THE STRUCTURE, DYNAMICS, AND ABUNDANCE OF SPECIES BELONGING TO USEFUL AND HARMFUL FAUNA IN SOME VINEYARDS IN VRANCEA COUNTY IN 2023

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Abstract

The observations were made in a vineyard plantation in the Vrancea region using Barber soil traps in 2023. Two variants were used:

- *Variant 1: a vineyard plantation located on a hill where chemical treatments were applied to control pathogens and pests.*
- *Variant 2: a vineyard plantation located on a hill where no chemical treatments were applied to control pathogens and pests.*

The material collection from the traps was carried out periodically from June to August on the following dates: 21.06, 30.06, 10.07, 16.07, 26.07, 02.08, 14.08. The material collected from the traps was then cleaned of plant debris, preserved in 40% alcohol, and identified, focusing solely on epigeal arthropod species from the order Coleoptera.

The highest number of specimens and species collected belonged to the family Carabidae. Among the most frequently collected species and those with the highest number of specimens, we mention: Opatrum sabulosum, Harpalus distinguendus, Crypticus quisquilius, Amara aenea, Ontophagus ovatus, Formicomus pedestris, etc.

Key words**: **grapevines, harmful and usefu fauna, pitfall traps.

INTRODUCTION

Grapevines, one of the most important agricultural crops worldwide, attract a wide diversity of insects, including beetles. Beetles represent a vast insect order, encompassing over 400,000 species, some of which play a vital role in vineyard ecosystems. These insects can influence grapevine cultivation in both positive and negative ways: they can contribute to the health of the agroecosystem or cause damage to the crops.

In vineyards, beetles fall into two main categories: pests and beneficial insects. Pest species can cause significant harm by attacking the grapevine's leaves, stems, and roots. Such damage reduces plant vitality and grape quality, necessitating the use of appropriate control measures. On the other hand, beneficial beetles serve as biological control agents, feeding on harmful insects that could otherwise seriously impact grapevines. Additionally, certain saprophagous beetle species aid in breaking down organic matter, thus enhancing soil structure and fertility. (Altieri. 1999)

Understanding the dynamics of beetle populations within vineyard ecosystems is therefore crucial for effective management. Close monitoring of these insects and the

implementation of integrated pest management strategies, including the conservation of natural predators, are essential to ensure a healthy and sustainable grape production.

MATERIALS AND METHODS

The research was conducted in a vineyard plantation in the Vrancea region in 2023, focusing on observations and analyses related to the collection and identification of both harmful and beneficial organisms in this area.

Insect collection was carried out using Barber-type soil traps, installed in selected plots starting from June until September, with samples collected every 10-14 days.

Figure 1 . Harvest and inventory of the collected entomological material

This method is one of the most common techniques for collecting soil-level invertebrates. (Pfiffner and Luka, 2000) These traps are plastic containers with an opening diameter of 5-10 cm, buried in the ground so that the opening aligns with the soil surface. A cover, extending 4-6 cm beyond the container edges, was placed above the traps to prevent rainwater from filling them (Figure 1). A total of seven traps were installed, spaced 8-10 meters apart. To collect and preserve the insects, a 2.5% salt solution was added to each trap.(Tălmaciu et all, 2011)

The biological material collected was separated from plant debris, examined in the laborator under a binocular microscope, and identified down to species and taxa.

RESULTS AND DISCUSSIONS

In the untreated variant (Table 1):

First collection on 21.06: Collected 4 arachnid specimens and one specimen of the beetle species *Harpalus calceatus*, totaling 5 specimens.

Second collection on 30.06: Collected 3 arachnids and three beetle species (*Harpalus calceatus, Ophonus ovatus, and Rhizobius frontalis*), totaling 11 arthropod specimens.

Third collection on 10.07: Collected 16 arachnid specimens.

Fourth collection: Collected 4 arthropods, including 2 arachnid specimens and one specimen each of beetle species *Harpalus hirtipes* and *Pseudophonus pubescens*.

Fifth collection on 26.07: Collected 4 arthropod specimens, including one arachnid and three beetle specimens (*Zabrus spinipes* with 2 specimens, and *Ontophagus ovatus* with one specimen).

Sixth collection on 02.08: Collected 9 arthropod specimens, consisting bof 5 arachnids and 4 beetles across three species (*Harpalus calceatus* with 2 specimens, *Pentodon idiota*, and Pseudophonus pubescens with one specimen each).

Seventh collection on 14.08: No were collected arthropod species.

In total, across the seven collections, 49 specimens were collected.

