OBSERVATIONS ON THE STRUCTURE, DYNAMICS AND ABUNDANCE OF EPIGEOUS ARTHROPODS IN SOME GRAPEVINE PLANTATIONS IN VRANCEA COUNTY

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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 epigeous arthropod species from the order Coleoptera.

The highest number of specimens and species collected belonged to the family Carabidae. Among the species collected were: Harpalus distinguendus, Harpalus tardus, Harpalus binotatus, Carabus scabriusculus, all belonging to the family Carabidae.

Other species from the order Coleoptera were also collected, belonging to the following families: Tenebrionidae, Staphilinidae, Elateridae, Curculionidae.

Key words: vineyard, Coleoptera, epigeous arthropod

INTRODUCTION

The grapevine is one of the most important agricultural crops, playing a crucial role in both the agricultural economy and the culture and traditions of our people. However, this crop faces a series of challenges, including pests that can significantly affect the health and productivity of the vines. Pests can cause direct damage by feeding on the leaves and grapes, as well as indirect damage by transmitting diseases that can lead to considerable economic losses (Daane,2010).

To ensure a quality harvest and maintain the health of the vineyard, it is essential to implement effective pest control measures. These measures should be integrated, considering chemical, biological, and cultural methods (Pătruică, 2007).

Proper pest management not only protects the grapevine but also contributes to maintaining a healthy environment by reducing the impact on the ecosystem

In this paper, we aim to analyze the epigeic arthropod species that affect grapevine

plantations, presenting methods for identifying and monitoring them, as well as effective control strategies. In this regard, it is important to understand the complex interactions between pests, the cultivated plant, and the surrounding environment to develop solutions tailored to the specific needs of each vineyard.

MATERIALS AND METHODS

In the studied biotope, 12 pitfall traps were set up in two rows, installed from the edge toward the interior, with a 10-meter distance between the rows and 10 meters between the traps in each row (Talmaciu, 2020).The Barber-type soil traps (pitfall traps) consisted of plastic containers inserted into the ground, in which a 25% salt solution, or similar was used as a fixative liquid (Fig. 1).

Plastic containers with a volume of 500 ml and a diameter of 10 cm were used, in which a 4% formalin solution was added as the fixative liquid. Sample collection was carried out every 10–14 days between May and September 2023 (Tălmaciu, 2005).

The experimental plot was set up in a vineyard located on a slope in the Vrancea region, where two experimental variants were initiated:

- 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 was collected periodically from the traps between June and 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 epigeic arthropod species from the order *Coleoptera*.

Figure 1 Pitfall traps type Barber (original)

RESULTS AND DISCUSSIONS

The situations of epigeous beetles collected in Barber traps from a vineyard plantation were applied the chemical treatments against pests and pathogens (V1- Table1) and the situation of epigeous beetles collected from a vineyard plantation were not applied the chemical treatments against pests and pathogens (V2- Table2)

In the first collection, on 10.06.2023, from the Barber traps in the treated variant, 11 beetle species were collected, totaling 28 specimens. In the untreated variant, 19 beetle species were collected, totaling 273 specimens. The species common to both variants were: *Anisodactylus binotatus, Anysodactilus signatus, Carabus scabriusculus, Dermestes laniarius, Harpalus tardus, Ontophagus ovatus*, and *Opatrum sabulosum*.

In the second collection, on 30.06.2023, 13 beetle species were collected in the treated variant, totaling 37 specimens. In the untreated variant, 8 species were collected, totaling 273 specimens. The species common to both variants were: *Anisodactylus binotatus, Carabus scabriusculus, Necrophorus vespillo*, and *Ontophagus ovatus.*

Table1

The species of collected beetles in pitfall traps, in the the vineyard - variant with chemical treatments

