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STUDY ON THE STRUCTURE, DYNAMICS, ABUNDANCE AND OTHER ECOLOGICAL INDICATORS OF ARTHROPOD SPECIES IN PEA CROPS IN NORTH-EAST ROMANIA

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Abstract

The research was carried out during two years, 2023 and 2024, in a pea crop located in the north-east of Romania, in the Răducăneni locality of Iaşi county. In the study, the pitfall traps, filled with a 2.5% NaCl solution. We are used 12 traps, arranged in two rows of 6 traps for each, to carry out the research. The traps were placed at distances of 8-10 meters between them, and a distance of 12 meters was maintained between rows. The material collected in the traps was appropriately labeled, each label indicating the trap number and the date of harvest. In 2023, the collection of material from traps was carried out on 10 harvested, but in 2024, a number of 6 harvests of the material from the traps were carried out. The species most frequently collected and which also had the most specimens collected were Opatrum sabulosum, Coccinella 7 punctata, Dermestes laniarius, orthopters species, Arachnids etc.

Key words*: ecological indicators, pea crops, arthropod species.*

INTRODUCTION

The study of arthropods in agricultural ecosystems is an area of interest in applied ecology, with significant implications for understanding the dynamics and stability of these ecosystems.

The study of epigeic fauna in agroecosystems is an essential aspect of ecological and agricultural research, directly impacting the dynamics of pest and predator populations, as well as soil health (Malachi and Mustea, 1993; Sabluk et al., 2021).

In this context, pea crops (*Pisum sativum* L.) provide a diverse habitat for numerous arthropod groups, including beetles and spiders, which play an important role in regulating harmful populations.

The results obtained can provide relevant information for the sustainable management of crops and biodiversity conservation, with practical implications for plant protection and reducing pesticide use through the promotion of natural biological control.

In this context, pea crops (*Pisum sativum* L.) offer a diverse habitat for numerous arthropod groups, including beetles and spiders, which play an important role in regulating harmful populations (Maneva et al., 2023).

The technology for cultivating peas involves several essential stages, from soil preparation and sowing to harvesting and phytosanitary protection. Peas prefer well-drained soils with a neutral to slightly acidic pH, and proper soil preparation is necessary to ensure good germination and plant development. Sowing is done in early spring at depths of 4-6 cm, with an optimal density that varies depending on the variety and the intended use of the crop.

Peas are a leguminous crop of great economic and agricultural importance, due to their nutritional value and their role in improving soil fertility (Rusch et al., 2016).

Due to their ability to fix nitrogen biologically through symbiotic bacteria (*Rhizobium*), peas contribute to reducing the need for nitrogen fertilizers and increasing soil productivity. They are used both for human consumption, in the form of dried or fresh beans, and as animal feed, being high in protein, fiber, and vitamins.

MATERIALS AND METHODS

This study aims to identify the predominant species, assess their diversity and roles within the agricultural ecosystem, and determine the factors that influence these ecological traits (Popov et al., 2005).

Barber traps are an effective and widely used method for collecting and monitoring epigeic fauna, using bowls buried at ground level and filled to 70% with a 2.5% NaCl solution. This method provided valuable data on the composition, abundance, distribution, dominance, and ecological significance of species in pea crops (Tălmaciu et al., 2019).

By using this method, the present study aims to analyze the diversity and structure of epigeic arthropod communities in pea crops, highlighting the ecological factors that influence these populations and contributing to a better understanding of the ecological interactions within the crop.

Pea crops (*Pisum sativum*) in northeastern Romania provide a suitable habitat for a wide range of arthropod species, which can affect both agricultural production and the ecological structure of these crops. Arthropods play an essential role in ecological processes such as pollination, natural pest control, and nutrient recycling, but they can also become limiting factors if their population increases uncontrollably.

In the stationary site represented by a pea crop cultivated in the Raducaneni commune during the two years of observation (2023-2024), the primary focus was on evaluating and centralizing the faunal structure to identify the insect groups that pose problems in this crop, as well as the beneficial fauna within this ecosystem.

This study represents an important contribution to understanding the complexity of the relationships between arthropods and pea crops, with the potential to support the development of more environmentally friendly agricultural practices.

The results obtained can provide relevant information for the sustainable management of crops and biodiversity conservation, with practical implications for plant protection and reducing pesticide use by promoting natural biological control.

RESULTS AND DISCUSSIONS

An essential role in the ecological balance of agricultural crops is played by the entomofauna in these agroecosystems, considering both beneficial and harmful species. In pea crops (*Pisum sativum*), the presence of insects can influence productivity through direct effects and interactions with other environmental factors.

Entomofauna in pea crops plays a crucial role in the agricultural ecology of this ecosystem, including both beneficial and harmful species. Using the Barber method for insect collection, this study analyzes their diversity and abundance, highlighting both beneficial and harmful species that influence the pea crop.

