

## EPIGENOUS FAUNA (ARTHROPODA: ARANEAE, INSECTA) IN THE RYE CROP FROM HORODNIC DE JOS (SUCEAVA COUNTY, ROMANIA)

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**Abstract.** The entomofaunal material samples were made with the help of some soil pitfalls in the period April-August 2014 in a rye crop from Horodnic de Jos village, Suceava County, Romania. In total, there were collected 504 arthropoda specimens that belonged to the following classes: Arachnida, Miriapoda and Insecta. The Insects were net dominant that possessed 98% from the total of the collected individuals. Regarding to what concerns the insects, there were identified six orders, the dominant ones Coleoptera (59.9%), followed by Hymenoptera (34.0%). There were identified 11 families of Coleoptera, the most individuals belonging to the family of Carabidae (51.7%), followed by Dermestidae. Referring to Carabidae, there were identified 12 species, the most abundance being observed in *Pseudoophonus rufipes* species (41.3%).

**Keywords:** rye crop, soil pitfalls, epigenous entomofauna, carabidae, Suceava County, Romania.

**Rezumat. Fauna epigea (Arthropoda: Araneae, Insecta) din cultura de seară din localitatea Horodnic de Jos, Județul Suceava, România.** Colectările de material entomofaunistic s-au făcut cu capcane de sol în perioada aprilie-august 2014 dintr-o cultură de seară din localitatea Horodnic de Jos, județul Suceava, România. În total s-au colectat 504 exemplare de artropode, din clasele Arachnida, Miriapoda și Insecta. Net dominante au fost Insectele care au deținut 98% din totalul indivizilor colectați. În ce privește insectele au fost identificate șase ordine, dominante fiind Coleopterele (59,9%), urmate de Hymenoptere (34,0%). Au fost identificate 11 familii de Coleoptere, cei mai mulți indivizi au aparținut familiei Carabidae (51,7%), urmată de Dermestidae. Referitor la Carabidae, au fost identificate 12 specii, abundența cea mai mare s-a constatat la specia *Pseudoophonus rufipes* (41,3%).

**Cuvinte cheie:** cultura de seară, capcane de sol, entomofaună epigea, carabide, județul Suceava, România.

### Introduction

The rye represents a straw cereal species that in Romania it's produced mainly in the North area of the country. According to its importance for Suceava County economy, we set up to investigate the pests related to this crop but also the auxiliary entomofauna. In the current paper we present the epigenous entomofauna observed from a rye crop from Horodnic de Jos village, in Suceava County.

### Material and Methods

The epigenous fauna's collecting was made with the help of 12 soil traps (Barber pitfalls), placed on a 5 m line distance between one another. The pitfalls were placed in the soil on 16 of April 2014, the material was collected from two in two weeks, until the very of August, including when the crop was collected. In all, there were made 8 samples. There was 4% formol in the pitfalls; the collecting was made with a mesh strainer. The collected material was placed in glass vessels, tagged and identified at the level of class, order, family and species (Radu & Radu, 1967; Lăcătușu & Ionescu, 1971; Lăcătușu *et al.*, 1974;

Pisică *et al.*, 2002). The primary data of Carabidae were registered and statistically analysed, calculating the abundance, the constancy, the dominance and the ecological significance index (Turculeț & Varvara, 2006).

### Results and Discussion

In total, in the period of April-August there were collected 504 individuals of Arthropoda that belonged to 3 classes: Arachnida, Miriapoda and Insecta. The insects were net dominant that possessed 98.0% from the total individuals of the collected Arthropoda (Table 1). Referring to insects, in total, there were collected 494 individuals and were identified six orders: Orthoptera, Dermaptera, Heteroptera, Hymenoptera, Coleoptera and Diptera. The most insect specimens belonged to the order Coleoptera which possessed 59.9% from the total of insect individuals, followed by Hymenoptera (34%). The other orders were less numbering represented (Table 2). Hymenoptera were represented only by the family Formicidae and Orthoptera only by *Gryllus campestris*. Regarding Coleoptera there were collected 296 individuals which belonged to 11 families: Carabidae, Dermestidae, Elateridae, Meloidae, Tenebrionidae, Curculionidae, Silphidae, Scarabaeidae, Coccinellidae, Staphylinidae, Chrysomelidae.