No.	Name	C1	C2	C3	C4	C5	C6	C7	Total
1st Harvest 10.2023									
1	Anisodactylus binotatus	-	-	1	-	-	-	3	4
2	Anisodactylus signatus	-	-	-	-	-	1	-	1
3	Carabus scabriusculus	1	1	-	-	-	-	-	2
4	Crypticus quisquilius	-	-	-	1	-	-	-	12
5	Dermestes laniarius	-	-	-	-	-	1	-	1
6	Harpalus distinguendus	-	-	-	1	-	-	-	1
7	Harpalus tardus	-	1	-	-	-	-	-	1
8	Licinus cassideus	1	-	-	-	-	-	-	1
9	Onthophagus ovatus	2	-	-	1	-	-	-	3
10	Opatrum sabulosum	1	-	1	2	-	4	3	11
11	Otiorrhynchus corvus	-	-	-	-	-	1	1	2
	Total I	5	2	2	5	-	7	7	28
2nd Harvest II- 30.06.2023									
1	Anisodactylys binotatus	-	-	-	-	-	1	-	1
2	Carabus scabriusculus	-	-	1	-	-	-	-	1
3	Crypticus quisquilius	1	-	-	1	1	-	16	19
4	Harpalus calceatus	1	-	-	-	-	-	-	1
5	Harpalus distinguendus	-	-	-	-	-	1	-	1
6	Harpalus tardus	-	-	-	2	-	-	-	2
7	Hister purpurascens	-	-	-	-	-	-	1	1
8	Necrophorus vespillo	-	1	1	-	-	-	3	5
9	Onthophagus ovatus	-	-	-	1	-	-	-	1
10	Opatrum sabulosum	1	-	-	-	-	-	-	1
11	Otiorrhynchus corvus	-	-	1	-	-	-	-	1
12	Ploeonomus monilicornis	-	-	-	-	-	-	2	2
13	Pseudophonus pubescens	-	1	-	-	-	-	-	1
	Total II	3	2	3	4	1	2	22	37
3rd Harvest III- 10.07.2023									
1	Anisodactylus binotatus	-	-	-	1	-	-	-	1
2	Crypticus quisquilius	-	1	-	2	-	2	-	5
3	Harpalus rubripes	-	1	-	-	-	-	-	1
4	Otiorhynchus corvus	-	-	-	-	-	1	-	1
5	Sitona lineatus	-	-	-	-	-	1	-	1
	Total III	-	2	-	3	-	4	-	9
4th Harvest IV- 16.07.2023									
1	Crypticus quisquilius	-	1	-	1	-	2	-	4
2	Ophonus azureus	-	-	-	-	-	1	-	1
	Total IV	-	1	-	1	-	3	-	5
5th Harvest V- 20.07.2023									
1	Carabus violaceus	-	-	-	-	-	-	1	1
2	Ophonus puncticollis	-	-	-	-	-	-	1	1
3	Otiorrhynchus corvus	-	-	-	-	1	-	-	1
	Total V	-	-	-	-	1	-	2	3
6th Harvest VI- 02.08.2023									
At the sixth collection, no beetles were caught									
7th Harvest VII- 14.08.2023									
3	Opatrum sabulosum	-	-	1	-	-	-	-	1
4	Staphylinus caesareus	-	-	-	-	-	-	1	1
	Total VII	-	-	1	-	-	-	1	2

In the third collection, on 10.07.2023, 5 species were collected in the chemically treated variant, totaling 9 beetle specimens. In the untreated variant, 25 specimens belonging to 2 species were collected. In this collection, only one species was common to both variants: *Harpalus rufipes*.

In the fourth collection, on 16.07.2023, 5 specimens from 2 species were collected in the chemically treated variant. In the untreated variant, 9 beetle specimens were collected, belonging to 8 species. In this collection, there was only one common species: *Ophonus azureus*.

In the fifth collection, 3 specimens from 3 species were collected in the chemically treated variant. In the untreated variant, 3 specimens from 2 species collected. No common species were found between the two variants in this collection.

Table 2

The species of collected beetles in pitfall traps, in the the vineyard - variant without chemical treatments