Table 1. The situation regarding the number of collections in which each species was collected during the period May-September, in 2023, and the type of food

No.	Name of species	Harvest										No. of traps	Total samples	Type of food***
		I	II	III	IV	V	VI	VI	VIII	IX	X			
1.	*Dermestes laniarius*	55	104	45	17	2	8	6	34	2	4	55	277	P
2.	*Messor structor*	10	20	9	0	52	144	20	21	5	10	33	274	P
3.	*Coccinella septempunctata*	128	74	29	33	0	0	0	0	0	0	34	201	P
4.	*Phalangium opilio*	46	15	36	17	3	10	7	15	2	2	50	151	P
5.	*Pseudophonus pubescens*	4	0	0	0	6	3	3	5	1	122	26	136	P
6.	*Dermestes lardarius*	22	20	18	0	0	0	0	0	0	0	15	60	P
7.	*Opatrum sabulosum*	21	27	11	0	0	0	0	0	0	1	25	59	F
8.	*Pyrrhocoris apterus*	14	3	0	0	0	0	0	0	6	6	14	29	F
9.	*Lixus cardui*	0	0	1	0	0	0	4	11	0	10	8	26	F
10.	*Hipodamia variegata*	4	15	0	1	1	0	0	0	0	0	14	22	P
11.	*Anthicus floralis*	0	0	20	0	0	0	0	0	0	0	5	20	P
12.	*Harpalus distinguendus*	14	1	0	3	2	0	0	0	0	0	9	20	D
13.	*Sitona lineatus*	20	0	0	0	0	0	0	0	0	0	2	20	I
14.	*Polydrusus amoenus*	0	18	0	0	0	0	0	0	0	0	5	18	D
15.	*Formicomus pedestris*	4	8	0	0	2	0	3	0	0	0	11	17	P
16.	*Lygaeus aequestris*	0	0	3	0	2	1	0	0	0	10	7	16	D
17.	*Bothynoderes punctiventris*	15	0	0	0	0	0	0	0	0	0	1	15	D
18.	*Coccinella 11punctata*	14	0	0	0	0	0	0	0	0	0	2	14	P