The most individuals belonged to the family of Carabidae, which possessed 51.7% from the total collected individuals of Coleoptera, followed by the families Dermestidae (31.4%) and Tenebrionidae (6.4%). The rest of Coleoptera families were less numbering represented (Table 3). Although the abundance of Dermestides has a high value, the diversity of this family is low, being represented by only one species (*Dermestes lanarius* Illiger). Referring to Carabidae, there were collected 160 individuals and were identified 12 species: *Carabus cancellatus* Illiger, *Carabus scabriusculus* Ol., *Anisodactylus signatus* Panzer, *Pseudoophonus rufipes* De Geer, *Harpalus distinguendus* Duftschmid, *Pterostichus melanarius* Illiger, *Pterostichus strenuus* Linne, *Poecilus cupreus* Linne, *Metophonus punctatulus* Duftschmid, *Bembidion lampros* Hrbst., *Brachinus explodens* Duftschmid and *Brachinus crepitans*. The biggest abundance has been observed in *Pseudoophonus rufipes* which possessed 41.3% from the total Carabidae followed by *Poecilus cupreus* (22.5%), *Carabus cancellatus* (17.8%), *Pterostichus melanarius* (6.3%) and *Anisodactylus signatus* (5.6%). The rest of the species are represented by fewer individuals (Table 4). The Carabidae have presented the maximum of activity in the month of June and at the beginning of July.

The rest of the Coleoptera families were represented only by one species, excepting the family of Silphidae which is represented by two species. In the matter of numbers, only Dermestidele and Tenebrionidae possess more individuals (Table 5).

The statistic calculation applied to Carabidae, regarding the constancy of the obtained data it reveals that species *Pseudoophonus rufipes* and *Poecilus cupreus* are euconstant, *Pterostichus melanarius* is constant and the rest of the species are accessories and accidental. Regarding dominance, the species *Pseudoophonus rufipes*, *Poecilus cupreus* and *Carabus cancellatus* are eudominant, *Pterostichus melanarius* and *Anisodactylus signatus* are dominant and the rest are recedent and subrecedent (Table 6). The ecological significance index reveals that the species *Pseudoophonus rufipes* and *Poecilus cupres* are the best adapted to the ecological conditions from this place and are characteristic.

The data from the specific literature referring to this type of enthomofauna for this particular cultured plant species are few. We've compared our results with the ones that Alexandru Dascalu obtained (in manuscript), from Zvoriștea village, Suceava County, in the year 1993, observing that there aren't significant differences regarding the quality aspects, but they differ from the quantity point of view. So much so, referring to families of Coleoptera, the author has identified 12 families, the most abundance presenting the Carabidae family, but the number of Coleoptera individuals were a lot higher than in our case (2817 individuals among which 2698 individuals belonged to Carabidae). We consider that this big difference it owns in the first place to the fact that at Horodnic de Jos in the summer of 2014 and the beginning of 2014's summer there was frequently raining, low temperatures and soil differences and agricultural techniques.

**Table 1.** Abundance (A) and dominance (D) of Arthropoda collected using soil pitfalls, in the rye crop from Horodnic de Jos, Suceava County.

Taxon	Collecting dates in 2014																Total	
	29.04		12.05		30.05		12.06		30.06		12.07		29.07		14.08			
	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D
Order Araneae	1	3.1	2	4.2	-	-	-	-	-	-	1	0.9	3	4.8	-	-	7	1.4
Class Miriapoda	-	-	-	-	-	-	-	-	-	-	-	-	2	3.1	1	2.4	3	0.6
Class Insecta	31	96.9	46	95.8	25	100	91	100	87	100	112	99.1	59	92.2	43	97.7	494	98
Total	32	-	48	-	25	-	91	-	87	-	113	-	64	-	44	-	504	-

**Table 2.** Abundance (A) and dominance (D) of collected insects using soil pitfalls, in the rye crop from Horodnic de Jos village, Suceava County.

