

THE BIODIVERSITY OF LADYBIRDS (COLEOPTERA, COCCINELLIDAE) IN SOME ALFALFA CROPS FROM THE NORTH OF MOLDAVIA

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Abstract. Studies on the coccinellids fauna were conducted in 11 alfalfa crops in North of Moldavia (Romania). The most abundant species recorded were *Propylaea quatuordecimpunctata* L. (32.92% of the total), *Coccinella septempunctata* L. (25.71%) and *Subcoccinella 24-punctata* L. (23.82%).

Keywords: *Coccinellidae*, alfalfa crops, *Propylaea quatuordecimpunctata* L.

Rezumat. Biodiversitatea coccinelidelor (Coleoptera, Coccinellidae) în unele culturi de lucernă din nordul Moldovei. S-au identificat coccinelidele colectate din culturi de lucernă din 11 localități din județele Iași, Botoșani și Suceava. În lucernierele investigate din punct de vedere entomofaunistic, s-au identificat 11 specii de coccinelide. Dintre acestea cele mai abundente au fost speciile: *Propylaea quatuordecimpunctata* L., *Coccinella septempunctata* L. și *Subcoccinella 24-punctata* L. iar la polul opus s-au situat speciile *Adalia decempunctata* L. și *Platynaspis luteorubra*.

Cuvinte cheie: *Coccinellidae*, cultura de lucernă, *Propylaea quatuordecimpunctata* L.

Introduction

The majority of ladybirds are carnivorous, both the larvae and the adults feeding on aphids, which damages the agricultural crops. Consequently, the Coccinellids have a great importance as main natural predator of these pests. Of the four species of phytophagous coccinellids which live in Romania *Subcoccinella vigintiquatuordecimpunctata* L. is a specific pest to the alfalfa crops.

Among the researches made on the Coccinellidae from the alfalfa crops, we mention the authors' works: Kalushkov (1990) and Ciepielevska (1991); and Lacatușu (1981), Moglan (1983), Lisenchi Murariu (2006) from Romania.

Material and Methods

The insects were harvested periodically with the help of the entomological net from alfalfa crops in 11 localities from the districts of Botoșani (Ipotești, Cucorăni, Vorona, Bucecea), of Suceava (Dumbrăveni, Vadu Moldovei, Drăgușeni, Siminicea, Verești) and of Iași (Cristești and Blăgești).

Between 2004 and 2006 we made fifty cuttings with the help of the net, on sunny days between 12 o'clock and 2 o'clock p.m. drawing from 2 up to 10 samples for each site of collecting.

The alfalfa crops submitted to the entomofaunistic analysis were not treated chemically and they were in different years of vegetation. From the complex of harvested species belonging to different groups of arthropods, the coccinellids were separated and determined.

Among the analytical ecological indexes for the coccinellids species registered in this agrobiocoenosis, we estimated the abundance, the constancy and the dominance, and among the synthetic ecological indexes, the index of ecological significance.

Results and Discussion

We analyzed and identified in all 319 individuals of Coccinellidae which belonged to 11 species (Table 1).

Table 1. The abundance of the Coccinellidae species in the collected samples.

No.	Localities	No samples	<i>Subcoccinella 24-punctata</i> L.	<i>Scymnus frontalis</i> F.	<i>Adonia variegata</i> Goeze	<i>Tyrthaspis sedecimpunctata</i> L.	<i>Adalia bipunctata</i> L.	<i>Adalia decempunctata</i> L.	<i>Coccinella septempunctata</i> L.	<i>Coccinula 14-pustulata</i> L.	<i>Propylaea 14-punctata</i> L.	<i>Psyllobora vigintiduopunctata</i> L.	<i>Platynaspis luteorubra</i> L.	Total
1	Cristești	2	0	0	2	0	1	0	2	6	4	1	0	16
2	Blăgești	3	0	0	9	0	0	0	1	0	4	0	0	14
3	Drăgușeni	3	1	0	0	0	1	0	1	0	5	1	0	9
4	Vadu Moldovei	2	0	0	1	0	0	0	0	0	4	0	0	5
5	Dumbrăveni	9	0	0	2	0	2	0	27	0	22	1	0	54
6	Siminicea	3	1	0	0	0	0	0	1	0	4	0	0	6
7	Verești	4	0	0	0	0	0	0	1	0	11	0	0	12
8	Vorona	6	57	1	0	0	0	0	13	0	10	4	0	85
9	Bucecea	6	0	0	0	4	0	0	3	1	15	0	0	23
10	Ipoțești	10	14	2	9	0	0	0	6	0	7	1	1	40
11	Cucorâni	9	3	0	2	0	2	1	27	0	19	1	0	55
Total		57	76	3	25	4	6	1	82	7	105	9	1	319

Of the data presented in table 2, result of the fact that from the alfalfa crops under study *Propylaea quatuordecimpunctata* L. and *Coccinella septempunctata* L. had the highest abundance and frequency. The abundance of these species is justifiable having in view the fact that these aphidiphagous species also prefer, among other things the *Aphis craccivora* Koch and *Acyrtosiphon pisum* Harris species which are very abundant in alfalfa crops (Hodek, 1973; Andriev, 2004).