Table 1. Arthropod species collected in Barber traps in 2023 in the untreated variant

No.	Name of species	C1	C2	C3	C4	C5	C6	C7	TOTAL
1st Harvest21.06.2023									
1	Arahnids		2			1	1		4
2	Harpalus caleatus				1				1
Total			2		1	1	1		5
2nd Harvest 30.06.2023									
1	Arahnids	1	1				1		3
2	Harpalus caleatus	1							1
3	Ontophagus ovatus		1				1	1	3
4	Rhizobius frontalis	2	2			3	3	1	11
Total									
3rd Harvest 10.07.2023									
1	Arahnids			2	1	6	3	4	16
Total				2	1	6	3	4	16
4th Harvest 16.07.2023									
1	Arahnids	1					1		2
2	Harpalus hirtiptes					1			1
3	Pseudophonus pubescens						1		1
Total		1				1	2		4
5th Harvest 26.07.2023									
1	Arahnids		1						1
2	Ontophagus ovatus		1						1
3	Zabrus sinipes			1	1				2
Total			2	1	1				4
6th Harvest 2.08.2023									
1	Arahnids		2					3	5
2	Harpalus calceatus					2			2
3	Pentodon idiota				1				1
4	Pseudophonus pubescens							1	1
Total			2		1	2		4	9
7th Harvest 14.08.2023									
Not were samples colected									
Total Samples = 49									

In the chemically treated variant (Table 2):

First collection on 21.06: Collected 53 arthropod specimens, including 1 mite (*Acari* order), 4 arachnids (*Aranea* order), and 48 beetles across various species: *Crypticus quisquilius* (17 specimens), *Harpalus distinguendus* (5 specimens), *Harpalus tardus* (2 specimens), Hypnoidus quadripustulatus (1 specimen), *Melighetes*

aeneus (1 specimen), and *Opatrum sabulosum* (19 specimens).

Second collection on 30.06: Collected 15 arthropod specimens: 5 arachnids, 1 earwig (*Dermaptera* order), and 9 beetles from species *Crypticus quisquilius*(1 specimen), *Hippodamia variegata* (1 specimen), and *Opatrum sabulosum* (6 specimens).

Third collection on 10.07: Collected 8 arthropod specimens: 3 arachnids and 5 beetles, including *Crypticus quisquilius* (2 specimens), *Formicomus pedestris* (1 specimen), and *Hypnoidus pulchelus* (1 specimen).

Fourth collection on 16.07: Collected 10 arthropods, including 3 arachnids and 7 beetles from species *Crypticus quisquilius* (5 specimens) and *Harpalus distinguendus* (2 specimens).

Fifth collection on 26.07: Collected 2 beetles, with one specimen each from species *Ontophagus ovatus* and *Opatrum sabulosum.*

Sixth collection on 02.08: Collected 4 specimens of *Harpalus distinguendus*.

Seventh collection on 14.08: Collected 15 arthropods, including 2 arachnids (*Aranea* order) and 13 beetles from species *Crypticus quisquilius* (1 specimen), *Harpalus distinguendus* (4 specimens), and *Opatrum sabulosum* (8 specimens).

In total, 107 arthropod specimens were collected in this variant over the seven collections.

Tabelul 2. Arthropod species collected in Barber traps in 2023 in the chemically treated variant

No.	Name of species	C1	C2	C3	C4	C5	C6	C7	TOTAL
1st Harvest21.06.2023									
1	Mites					1			1
2	Amara aenea					3			3
3	Arahnids	1	1			2			4
4	Crypticus quisquilius	2	2			3	8	2	17
5	Harpalus distinguendus	1				1	2	1	5
6	Harpalus tardus	2							2
7	Hypnoidus quadripustulatus					1			
8	Melighetes aeneus							1	1
9	Opatrum sabulosum	1	4		2	9	1	2	19
Total		7	7		2	20	11	6	53
2nd Harvest 30.06.2023									
1	Amara crenata							1	1
2	Arahnids	2		2		1			5
3	Crypticus quisquilius					1			1
4	Dermapters			1					1
5	Hippodamia variegata							1	1
6	Opatrum saabulosum	1				1		4	6
Total		3		3		3		6	15
3rd Harvest 10.07.2023									
1	Amara aenea							1	1
2	Arahnids			1	2				3
3	Crypticus quisquilius					2			2
4	Formicomus pedestris							1	1
5	Hypnoidus pulchellus							1	1
Total				1	2	2		3	8
4th Harvest 16.07.2023									
1	Arahnids				1	2			3
2	Crypticus quisquilius		5						5
3	Harpalus distinguendus						2		2
Total			5		1	2	2		10
5th Harvest 26.07.2023									
1	Ontophagus ovatus	1							1
2	Opatrum saabulosum			1					1
Total		1		1					2
6th Harvest 2.08.2023									
1	Harpalus distinguendus				4				4
Total					4				4
7th Harvest 14.08.2023									

1	Arahnids		1	1					2
2	Crypticus quisquilius			1					1
3	Harpalus distinguendus			3	1				4
4	Opatrum saabulosum			5			3		8
Total			1	10	1		3		15
Total harvest= 107									

Regarding species structure based on their feeding habits in the untreated variant, for the 9 arthropod species, the situation is as follows (Table 3):

- 4 species are predators, including arachnids and the carabid beetles: *Harpalus calceatus, Harpalus hirtipes*, and *Pseudophonus pubescens*.
- 2 species are neutral: *Ontophagus ovatus* and *Rhizobius frontalis*.
- 2 species are harmful: *Zabrus spinipes* and *Pentodon idiota*.