Order	Collecting dates in 2014																Total	
	29.04		12.05		30.05		12.06		30.06		12.07		29.07		14.08			
	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D
Orthoptera	4	12.9	8	-	2	8.0	1	1.1	1	1.2	3	2.7	1	1.7	2	4.7	22	4.5
Dermaptera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4.7	2	0.4
Heteroptera	-	-	-	-	-	-	1	1.1	-	-	-	-	2	3.4	1	2.3	4	0.8
Hymenoptera	-	-	-	-	-	-	42	46.2	49	56.3	32	28.6	28	47.5	17	39.5	168	34.0
Coleoptera	27	87.1	38	-	23	92.0	47	51.1	37	42.5	76	67.9	27	45.8	21	48.8	296	59.9
Diptera	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	2	0.4
Total	31	-	46	-	25	-	91	-	87	-	112	-	59	-	43	-	494	-

**Table 3.** Abundance (A) and dominance (D) of Coleoptera collected using soil pitfalls, in the rye crop from Horodnic de Jos village, Suceava County.

Family	Collecting dates in 2014																Total	
	29.04		12.05		30.05		13.06		30.06		12.07		29.07		19.08		A	D
	A	D	A	D	A	D	A	D	A	D	A	D	A	D				
Carabidae	8	29.6	7	18.4	2	8.7	22	46.8	29	78.4	60	78.9	12	44.	13	60.9	153	51.7
Dermestidae	16	59.3	15	39.5	18	78.3	24	51.1	4	10.8	8	10.5	5	18.5	3	14.3	93	31.4
Elateridae	3	11.1	4	10.5	-	-	-	-	-	-	3	4.0	-	-	1	4.8	11	3.7
Meloidae	-	-	1	2.6	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3
Tenebrionidae	-	-	10	26.3	3	13.0	-	-	2	5.4	3	4.0	-	-	1	4.8	19	6.4
Curculionidae	-	-	1	2.6	-	-	-	-	-	-	-	-	2	7.4	-	-	3	1.0
Silphidae	-	-	-	-	-	-	1	2.1	1	2.7	-	-	1	3.7	-	-	3	1.0
Scarabaeidae	-	-	-	-	-	-	-	-	1	2.7	1	1.3	3	11.1	-	-	5	1.7
Coccinellidae	-	-	-	-	-	-	-	-	-	-	-	-	2	7.4	1	4.8	3	1.0
Staphylinidae	-	-	-	-	-	-	-	-	-	-	1	1.3	-	-	1	4.8	2	0.7
Chrysomelidae	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	4.8	3	1.0
Total	27	-	38	-	23	-	47	-	37	-	76	-	27	-	21	-	296	-

**Table 4.** Abundance (A) and dominance (D) of Carabidae species collected using soil pitfalls, in the rye crop from Horodnic de Jos village, Suceava County.

Species	Collecting dates in 2014														Total			
	29.04		12.05		30.05		12.06		30.06		12.07		29.07		14.08		A	D
	A	D	A	D	A	D	A	D	A	D	A	D	A	D				
<i>Pseudoophonus rufipes</i>	4	50.0	1	14.3	1	50.0	7	24.1	14	48.3	31	51.7	5	41.7	3	23.1	66	41.3
<i>Poecilus cupreus</i>	1	12.5	6	85.7	1	50	3	10.4	-	-	18	30	3	25.1	4	30.8	36	22.5
<i>Carabus cancelatus</i>	1	12.5	-	-	-	-	14	48.3	11	37.9	-	-	1	8.3	-	-	27	17.8
<i>Pterostichus melanarius</i>	-	-	-	-	-	-	3	10.4	2	6.9	3	5.0	1	8.3	1	7.7	10	6.3
<i>Anisodactylus signatus</i>	-	-	-	-	-	-	1	3.5	-	-	6	10.0	-	-	2	15.4	9	5.6
<i>Brachinus crepitans</i>	-	-	-	-	-	-	-	-	1	3.5	-	-	-	-	2	15.4	3	1.9
<i>Bembidion lampros</i>	-	-	-	-	-	-	-	-	-	-	-	-	2	16.6	1	7.7	3	1.9
<i>Carabus scabriusculus</i>	-	-	-	-	-	-	-	-	-	-	2	3.3	-	-	-	-	2	1.3
<i>Metoponus punctatulus</i>	-	-	-	-	-	-	-	-	1	3.5	-	-	-	-	-	-	1	0.6
<i>Harpalus distinguendus</i>	1	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.6
<i>Pterostichus strenuus</i>	1	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.6
<i>Brachinus explodens</i>	-	-	-	-	-	-	1	3.5	-	-	-	-	-	-	-	-	1	0.6
Total	8	-	7	-	2	-	29	-	29	-	60	-	12	-	13	-	160	-

**Table 5.** Silphidae, Scarabeidae, Dermestidae, Elateridae, Tenebrionidae and Meloidae collected with soil pitfalls, in the rye crop from Horodnic de Jos, Suceava County.