19.	*Pseudophonus griseus*	0	0	0	0	2	9	0	0	0	1	7	12	P
20.	*Cassida nebulosa*	8	3	0	0	1	2	0	1	0	0	7	15	D
21.	*Anthicus humeralis*	0	0	10	0	0	0	0	0	0	0	5	10	I
22.	*Oxythyrea funesta*	10	0	0	0	0	0	0	0	0	0	4	10	P
23.	*Harpalus tardus*	6	2	0	0	0	1	0	0	0	0	7	9	D
24.	*Podagrica malvae*	1	1	5	1	0	0	0	0	0	0	5	8	D
25.	*Aphthona euphorbiae*	0	0	4	0	0	0	2	0	1	0	5	7	D
26.	*Anisodactylus binotatus*	4	2	0	0	0	0	0	0	0	0	4	6	P
27.	*Harpalus calceatus*	3	1	0	0	1	0	0	0	0	0	4	5	P
28.	*Otiorrhynchus raucus*	2	0	0	0	2	1	0	0	0	0	5	5	D
29.	*Phyllobius pyri*	0	0	5	0	0	0	0	0	0	0	3	5	D
30.	*Calathus fuscipes*	1	0	0	0	0	0	0	0	0	3	3	4	P
31.	*Chromatoilus unilineatus*	1	0	1	0	0	1	0	0	1	0	4	4	P
32.	*Eremotes punctatus*	4	0	0	0	0	0	0	0	0	0	1	4	I
33.	*Pedinus femoralis*	0	4	0	0	0	0	0	0	0	0	3	4	I
34.	*Brachynus crepitans*	3	0	0	0	0	0	0	0	0	0	3	3	P
35.	*Elater nigerimus*	1	0	0	1	1	0	0	0	0	0	3	3	P
36.	*Ophonus azureus*	1	0	0	0	0	1	1	0	0	0	3	3	P
37.	*Oxytelus inustus*	3	0	0	0	0	0	0	0	0	0	1	3	P
38.	*Amara aenea*	2	0	0	0	0	0	0	0	0	0	2	2	P
39.	*Amara apricaria*	2	0	0	0	0	0	0	0	0	0	2	2	P
40.	*Amara crenata*	0	0	0	0	0	0	0	0	0	2	1	2	P
41.	*Anisodactylus signatus*	2	0	0	0	0	0	0	0	0	0	2	2	P
42.	*Ceutorhynchus macula alba*	0	1	0	0	1	0	0	0	0	0	2	2	D
43.	*Leistus fulvibarbis*	0	0	0	0	1	0	1	0	0	0	2	2	P
44.	*Metabletus truncatelus*	1	0	0	0	0	0	1	0	0	0	2	2	P
45.	*Phyllotreta atra*	0	1	0	0	0	0	0	0	1	0	2	2	D
46.	*Phyllotreta nemorum*	0	0	0	0	0	0	2	0	0	0	1	2	D
47.	*Acupalpus elegans*	0	1	0	0	0	0	0	0	0	0	1	1	P
48.	*Aglenus brunneus*	0	1	0	0	0	0	0	0	0	0	1	1	I
49.	*Aphodius granarius*	0	1	0	0	0	0	0	0	0	0	1	1	I
50.	*Baris artemisiae*	0	0	0	0	0	1	0	0	0	0	1	1	D
51.	*Bruchus pisorum*	0	1	0	0	0	0	0	1	0	0	2	2	D
52.	*Cantharis fusca*	0	0	0	1	0	0	0	0	0	0	1	1	P
53.	*Cantharis nigricans*	0	1	0	0	0	0	0	0	0	0	1	1	P
54.	*Carabus coriaceus*	0	0	0	0	1	0	0	0	0	0	1	1	P
55.	*Chrysopa perla*	0	0	0	0	0	0	0	0	1	0	1	1	P
56.	*Crypticus quisquilius*	0	0	0	0	0	1	0	0	0	0	1	1	I
57.	*Leptinotarsa decemlineata*	0	0	0	0	0	0	0	0	1	0	1	1	D
58.	*Longitarsus suturalis*	0	0	0	0	0	0	0	0	1	0	1	1	D
59.	*Malachius bipustulatus*	0	1	0	0	0	0	0	0	0	0	1	1	P
60.	*Meligethes aeneus*	1	0	0	0	0	0	0	0	0	0	1	1	D
61.	*Nebria jockischii*	0	0	1	0	0	0	0	0	0	0	1	1	P
62.	*Notaris maerkeli*	0	0	1	0	0	0	0	0	0	0	1	1	I
63.	*Ophonus rupicola*	0	0	1	0	0	0	0	0	0	0	1	1	P
64.	*Otiorrhynchus ovatus*	0	0	0	1	0	0	0	0	0	0	1	1	D
65.	*Otiorrhynchus pinastri*	0	0	1	0	0	0	0	0	0	0	1	1	D
66.	*Pentodon idiota*	1	0	0	0	0	0	0	0	0	0	1	1	D
67.	*Platynaspis luteorubra*	1	0	0	0	0	0	0	0	0	0	1	1	P
68.	*Pleurophorus caesus*	1	0	0	0	0	0	0	0	0	0	1	1	I
69.	*Pterostichus vernalis*	1	0	0	0	0	0	0	0	0	0	1	1	P
70.	*Rhinomias forticornis*	0	0	1	0	0	0	0	0	0	0	1	1	D
71.	*Rhyzophagus picipes*	0	0	0	0	0	0	1	0	0	0	1	1	I
72.	*Stenopterus rufus*	0	0	1	0	0	0	0	0	0	0	1	1	D
Total 72 species		431	323	203	75	80	183	51	88	22	171	120	1536	

***P=pradatory species, D=harmful species, I= indifferent species

Between May and September 2023, several insect species were collected in the pea crop using Barber traps. Among the most frequent species were *Dermestes laniarius* (277 specimens), *Messor structor* (274 specimens), and *Coccinella septempunctata* (201 specimens). Other species of interest included *Phalangium opilio* (151 specimens) and *Pseudophonus pubescens* (136 specimens). Additionally, rarer species such as *Anthicus floralis* and *Polydrusus amoenus* were collected, with a small number of specimens (20 and 18, respectively). Overall, various species of both beneficial and harmful insects were captured throughout the summer, having a significant impact.

Table 2. The situation regarding the calculation of ecological factors for each species during the period May -September, in the pea crop in 2023

