	0,88	D1	0,0210	W1
9.	Dermestes lanarius	2	4,76	C1	0,59	D1	0,0281	W1
10.	Longitarsus tabidus	2	4,76	C1	0,59	D1	0,0281	W1
11.	Metabletus truncatulus	2	4,76	C1	0,59	D1	0,0281	W1
12.	Pteryngium crenatum	2	4,76	C1	0,59	D1	0,0281	W1
13.	Rinomias forticornis	2	4,76	C1	0,59	D1	0,0281	W1
14.	Acylophorus glaberrinus	1	2,38	C1	0,29	D1	0,0070	W1
15.	Agriotes ustulatus	1	2,38	C1	0,29	D1	0,0070	W1
16.	Cianirys cianea	1	2,38	C1	0,29	D1	0,0070	W1
17.	Harpalus aeneus	1	2,38	C1	0,29	D1	0,0070	W1
18.	Malachius bipustulatus	1	2,38	C1	0,29	D1	0,0070	W1
19.	Mordela aculeata	1	2,38	C1	0,29	D1	0,0070	W1
20.	Otiorrhynchus porcatus	1	2,38	C1	0,29	D1	0,0070	W1
21.	Tachyporus hypnorum	1	2,38	C1	0,29	D1	0,0070	W1
<b>TOTAL</b>	<b>21 species</b>	<b>338 specimens collected</b>						



**Fig. 1. Location of Barber soil traps at the beginning of the vegetation period (original)**