No.	Name of species	C1	C2	C3	C4	C5	C6	C7	Total
1st Harvest 10.06.2023									
1	Amara aenea	-	-	1	-	-	-	-	1
2	Anisodactylus binotatus	1	-	-	-	-	-	-	1
3	Anisodactylus signatus	-	10	-	-	-	-	-	10
4	Bothynoderes punctiventris	-	1	-	-	-	-	-	1
5	Brachynus crepitans	-	-	-	5	-	-	-	5
6	Callistus lunatus	1	-	-	-	1	-	-	2
7	Calathus fuscipes	-	-	-	-	-	1	-	1
8	Carabus scabriusculus	-	-	-	-	-	1	-	1
9	Cassida nebulosa	-	-	1	-	-	-	-	1
10	Dermestes laniarius	2	6	8	2	2	3	-	23
11	Ectobius lapponicus	3	4	7	3	-	-	4	21
12	Harpalus tardus	-	2	-	-	1	-	-	3
13	Harpalus calceatus	-	2	-	4	1	3	-	10
14	Necrophorus vespillo	-	1	2	-	-	6	-	9
15	Onthophagus ovatus	73	1	42	30	1	-	-	147
16	Opatrum sabulosum	3	2	9	8	3	1	1	27
17	Pedinus femoralis	1	-	-	-	-	-	-	1
18	Staphylinus caesareus	1	5	-	-	-	-	-	6
19	Trox sabulosum	1	-	-	-	-	1	-	2
20	Ophonus azureus	-	-	1	-	-	-	-	1
	Total I	86	34	71	52	9	16	5	273
2nd Harvest 30.06.2023									
1	Anisodactylus binotatus	-	-	-	-	-	1	-	1
2	Carabus coriaceus	-	-	1	-	-	-	-	1
3	Carabus scabriusculus	-	-	-	-	-	1	1	2
4	Cassida nebulosa	2	1	-	-	-	-	-	3
5	Dermestes laniarius	-	-	7	-	-	-	-	7
6	Ectobius lapponicus	-	-	-	-	-	19	2	21
7	Necrophorus vespillo	-	-	10	-	-	1	-	11
8	Ontophagus ovatus	8	28	26	-	-	200	3	265
	Total II	20	29	440	-	-	222	6	311
3rd Harvest 10.07.2023									
1	Dermestes laniarius	-	-	1	1	-	-	-	2
2	Ectobius lapponicus	-	-	-	-	-	-	5	5
3	Harpalus calceatus	-	-	-	1	-	-	-	1
4	Harpalus rubripes	-	-	-	-	-	1	-	1
5	Mordella aculeata	-	-	-	-	1	-	-	1
6	Mylacus rotundatus	-	-	-	-	-	-	1	1
7	Onthophagus ovatus	-	-	3	-	-	9	-	12
8	Pedinus femoralis	-	-	-	-	2	-	-	2
	Total III	-	-	4	2	3	10	6	25
4th Harvest - a 16.07.2023									
1	Anisodactylus binotatus	-	-	-	-	-	1	-	1
2	Callistus lunatus	2	-	-	-	-	-	-	2
3	Dermestes laniarius	-	-	1	-	-	-	-	1
4	Harpalus distinguendus	-	-	-	-	-	1	-	1
5	Harpalus tardus	-	-	1	-	-	-	-	1
6	Onthophagus ovatus	-	-	-	-	1	-	-	1
7	Ophonus azureus	-	-	1	-	-	-	-	1
8	Ophonus puncticollis	-	-	1	-	-	-	-	1
	Total IV	2	-	4	-	1	2	-	9
5th Harvest V- a 26.07.2023									
1	Anisodactylus signatus	-	-	-	-	-	2	-	2
2	Ophonus puncticollis	-	-	-	-	1	-	-	1
	Total V	-	-	-	-	1	2	-	3
6th Harvest VI- a 02.08.2023									
1	Cassida viridis	-	-	1	-	-	-	-	1
2	Chaetarthria seminulum	-	-	-	-	1	-	-	1
3	Ophonus azureus	1	-	-	1	-	-	-	2
4	Pseudophonus pubescens	1	-	-	-	-	-	-	1
	Total VI	2	-	1	1	1	-	-	5
7th Harvest 14.08.2023									
1	Blaps mortisaga	-	1	-	-	-	-	-	1
2	Carabus violaceus	-	-	-	-	-	-	1	1
3	Pseudophonus pubescens	-	-	-	1	-	-	-	1
	Total VII	-	1	-	1	-	-	1	3

In the sixth collection, on 02.08.2023, no beetles from the *Coleoptera* order were collected in the chemically treated variant. In the untreated variant, 5 beetle specimens were collected, belonging to 4 species.

In the seventh collection, on 14.08.2023, two species totaling two specimens were collected in the chemically treated variant. In the untreated variant, 3 specimens from 3 species were collected. No common species were found in this collection.

