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NATURAL CONTROL REALIZED BY PARASITOID INSECTS INSIDE THE *APHIS FABAE* SCOP. COLONIES

BY

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This paper presents a parasitoid complex realized by 13 insect species from 6 genres of Hymenoptera Phyllum and families such as: Aphidiidae, Megaspilidae, Cynipidae, Pteromalidae and Encyrtidae. These species controlls, through natural ways, the *Aphis fabae* Scop. populations which are installed on different plants.

Introduction

Aphis fabae Scop. is a kind of aphid species very dangerous to cultivated plants. This species realized migrations from *Phyladelphus*, *Evonimus*, *Viburnum* (which are primary host-plants) to over 200 spontaneous and cultivated herbal species.

Aphidiides acting as primary parasitoids and they realized certain limitations of some colonies of those aphides. Intervention of secondary parasitoids limited the efficiency of the primary parasitoids.

Relationships between primary parasitoids and hyperparasitoids are enough complex and they are presented as a trophic network, characteristic for parasitoid biocoenosis.

Material and methods

We investigated the role of parasitoid insects in the natural control of these aphides populations. Our researches are based on investigations made in 2003 in seven localities from Botoşani District. We investigated *Aphis fabae* Scop. colonies installed on 10 plant species such as: *Phyladelphus coronarius* (primary host-plants) and *Robinia pseudaccacia, Cichorium intibus, Trifolium pratense, Helianthus annuus, Arctium lappa, Phaseolus vulgaris, Cirsium arvense, Medicago sativa* and *Zea m*ays (secondary host-plants).

There were been preserved 2707 mummies formed by primary parasitoids and they were kept in laboratory conditions for obtaining the parasitoids. They were obtained 13 parasitoid species (3 primary parasitoid species and 19 hyperparasitoid species).

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Based both on dissections and the investigations of mummies after parasitoids hatching of eggs we clear up trophic relationships between species and we realize a new trophic network.

For the investigation of each species role inside the biocoenotic complex we made a sinecological analysis of parasitoid species concerning: abundance, constancy, dominance, ecological significance index and coenotic affinity.

Results and discussions

We collected 2707 mummies formed by aphidiides inside the *Aphis fabae* Scop. colonies preserved from 10 host-plants, from seven localities in Botoşani District (Table 1). In laboratory conditions were been hatching a number of eggs equal both for parasitoids and hyperparasitoids from 13 species as following:

Aphidiidae family: *Lysiphlebus fabarum* (Marsh.), *L. amb*iguus (Hal.) and *L. melandriicola* Starý.

Cynipidae family*: Charips arcuatus* (Kieff), *Ch. carpenteri* (Kieff), *Ch. melanogaster* (Hartig), *Ch. minutum*, *Alloxysta campyla* Kieff. and *Aloxysta semiclausa* Kieff.

Megaspilidae family: *Dendrocerus aphidum* (Rond.) and *D. carpenteri* (Kieff.)

Pteromalidae family*: Pachyneuron aphidum* (Bché.)

Encyrtidae family: *Aphidencyrtus aphidivorus* (Mayr.)

Based on the dissections realized on aphides (at the level of parasitoids larva) and the control of mummies after the hatching of eggs, we manage to establish trophic relationships between species and we draw the specific trophic network especially for this biocoenotic complex (Figure 1).

Primary parasitoid species have not much efficiency in the limiting of *Aphis fabae* populations. However, inside the colonies with few individs from some plants (*Arctium lappa*, *Helianthus annuus*, *Medicago sativa*) the parasitism percentage is between 15-20%.

It was been realized a sinecologic analysis for presentation the role of each specie from this biocenotic complex. Table 2 presenting species depending on their abundance level: *Pachyneuron aphidis* with 938 individuals, *Lysiphlebus fabarum* with 784 individuals, *Aphydencirtus aphidivorus* with 745 individuals and *Lysiphlebus ambiguus* with 161 individuals. After those, there are following some another species with a smaller number of individuals. First three species of them are, in the same time, euconstant, eudominant and with the highest value of ecological significance index. *L. ambiguus* is the dominant specie, and four species have an accessory or accidental presence inside of complex.

Cenotic affinity does not prove than the euconstant and eudominant species have high affinity, and their role concerning to the biocenotic complex stability.

Conclusions

Based on the researches made in 2003 concerning *Aphis fabae* Scop. colonies which attacked 10 plant species from seven localities (Botoşani District), we manage to identified 13 parasitoid species from 6 genres of 5 families from *Hymenoptera* Phyllum.