No.	Name of species	No. traps	Abundance	Constancy		Dominance		W	
				%	***	%	***	%	***
1.	*Dermestes laniarius*	55	277	45,8	C2	18,0	D5	8,244	W4
2.	*Messor structor*	33	274	27,5	C2	17,8	D5	4,895	W3
3.	*Coccinella septempunctata*	34	201	28,3	C2	13,1	D5	3,707	W3
4.	*Phalangium opilio*	50	151	41,7	C2	9,8	D4	4,086	W3
5.	*Pseudophonus pubescens*	26	136	21,7	C1	8,9	D4	1,931	W3
6.	*Dermestes lardarius*	15	60	12,5	C1	3,9	D3	0,604	W2
7.	*Opatrum sabulosum*	25	59	20,8	C1	3,8	D3	0,790	W2
8.	*Pyrrhocoris apterus*	14	29	11,7	C1	1,9	D2	0,222	W2
9.	*Lixus cardui*	8	26	6,7	C1	1,7	D2	0,114	W2
10.	*Hipodamia variegata*	14	22	11,7	C1	1,4	D2	0,164	W2
11.	*Harpalus distinguendus*	9	20	7,5	C1	1,3	D2	0,097	W1
12.	*Sitona lineatus*	2	20	1,7	C1	1,3	D2	0,022	W1
13.	*Anthicus floralis*	5	20	4,2	C1	1,3	D2	0,055	W1
14.	*Polydrusus amoenus*	5	18	4,2	C1	1,3	D2	0,050	W1
15.	*Formicomus pedestris*	11	17	9,1	C1	1,2	D2	0,100	W2
16.	*Lygaeus aequestris*	7	16	5,8	C1	1,1	D1	0,058	W1
17.	*Bothynoderes punctiventris*	1	15	0,8	C1	1,0	D1	0,007	W1
18.	*Coccinella 11punctata*	2	14	1,7	C1	0,9	D1	0,015	W1
19.	*Pseudophonus griseus*	7	12	5,8	C1	0,9	D1	0,046	W1
20.	*Oxythyrea funesta*	4	10	3,3	C1	0,8	D1	0,019	W1
21.	*Anthicus humeralis*	5	10	4,2	C1	0,6	D1	0,025	W1
22.	*Harpalus tardus*	7	9	5,8	C1	0,6	D1	0,035	W1
23.	*Cassida nebulosa*	3	8	2,5	C1	0,6	D1	0,012	W1
24.	*Podagrica malvae*	5	8	4,2	C1	0,5	D1	0,021	W1
25.	*Aphthona euphorbiae*	5	7	4,2	C1	0,5	D1	0,016	W1
26.	*Anisodactylus binotatus*	4	6	3,3	C1	0,4	D1	0,010	W1
27.	*Harpalus calceatus*	4	5	3,3	C1	0,3	D1	0,010	W1
28.	*Otiorrhynchus raucus*	5	5	4,2	C1	0,3	D1	0,013	W1
29.	*Phyllobius pyri*	3	5	2,5	C1	0,3	D1	0,007	W1
30.	*Calathus fuscipes*	3	4	2,5	C1	0,3	D1	0,007	W1
31.	*Eremotes punctatus*	1	4	0,8	C1	0,3	D1	0,002	W1
32.	*Chromatoilus*	4	4	3,3	C1	0,3	D1	0,010	W1
33.	*Pedinus femoralis*	3	4	2,5	C1	0,3	D1	0,007	W1
34.	*Brachynus crepitans*	3	3	2,5	C1	0,2	D1	0,005	W1
35.	*Elater nigerimus*	3	3	2,5	C1	0,2	D1	0,005	W1
36.	*Ophonus azureus*	3	3	2,5	C1	0,2	D1	0,005	W1
37.	*Oxytelus inustus*	1	3	0,8	C1	0,2	D1	0,002	W1
38.	*Cassida nebulosa*	3	3	2,5	C1	0,2	D1	0,005	W1
39.	*Amara aenea*	2	2	1,7	C1	0,1	D1	0,002	W1
40.	*Amara apricaria*	2	2	1,7	C1	0,1	D1	0,002	W1
41.	*Anisodactylus signatus*	2	2	1,7	C1	0,1	D1	0,002	W1
42.	*Metabletus truncatelus*	2	2	1,7	C1	0,1	D1	0,002	W1
43.	*Ceutorhynchus macula alba*	2	2	1,7	C1	0,1	D1	0,002	W1
44.	*Phyllotreta atra*	2	2	1,7	C1	0,1	D1	0,002	W1
45.	*Phyllotreta nemorum*	1	2	0,8	C1	0,1	D1	0,001	W1
46.	*Amara crenata*	1	2	0,8	C1	0,1	D1	0,001	W1
47.	*Meligethes aeneus*	1	1	0,8	C1	0,1	D1	0,001	W1
48.	*Pentodon idiota*	1	1	0,8	C1	0,1	D1	0,001	W1
49.	*Platynaspis luteorubra*	1	1	0,8	C1	0,1	D1	0,001	W1
50.	*Pleurophorus caesus*	1	1	0,8	C1	0,1	D1	0,001	W1
51.	*Pterostichus vernalis*	1	1	0,8	C1	0,1	D1	0,001	W1
52.	*Acupalpus elegans*	1	1	0,8	C1	0,1	D1	0,001	W1
53.	*Aglenus brunneus*	1	1	0,8	C1	0,1	D1	0,001	W1
54.	*Aphodius granarius*	1	1	0,8	C1	0,1	D1	0,001	W1
55.	*Bruchus pisorum*	1	1	0,8	C1	0,1	D1	0,001	W1
56.	*Cantharis nigricans*	1	1	0,8	C1	0,1	D1	0,001	W1
57.	*Malachius bipustulatus*	1	1	0,8	C1	0,1	D1	0,001	W1
58.	*Nebria jockischii*	1	1	0,8	C1	0,1	D1	0,001	W1
59.	*Notaris maerkeli*	1	1	0,8	C1	0,1	D1	0,001	W1
60.	*Ophonus rupicola*	1	1	0,8	C1	0,1	D1	0,001	W1
61.	*Otiorrhynchus pinastri*	1	1	0,8	C1	0,1	D1	0,001	W1
62.	*Rhinomias forticornis*	1	1	0,8	C1	0,1	D1	0,001	W1
63.	*Stenopterus rufus*	1	1	0,8	C1	0,1	D1	0,001	W1
64.	*Cantharis fusca*	1	1	0,8	C1	0,1	D1	0,001	W1
65.	*Otiorrhynchus ovatus*	1	1	0,8	C1	0,1	D1	0,001	W1
66.	*Carabus coriaceus*	1	1	0,8	C1	0,1	D1	0,001	W1
67.	*Leistus fulvibarbis*	1	1	0,8	C1	0,1	D1	0,001	W1
68.	*Baris artemisiae*	1	1	0,8	C1	0,1	D1	0,001	W1
69.	*Crypticus quisquilius*	1	1	0,8	C1	0,1	D1	0,001	W1
70.	*Leistus fulvibarbis*	1	1	0,8	C1	0,1	D1	0,001	W1