Family: species	Collecting dates in 2014								Total
	29.04	12.05	30.05	12.06	30.06	12.07	29.07	14.08	
Silphidae: <i>Necrophorus vespillo</i>	-	-	-	-	1	2	-	-	3
Silphidae: <i>Phosphuga atrata</i>	-	-	-	1	-	-	-	-	1
Scarabaeidae: <i>Onthophagus</i> sp.	-	-	-	-	1	1	3	-	5
Dermestidae: <i>Dermestes lanarius</i>	16	15	18	24	4	8	5	3	93
Elateridae: <i>Agriostes lineatus</i>	3	4	-	-	-	-	-	2	9
Tenebrionidae: <i>Opatrum sabulosum</i>	-	10	3	-	2	3	-	1	19
Meloidae: <i>Meloe proscarabaeus</i>	-	1	-	-	-	-	-	-	1
Coccinellidae: <i>Coccinella 7.punctata</i>	-	-	-	-	-	-	2	1	3
Total	19	30	21	25	8	14	10	7	134

**Table 6.** Abundance (A), constancy (C), dominance (D) and ecological significance index (W) of Carabidae species, in the rye crop from Horodnic de Jos, Suceava County.

Species	A	C	D	W
		%	%	%
<i>Pseudoophonus rufipes</i>	66	100	41.3	41.3
<i>Poecilus cupreus</i>	36	87.5	22.5	19.6
<i>Carabus cancellatus</i>	27	50.0	17.8	8.9
<i>Pterostichus melanarius</i>	10	62.5	6.3	3.9
<i>Anisodactylus signatus</i>	9	37.5	5.6	2.1
<i>Brachinus crepitans</i>	3	25.0	1.9	0.5
<i>Bembidion lampros</i>	3	25.0	1.9	0.5
<i>Carabus scabriusculus</i>	2	12.5	1.3	0.2
<i>Harpalus distinguendus</i>	1	12.5	0.6	0.08
<i>Pterostichus strenuus</i>	1	12.5	0.6	0.08
<i>Metophonus punctatulus</i>	1	12.5	0.6	0.08
<i>Brachinus explodens</i>	1	12.5	0.6	0.08
Total	160	-	-	-

## Conclusions

From the rye crop from Horodnic de Jos village, in 2014's year conditions, with the help of soil pitfalls there were collected in total 504 Arthropoda specimens, who belonged to three classes: Arachnida, Miriapoda and Insecta. Insects were net dominant.

At the level of order, the collected insects belonged to six orders, dominant being Coleoptera. Although, Hymenoptera were also well numbering represented, the diversity was low, only the family of Formicidae. Coleoptera were represented by 11 families.

Most individuals belonged to family Carabidae followed by the family Dermestidae, but, the last one, even with high abundance, was represented only by a single species, *Dermestes lanarius*.

Referring to Carabidae, there were identified 12 species: *Carabus cancellatus* Illiger, *Carabus scabriusculus* Ol., *Anisodactylus signatus* Panzer, *Pseudoophonus rufipes* De Geer, *Harpalus distinguendus* Duftschmid, *Pterostichus melanarius* Illiger, *Pterostichus strenuus* Linne, *Poecilus cupreus* Linne, *Metophonus punctatulus* Duftschmid, *Bembidion lampros* Hrbst., *Brachinus explodens* Duftschmid and *Brachinus crepitans* Linne. The most individuals belonged only to 4 species: *Pseudoophonus rufipes* De Geer, *Poecilus cupreus* Linne, *Carabus cancellatus* Illiger, *Pterostichus melanarius* Illiger.

The statistic calculation applied to Carabidae reveals that *Pseudoophonus rufipes* and *Poecilus cupreus* are characteristic for the investigated crop from Horodnic de Jos and the most well adapted to this place's ecological conditions.

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