Across the two variants (Table 3), a total of 37 beetle species were collected, totaling 713 specimens. The species with the highest number of specimens collected were *Ontophagus ovatus* with 429 specimens, representing 60.17% of the total arthropods collected; *Opatrum sabulosum* with 40 specimens, representing 5.61%; *Ectobius laponicus* with 47 specimens, representing 6.60%; *Dermestes laniarius* with 34 specimens, representing 4.77%; *Crypticus quisquilius* with 29 specimens, representing 4.7%; and *Necrophorus vespillo* with 25 specimens, representing 3.51% of the total arthropods collected in both variants. The other species collected had between 1 and 13 specimens each.

Table 3

The beetle species collected from the vineyard in 2023

	Name of species	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**Total**
1.	Amara aenea	-	-	1	-	-	-	-	**1**
2.	Anisodactylus binotatus	1	-	1	1	-	3	3	**9**
3.	Anisodactylus signatus	-	10	-	-	-	3	-	**13**
4.	Blaps mortisaga	-	1	-	-	-	-	-	**1**
5.	Bothynoderes punctiventris	-	1	-	-	-	-	-	**1**
6.	Brachynus crepitans	-	-	-	5	-	-	-	**5**
7.	Calathus fuscipes	-	-	-	-	-	1	-	**1**
8.	Callistus lunatus	3	-	-	-	1	-	-	**4**
9.	Carabus coriaceus	-	-	1	-	-	-	-	**1**
10.	Carabus scabriusculus	1	1	1	-	-	2	1	**6**
11.	Carabus violaceus	-	-	-	-	-	-	2	**2**
12.	Cassida nebulosa	2	1	1	-	-	-	-	**4**
13.	Cassida viridis	-	-	1	-	-	-	-	**1**
14.	Chaetarthria seminulum	-	-	-	-	1	-	-	**1**
15.	Crypticus quisquilius	1	2	-	5	1	4	16	**29**
16.	Dermestes laniarius	2	6	17	3	2	4	-	**34**
17.	Ectobius lapponicus	3	4	7	3	-	19	11	**47**
18.	Harpalus calceatus	1	2	-	5	1	3	-	**12**
19.	Harpalus distinguendus	-	-	-	1	-	2	-	**3**
20.	Harpalus rubripes	-	1	-	-	-	1	-	**2**
21.	Harpalus tardus	-	3	1	2	1	-	-	**7**
22.	Hister purpurascens	-	-	-	-	-	-	1	**1**
23.	Licinus cassideus	1	-	-	-	-	-	-	**1**
24.	Mordella aculeata	-	-	-	-	1	-	-	**1**
25.	Mylacus rotundatus	-	-	-	-	-	-	1	**1**
26.	Necrophorus vespillo	-	2	13	-	-	7	3	**25**
27.	Onthophagus ovatus	83	29	71	32	2	209	3	**429**
28.	Opatrum sabulosum	5	2	11	10	3	5	4	**40**
29.	Ophonus azureus	1	-	2	1	-	1	-	**5**
30.	Ophonus puncticollis	-	-	1	-	1	-	1	**3**
31.	Otiorhynchus corvus	-	-	1	-	1	2	1	**5**
32.	Pedinus femoralis	1	-	-	-	2	-	-	**3**
33.	Ploeonomus monilicornis	-	-	-	-	-	-	2	**2**
34.	Pseudophonus pubescens	1	1	-	1	-	-	-	**3**
35.	Sitona lineatus	-	-	-	-	-	1	-	**1**
36.	Staphylinus caesareus	1	5	-	-	-	-	1	**7**
37.	Trox sabulosum	1	-	-	-	-	1	-	**2**
TOTAL		**108**	**71**	**130**	**69**	**17**	**268**	**50**	**713**

CONCLUSIONS

The collection of epigeous beetle species was carried out using Barber traps (pitfall traps) throughout 2023, with seven collections on the following dates: 10.06, 30.06, 10.07, 16.07, 20.07, 02.08, and 14.08.

Except for one collection on 20.07, where 3 specimens belonging to 3 species were collected in the treated variant, and 3 specimens belonging to 2 species in the untreated variant, in all other collections, the untreated variant had a higher number of species and an equal or greater number of specimens.

During the observation period across both variants, a total of 713 specimens of epigeal arthropods were collected. The species with the highest number of specimens were Ontophagus sabulosum with 40 specimens, *Dermestes laniarius* with 34 specimens, *Crypticus quisquilius* with 29 specimens, and *Necrophorus vespillo w*ith 25 specimens.

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