71.	*Rhyzophagus picipes*	1	1	0,8	C1	0,1	D1	0,001	W1
72.	*Bruchus pisorum*	1	1	0,8	C1	0,1	D1	0,001	W1
73.	*Leptinotarsa decemlineata*	1	1	0,8	C1	0,1	D1	0,001	W1
74.	*Longitarsus suturalis*	1	1	0,8	C1	0,1	D1	0,001	W1
75.	*Chrysopa perla*	1	1	0,8	C1	0,1	D1	0,001	W1
Total 75 species		120	1536						

The data in Table 2 refer to the ecological factors of the species collected between May and September 2023 in the pea crop, considering parameters such as Abundance, Constancy, Dominance, and Ecological Significance Index. The most abundant species are *Dermestes laniarius, Messor structor,* and *Coccinella septempunctata*, with significant abundance values (over 200 specimens). Most species have a high constancy (C2), indicating frequent presence. Constancy (C1-C4) ranges from accidental species (C1, 1-2%) such as *Bothynoderes punctiventris* and *Amara aenea*, to constant species (C3, 50.1-75%), such as *Phalangium opilio*. Species with high constancy, such as *Dermestes laniarius*, are essential in the ecosystem. Species that appear very rarely in the area or within a limited period, with low presence, are considered accidental with sporadic occurrence.

Dominance (D1-D5) reflects the presence and influence of species. Subrecent species (D1), such as *Amara apricaria*, have low presence, while *Dermestes laniarius* and *Messor structor* are eudominant (D5), having a major impact on the community.

The Ecological Significance Index shows variable adaptability (W1-W5), ranging from accidental species with low adaptability (W1), such as *Phyllobius pyri*, to highly adaptable species (W4), such as *Dermestes laniarius*, which are well integrated into the ecosystem.

Table 3. The situation regarding the number of collections in which each species was collected during the period May-September, 2024

No.	Name of species	Harvest						No. traps	Total samples	Food types ***
		I	II	III	IV	V	VI			
1.	*Coccinella septempunctata*	161	41	65	1	0	0	37	278	P
2.	*Opatrum sabulosum*	172	3	1	0	0	0	15	274	D
3.	*Phalangium opilio*	29	33	66	12	16	6	44	201	P
4.	*Pseudophonus pubescens*	1	0	8	11	47	85	31	151	P
5.	*Messor structor*	11	1	40	32	53	1	20	136	P
6.	*Dermestes laniarius*	10	7	47	3	5	2	33	60	P
7.	*Hipodamia variegatta*	38	11	23	0	0	0	19	57	P
8.	*Lygaeus aequsris*	2	8	12	7	8	11	22	27	I
9.	*Sitona lineatus*	26	0	0	0	0	0	6	26	D
10.	*Crypticus quisquilius*	18	6	0	0	0	0	11	22	D
11.	*Cleonus punctiger*	0	0	21	0	0	0	1	20	D
12.	*Pedinus femoralis*	8	0	9	0	0	0	7	20	D
13.	*Podonta nigrita*	0	0	14	1	0	0	8	20	P
14.	*Podagrica malvae*	0	12	1	2	0	3	11	18	I
15.	*Formicomus pedestris*	9	0	0	1	2	0	6	17	P
16.	*Pedinus femoralis*	0	10	0	0	0	0	13	16	I
17.	*Harpalus distinguendus*	1	0	5	0	0	1	6	15	P
18.	*Chromatoiulus unilineatus*	5	0	1	0	0	1	3	14	P
19.	*Otiorhynchus sulcatus*	6	0	0	0	0	0	4	12	I
20.	*Anisodactylus binotatus*	0	1	5	0	0	0	3	15	P
21.	*Pseudophonus griseus*	0	0	0	0	0	5	3	10	P
22.	*Harpalus tardus*	1	1	0	0	1	1	4	10	P
23.	*Hister purpurascens*	1	2	1	0	0	0	4	9	P
24.	*Anthicus floralis*	2	0	0	0	2	0	2	8	I
25.	*Adalia bipunctata*	0	0	4	0	0	0	2	7	P
26.	*Tanymecus palliatus*	1	1	1	0	0	0	3	6	D
27.	*Botynoderes punctiventris*	0	2	0	1	0	0	3	5	D
28.	*Ophonus azureus*	0	1	1	0	0	0	2	5	P
29.	*Chrysomella menthastri*	0	0	2	0	0	0	2	5	I
30.	*Corymbites affinis*	0	0	2	0	0	0	2	4	D
31.	*Longitarsus anchusae*	0	0	0	1	1	0	2	4	D
32.	*Aleochara laevigata*	1	0	0	0	0	0	1	4	P
33.	*Aleochara moereus*	1	0	0	0	0	0	1	4	P
34.	*Calathus fuscipes*	1	0	0	0	0	0	1	3	P
35.	*Cantharis fusca*	1	0	0	0	0	0	1	3	P
36.	*Hister sepulchralis*	1	0	0	0	0	0	1	3	P
37.	*Metabletus foveatus*	1	0	0	0	0	0	1	3	P