The aphidiide species acting as primary parasitoids, and the others acting as hyperparasitoids (secondary and tertiary). We manage to clear up the trophic relationships between species. We did it by using a specific trophic network of this biocenotic complex. For the establishing the contribution of each specie to the limitation of *Aphis fabae* Scop. populations, we used a sinecological analysis concerning to the: abundance, constancy, domination, ecological significance index and cenotic affinity.

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Table 1. Parasitoids complex from *Aphis fabae* Scop. colonies in 2003

Nr.	Data	Locality	**Host plant**	*Lysiphlebus ambiguus*	*Lysiphlebus fabarum*	*Lysiphlebus melandriicola*	*Dendrocerus aphidum*	*Dendrocerus carpenteri*	*Alloxysta campyla*	*Charips arcuatus*	*Charips carpenteri*	*Charips melanogaster*	*Charips minutum*	*Pachineuron adphidis*	*Aphidencyrtus aphidivorum*	
1	27.VII	Botoșani	**Robinia pseudaccacia**											6	2	8
2	24.VII	Hudum	*Cichorium intibus*		26							1			2	29
3	23.VI	Botoșani	*Trifolium pratense*		12		1			1			1			15
4	12.VI	Botoșani	*Helianthus annuus*	14	1										52	67
5	18.VII	Botoșani	*Arctium lappa*	78	13	1	8	2	1	1	3		2			113
6	11.IX	Botoșani	*Phaseolus vulgaris*	28	2						1			4	57	92
7	4.VI	Botoșani	*Philadelphus coronarius*	3	8	2	1							10	2	26
8	18.VIII	Curtești	*Cirsium arvense*	2	8		2					2		4	176	194
9	24.VI	Hudum	*Medicago sativa*	24	478			3						51	29	585
10	2.VIII	Brehuiești	*Medicago sativa*		29				1							31
11	30.VI	Botoșani	*Medicago sativa*	12	15.4	2			2		2		1	286	86	545
12	6.VII	Răchiți	*Medicago sativa*		22		1	2				1		287	63	372
13	29.VII	Hudum	*Zea mays*		1				3				2	197	88	293

14	27.VII	Leorda	*Zea mays*		4	2				2	1			9	21	39
15	20.VII	Curteşti	*Zea mays*		3						2		1		28	34
16	27.VII	Botoşani	*Zea mays*		21	1			1	1		2		7	49	84
17	3.VIII	Stânceşti	*Zea mays*				2		1			1	1	11	4	19
18	2.VIII	Brehuieşti	*Zea mays*		2			1	1		2	1		70	83	158
				161	784	8	15	8	10	5	9	9	8	938	745	2707

Table 2. Sinecological analysis of parasitoid species from *Aphis fabae* Scop. colonies

Nr.	Specie	Abundance	Domination	Constancy	Ecological Significance Index	Cenotic affinity												
						1	2	3	4	5	6	7	8	9	10	11	12	13
1	**Pachyneuron aphidis**	938	35,00 D5	67 C4	23,45 W5		56	80	36	29	29	36	27	27	38	20	42	14
2	*Lysiphlebus fabarum*	784	29,00 D5	89 C4	25,81 W5			72	44	29	35	31	25	25	38	38	31	25
3	*Aphidencyrtus aphidivorus*	745	28,00 D5	83 C4	23,24 W5				29	24	29	25	12	12	40	24	25	12
4	*Lysiphlebus ambiguus*	161	6.00 D4	39 C2	2,34 W3					30	75	77	57	38	75	63	71	57
5	*Dendrocerus aphidum*	15	0,70 D1	33 C2	0,23 W2						30	77	25	25	33	50	22	25

6	*Alloxysta campyla*	10	0,40 D1	39 C2	0,04 W2							20	11	11	30	44	20	22
7	*Charips arcuatus*	9	0,31 D1	28 C2	0,08 W2								13	13	0	38	43	29
8	*Charips carpenteri*	9	0,31 D1	22 C1	0,06 W2									14	11	25	25	33
9	*Dendrocerus carpenteri*	8	0,30 D1	22 C1	0,06 W2										11	25	25	14
10	*Charips melanogaster*	8	0,30 D1	36 C2	0,08 W2											9	9	30
11	*Charips minutum*	8	0,30 D1	36 C2	0,08 W2												22	25
12	*Lysiphlebus melandriicola*	8	0,30 D1	28 C2	0,08 W2													50
13	*Alloxysta semiclausa*	5	0,20 D1	22 C1	0,04 W2													

Fig. 1 Specific trophic network for *Aphis fabae* Scop. colonies and the parasitoids complex