Of the 49 collected arthropod specimens, 38 belong to predator species, 8 are neutral, and 3 are harmful.

Table 3. Structure, dynamics, abundance, and type of species collected in the untreated variant

No.	Name of species/taxa	Dates of harvest							No of samples	Type
		21.06	30.06	10.07	16.07	26.07	2.08	14.08		
1.	Arachnids	4	3	16	2	1	5	-	31	Pd
2.	Harpalus calceatus	1	1	-	-	-	2	-	4	Pd
3.	Ophonus ovatus	-	3	-	-	-1	-	-	4	I
4.	Rhizobius frontalis	-	4	-	-	-	-	-	4	I
5.	Harpalus hirtiptes	-	-	-	1	-	-	-	1	Pd
6.	Pseudophonus pubescens	-	-	-	1	-	1	-	2	Pd
7.	Zabrus spinipes	-	-	-	-	2	-	-	2	D
8.	Pentodon idiota	-	-	-	-		1	-	1	D
Total 7 species		5	11	16	4	4	9	0	49	

Regarding the structure of species based on the food they consume, in the case with chemical treatments, the situation is as follows: A total of 105 arthropod specimens belonging to 13 species / taxa were collected (Table 4):

Mites – a single specimen;
Arachnids – 17 specimens;
Insects from the order *Coleoptera* – 87 specimens.

Table 4. Structure, dynamics, abundance, and type of species collected in the chemical treatment variant

No.	Name of species/taxa	Dates of harvest							No of samples	Type
		21.06	30.06	10.07	16.07	26.07	2.08	14.08		
1.	Mites	1							1	Pd
2.	Arachnids	4	5	3	3	-	-	2	17	Pd
3.	Amara aenea	3	-	1	-	-	-	-	4	Pd
4.	Crypticus quisquilius	17	1	2	5	-	-	1	26	D
5.	Harpalus distinguendus	5	-	-	2	-	-	8	15	Pd
6.	Harpalus tardus	2	-	-	-	-	-	-	2	Pd
7.	Hypnoidus quadripustulatus	1	-	-	-	-	-	-	1	D
8.	Melighetes aeneus	1	-	-	-	-	-	-	1	D
9.	Opatrum sabulosum	19	6	-	-	1	-	8	34	D
10.	Amara crenata	-	1	-	-	-	-	-	1	Pd
11.	Formiconis pedestris	-	-	1	-	-	-	-	1	I
12.	Hypnoidus pulchelus	-	-	1	-	-	-	-	1	D
13.	Ontophagus ovatus	-	-	-	-	1	-	-	1	I
Total 7 species		53	13	8	10	2	-	19	**105**	

Based on the food they consume, 6 species/taxa are predators, totaling 40 specimens. Additionally, 5 species/taxa are harmful species, totaling 63 specimens, and two species are indifferent, totaling 2 specimens.

CONCLUSIONS

The collection of arthropod species was conducted in a vineyard using two variants: V1 - the vineyard where no chemical treatments were applied, and V2 - the vineyard where chemical treatments were performed to combat pests.

Observations were made throughout the year 2023, from June to August, with periodic collections conducted at intervals of 10 to 14 days, totaling 7 collections.

Only epigous arthropod species were inventoried, grouped according to their feeding habits into three categories: predatory species, harmful species, and indifferent species.

In the variant without chemical treatments, arthropods belonging to 8 taxa were collected, of which 4 represent predatory species, 2 are indifferent species, and 2 are harmful species, totaling 49 specimens.

In the variant with chemical treatments, arthropods belonging to 13 taxa were collected, of which 6 represent predatory species, 2 taxa are indifferent species, and 5 taxa are harmful species, totaling 105 specimens.

REFERENCES

Altieri, M. A. (1999). *The ecological role of biodiversity in agroecosystems*. Agriculture, Ecosystems & Environment, 74(1-3), 19-31.

Pfiffner, L. and Luka, H. (2000*). Overwintering of arthropods in soils of arable fields and adjacent semi-natural habitats*. Agriculture, Ecosystems & Environment, 78(3), 215-222.

Tălmaciu M., Talmaciu Nela, Herea Monica, (2011). *Research on the population structure, dynamics, and abundance of coleoptera species in sweet cherry and sour cherry plantations*,: International symposium on plant protection Book Series: Acta Horticulturae 917, 119-124.

Tălmaciu M., Tălmaciu Nela, Monica Herea, Croitoru N., Panuta S., (2020). *Research on the population of carabid beetles in apple orchards based on applied agricultural techniques*, Agricultural Science, 2, 41-49.