38.	*Phyllobius pyri*	1	0	0	0	0	0	1	2	D
39.	*Tanymecus dilaticolis*	1	0	0	0	0	0	1	2	D
40.	*Valgus hemipterus*	1	0	0	0	0	0	1	2	I
41.	*Amara familiaris*	0	1	0	0	0	0	1	2	P
42.	*Bruchus pisorum*	0	1	0	0	0	0	1	2	D
43.	*Crepidodera transversa*	1	0	0	0	0	0	1	2	D
44.	*Formicomus gracilis*	1	0	0	0	0	0	1	2	P
45.	*Oedemera virescens*	0	1	0	0	0	0	1	2	D
46.	*Ophonus puncticolis*	0	1	0	0	0	0	1	2	P
47.	*Tenebroides mauritanicus*	0	1	0	0	0	0	1	1	D
48.	*Agriotes lineatus*	0	0	1	0	0	0	1	1	D
49.	*Harpalus calceatus*	0	0	1	0	0	0	1	1	P
50.	*Necrophorus vespillo*	0	0	1	0	0	0	1	1	I
51.	*Pentodon idiota*	0	0	1	0	0	0	1	2	D
52.	*Polydrusus confluens*	0	0	1	0	0	0	1	1	D
53.	*Agriotes ustulatus*	0	0	0	1	0	0	1	1	D
54.	*Amara aenea*	0	0	0	1	0	0	1	1	P
55.	*Coccidula scutellata*	0	0	0	1	0	0	1	1	P
56.	*Elater elongatulus*	0	0	0	1	0	0	1	1	D
57.	*Elater erythtogonus*	0	0	0	1	0	0	1	1	D
58.	*Ptreyngium crenatum*	0	0	0	1	0	0	1	1	I
59.	*Amara crenata*	0	0	0	0	1	0	1	1	P
60.	*Mecinus janthinus*	0	0	0	0	1	0	1	1	D
61.	*Microlestes maurus*	0	0	0	0	1	0	1	1	P
62.	*Soronia punctatissima*	0	0	0	0	1	0	1	1	D
63.	*Amara aenea*	0	0	0	0	0	1	1	1	P
64.	*Procerus tibialis*	0	0	0	0	0	1	1	1	P
Total	64 species	513	145	334	78	139	118	72	1323	

***P=pradatory species, D=harmful species, I= indifferent species

The data summarized in Table 3 presents the distribution of species based on the number of collections made between May and September 2024. It is observed that species such as *Coccinella septempunctata, Opatrum sabulosum*, and *Phalangium opilio* are the most frequent, with a large number of specimens collected. On the other hand, other species such as *Pseudophonus pubescens* and *Messor structor* are less abundant, but still significant. Occasional species, such as *Cleonus punctiger* and *Podagrica malvae*, only appear in specific months.

Out of the total 1,323 specimens collected, 278 belong to *Coccinella septempunctata*, followed by *Opatrum sabulosum, Phalangium opilio, Pseudophonus pubescens,* and *Messor structor*, all with over 100 specimens. The species vary depending on their preferred food types (*P, D, I*), and the total of 64 species reflects an important ecological diversity during this period.

Tracking the dynamics of the collected species shows that 32 out of the 64 species collected recorded only a single specimen, categorizing them as occasional species. This variability indicates a large diversity of species depending on the habitat and environmental conditions.