Referring to the dominance of the collected coccinellids in these alfalfa crops, the estimates point out the fact that the species *Propylaea quatuordecimpunctata* L., *Coccinella septempunctata* L. and *Subcoccinella 24-punctata* L. are eudominant, a fact correlated with the rich trophic resource of these ones; the *Adonia variegata* Goeze is the dominant species in this agro-ecosystem while *Psyllobora vigintiduopunctata* L. and *Coccinula 14-pustulata* L. are subdominant species.

The index of ecological significance shows that the most adapted coccinellidae to the ecological factors in the alfalfa crops under study are: *Propylaea quatuordecimpunctata* L., *Coccinella septempunctata* L. and *Subcoccinella 24-punctata* L. (Table 2).

In our research, *Subcoccinella 24-punctata* L., pest of the alfalfa leaves, registered the highest abundance in the stationery from Vorona (Table 1).

This thing can be explained by the fact that the alfalfa crop from this stationery is in the fourth year of vegetation, which permitted the accumulation of biotic material in the soil. In other sites *Subcoccinella 24-punctata* L. had a low abundance.

Table 2. The sinecological analysis of the coccinellidae species presented in the collected samples.

No.	Species	Abundance	Dominance		Constancy		Index of ecological significance	
			%	cls	%	cls	%	cls
1	<i>Propylaea 14-punctata</i> L.	105	32.92	D ₅	100	C ₄	32.92	W ₅
2	<i>Coccinella septempunctata</i> L.	82	25.71	D ₅	90.9	C ₄	23.37	W ₅
3	<i>Subcoccinella 24-punctata</i> L.	76	23.82	D ₅	45.45	C ₂	10.83	W ₅
4	<i>Adonia variegata</i> Goeze	25	7.84	D ₄	54.54	C ₃	4.27	W ₃
5	<i>Psyllobora vigintiduopunctata</i> L.	9	2.82	D ₃	54.54	C ₃	1.54	W ₃
6	<i>Coccinula 14-pustulata</i> L.	7	2.19	D ₃	18.18	C ₁	0.40	W ₁
7	<i>Adalia bipunctata</i> L.	6	1.88	D ₂	36.36	C ₂	0.68	W ₁
8	<i>Tytthaspis sedecimpunctata</i> L.	4	1.25	D ₂	9.1	C ₁	0.11	W ₁
9	<i>Scymnus frontalis</i> F.	3	0.94	D ₁	18.18	C ₁	0.17	W ₁
10	<i>Adalia decempunctata</i> L.	1	0.31	D ₁	9.1	C ₁	0.03	W ₁
11	<i>Platynaspis luteorubra</i> L.	1	0.31	D ₁	9.1	C ₁	0.03	W ₁

In what concerns the preference for food of the Coccinellidae species identified in the alfalfa crop, it came out that eight species are aphidiphagous (*Propylaea quatuordecimpunctata* L., *Coccinella septempunctata* L., *Adonia variegata* Goeze, *Coccinula 14-pustulata* L., *Scymnus frontalis* F., *Adalia bipunctata* L., *Adalia 10-punctata* L., *Platynaspis luteorubra* L.), two mycetophagous (*Psyllobora 22-punctata* L., *Tytthaspis 16-punctata* L.) and one phytophagous (*Subcoccinella 24-punctata* L.).

Although the abundance of the aphids was great during all the years when the material was collected, the coccinellids did not develop according to the possibilities of feeding, a phenomenon which could be directly related with the repeated cuttings of the alfalfa crop, what permits the recovery of the populations of aphids but not that of the populations of coccinellids.

The investigated alfalfa crops were periodically cut for fodder and the conditions for multiplying the coccinellids were modified through this agrotechnical method. As a result, the populations of aphids recover quickly due to the high speed of multiplications, while the predators insects do not recover because of the little number of generations (most of the times having a single generation a year). Still, the role of the coccinellids is pretty important in reducing the populations of aphids and in establishing an equilibrium between prey and predator.

Comparing the obtained data with those of the speciality literature we ascertain the fact that the coccinellids species identified in the alfalfa crops from the north of Moldavia coincide, to a great extent, with those found by other authors in different areas from Romania (Manolache *et al.* 1969; Lăcătușu *et al.* 1981; Moglan, 1990).

In the consulted literature, the *Coccinella septempunctata* L. species is quoted as being the most abundant and frequent species from the predaceous coccinellids in alfalfa crops (Manolache *et al.*, 1969; Voicu *et al.*, 1983; Ciepielewska, 1991).

In the present case *Propylaea quatuordecimpunctata* L. is the most abundant and frequent species.

Conclusions

In the alfalfa crops investigated from an entomofaunistic point of view, we identified 11 species of *Coccinellidae*. Among the most abundant species were: *Propylaea quatuordecimpunctata* L., *Coccinella septempunctata* L. and *Subcoccinella 24-punctata* L. and the least abundant ones were *Adalia decempunctata* L. and *Platynaspis luteorubra*.

The alfalfa crop permits the development of the Coccinellids and especially of the *Propylaea quatuordecimpunctata* L. species, being real reservoirs which will provide with material for populating other ecosystems where the aphids are present but where the predaceous species does not have multiplying conditions.

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