Table 4. The situation regarding the calculation of ecological factors for each species during the period May-September, in the pea crop in 2024

No.	Name of species	No. traps	Abundance	Constancy		Dominance		W	
				%	***	%	***	%	***
1.	*Phalangium opilio*	44	162	61,2	C3	12,2	D5	7,466	W4
2.	*Coccinella septempunctata*	37	268	51,4	C3	20,3	D5	10,434	W5
3.	*Dermestes laniarius*	33	74	45,8	C2	5,6	D4	2,565	W3
4.	*Pseudophonus pubescens*	31	152	43,1	C2	11,5	D5	4,956	W3
5.	*Lygaeus aequsris*	22	48	30,5	C2	3,6	D3	1,102	W3
6.	*Messor structor*	20	138	27,8	C2	10,4	D5	2,891	W3
7.	*Hipodamia variegatta*	19	72	26,4	C2	5,4	D4	1,425	W3
8.	*Opatrum sabulosum*	15	176	20,8	C1	13,3	D5	2,766	W3
9.	*Pedinus femoralis*	13	10	18,1	C1	0,8	D1	0,145	W2
10.	*Podagrica malvae*	11	14	15,3	C1	1,1	D2	0,168	W2
11.	*Crypticus quisquilius*	11	24	15,3	C1	1,8	D2	0,275	W2
12.	*Podonta nigrita*	8	15	11,2	C1	1,1	D2	0,123	W2
13.	*Pedinus femoralis*	7	17	9,7	C1	1,3	D2	0,126	W2
14.	*Harpalus distinguendus*	6	7	8,3	C1	0,5	D1	0,041	W1
15.	*Formicomus pedestris*	6	12	8,3	C1	0,9	D1	0,074	W1
16.	*Sitona lineatus*	6	26	8,3	C1	1,9	D2	0,158	W2

17.	*Harpalus tardus*	4	4	5,6	C1	0,3	D1	0,017	W1
18.	*Hister purpurascens*	4	4	5,6	C1	0,3	D1	0,017	W1
19.	*Otiorhynchus sulcatus*	4	6	5,6	C1	0,5	D1	0,028	W1
20.	*Tanymecus palliatus*	3	3	4,1	C1	0,2	D1	0,008	W1
21.	*Botynoderes punctiventris*	3	3	4,1	C1	0,2	D1	0,008	W1
22.	*Pseudophonus griseus*	3	5	4,1	C1	0,4	D1	0,016	W1
23.	*Anisodactylus binotatus*	3	6	4,1	C1	0,5	D1	0,020	W1
24.	*Chromatoiulus unilineatus*	3	7	4,1	C1	0,5	D1	0,020	W1
25.	*Ophonus azureus*	2	2	2,8	C1	0,2	D1	0,006	W1
26.	*Chrysomella menthastri*	2	2	2,8	C1	0,2	D1	0,006	W1
27.	*Corymbites affinis*	2	2	2,8	C1	0,2	D1	0,006	W1
28.	*Longitarsus anchusae*	2	2	2,8	C1	0,2	D1	0,006	W1
29.	*Anthicus floralis*	2	4	2,8	C1	0,3	D1	0,008	W1
30.	*Adalia bipunctata*	2	4	2,8	C1	0,3	D1	0,008	W1
31.	*Aleochara laevigata*	1	1	1,4	C1	0,1	D1	0,001	W1
32.	*Aleochara moereus*	1	1	1,4	C1	0,1	D1	0,001	W1
33.	*Calathus fuscipes*	1	1	1,4	C1	0,1	D1	0,001	W1
34.	*Cantharis fusca*	1	1	1,4	C1	0,1	D1	0,001	W1
35.	*Hister sepulchralis*	1	1	1,4	C1	0,1	D1	0,001	W1
36.	*Metabletus foveatus*	1	1	1,4	C1	0,1	D1	0,001	W1
37.	*Phyllobius pyri*	1	1	1,4	C1	0,1	D1	0,001	W1
38.	*Tanymecus dilaticolis*	1	1	1,4	C1	0,1	D1	0,001	W1
39.	*Valgus hemipterus*	1	1	1,4	C1	0,1	D1	0,001	W1
40.	*Amara familiaris*	1	1	1,4	C1	0,1	D1	0,001	W1
41.	*Bruchus pisorum*	1	1	1,4	C1	0,1	D1	0,001	W1
42.	*Crepidodera transversa*	1	1	1,4	C1	0,1	D1	0,001	W1
43.	*Formicomus gracilis*	1	1	1,4	C1	0,1	D1	0,001	W1
44.	*Oedemera virescens*	1	1	1,4	C1	0,1	D1	0,001	W1
45.	*Ophonus puncticolis*	1	1	1,4	C1	0,1	D1	0,001	W1
46.	*Tenebroides mauritanicus*	1	1	1,4	C1	0,1	D1	0,001	W1
47.	*Agriotes lineatus*	1	1	1,4	C1	0,1	D1	0,001	W1
48.	*Harpalus calceatus*	1	1	1,4	C1	0,1	D1	0,001	W1
49.	*Necrophorus vespillo*	1	1	1,4	C1	0,1	D1	0,001	W1
50.	*Pentodon idiota*	1	1	1,4	C1	0,1	D1	0,001	W1
51.	*Polydrusus confluens*	1	1	1,4	C1	0,1	D1	0,001	W1
52.	*Agriotes ustulatus*	1	1	1,4	C1	0,1	D1	0,001	W1
53.	*Amara aenea*	1	1	1,4	C1	0,1	D1	0,001	W1
54.	*Coccidula scutellata*	1	1	1,4	C1	0,1	D1	0,001	W1
55.	*Elater elongatulus*	1	1	1,4	C1	0,1	D1	0,001	W1
56.	*Elater erythtogonus*	1	1	1,4	C1	0,1	D1	0,001	W1
57.	*Ptreyngium crenatum*	1	1	1,4	C1	0,1	D1	0,001	W1
58.	*Amara crenata*	1	1	1,4	C1	0,1	D1	0,001	W1
59.	*Mecinus janthinus*	1	1	1,4	C1	0,1	D1	0,001	W1
60.	*Microlestes maurus*	1	1	1,4	C1	0,1	D1	0,001	W1
61.	*Soronia punctatissima*	1	1	1,4	C1	0,1	D1	0,001	W1
62.	*Amara aenea*	1	1	1,4	C1	0,1	D1	0,001	W1
63.	*Procerus tibialis*	1	1	1,4	C1	0,1	D1	0,001	W1
64.	*Cleonus punctiger*	1	21	1,4	C1	0,1	D2	0,022	W1
Total 64 species		72	1323						

Ecological analysis for May-September 2024 (Table 4) reveals that *Coccinella septempunctata* and *Phalangium opilio* are the most dominant species, exhibiting high frequency, constancy, and abundance, and playing a pivotal role in shaping the ecosystem, while species like *Dermestes laniarius, Pseudophonus pubescens*, and *Messor structor*, though important, are less dominant. Over two years of study, the epigeic fauna in the pea crop is primarily composed of beneficial species, followed by harmful ones, with indifferent species representing a relatively small proportion in the overall community structure.

Between 2023 and 2024 (Table 5, Figure 1), the total number of specimens collected decreased from 1,536 to 1,323, with a significant reduction in predator species (81% → 72%) and an increase in harmful species (16% → 22%). This change suggests a potential ecological imbalance that could favor the proliferation of pests.

The increase in indifferent species (3% → 6%) indicates a modification of the habitat. The decline in predator species may be caused by climatic or agricultural factors, requiring biodiversity protection measures to maintain balance in this pea crop.

Table 5. Centralization of the data obtained over the two years of research regarding the feeding spectrum of the collected species

No	Food type	2023		2024	
		No. of samples	%	No. of samples	%
1	Pradatory species	1246	81	948	72
2	Harmful species	246	16	288	22
3	Indifferent species	44	3	87	6
Total samples		1536	100	1323	100

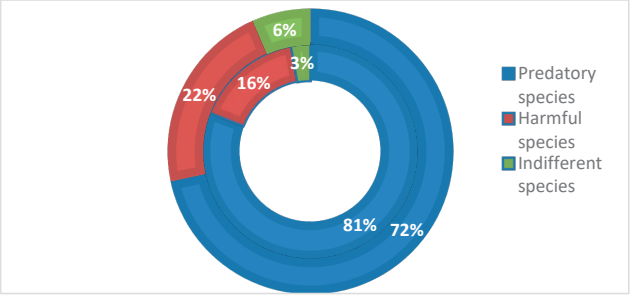

Figure 1. Graphical representation of the epigeic fauna structure based on the type of food in 2023-2024 period

CONCLUSIONS

The structure of the epigeic arthropod fauna has changed over the course of the observations. Between 2023 and 2024, there was a decrease in the total number of species collected, with a significant reduction in predator species and an increase in harmful species, indicating a potential ecological imbalance.

Dominant species from the beneficial fauna, such as *Coccinella septempunctata* and *Phalangium opilio*, were the most prevalent, showing high constancy and abundance, which gives them an important role in maintaining the balnce of the ecosystem.

The significance of eudominant species, such as *Dermestes laniarius*, *Pseudophonus pubescens*, and *Messor structor*, is also noteworthy, as they have a significant influence on the ecosystem, although they are not as dominant as *Coccinella septempunctata*, also contributing to ecological balance.

The increase in the number of harmful species from 16% to 22% could affect the pea crop, requiring additional pest control and protection measures to prevent damage to the production.

Analyzing the data collected during the two years of observation, we can see a decrease in the number of usedfull species and their specimens, as well as an increase in indifferent species, suggesting a modification of the habitat. Therefore, actions to protect the fauna are necessary to maintain a stable ecological balance.

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