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GROUND BEETLES (*CARABIDAE, COLEOPTERA*) APPEARING IN GOATS RUE (*GALEGA ORIENTALIS* LAM.) CULTIVATION

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Abstract. In 1997 and 1998, insects settling cultures of goats rue (*Galega orientalis* Lam.) at Mochełek were caught. Amongst ground beetles the dominating species were: *Pterostichus melanarius* Ill., *Carabus auratus* L., *Harpalus rufipes* De Geer, *Harpalus aeneus* F., and *Bembidion lampros* Hbst. and *Harpalus frolichi* Sturm. were subdominants.

Key words: *Coleoptera*, *Carabidae*, *Galega orientalis* Lam.

I. INTRODUCTION

Goats rue (*Galega orientalis* Lam.) is a valuable perennial fodder plant of great yielding crops potential providing a large amount of protein rich biomass.

The plant is hardly known in Poland. Due to its low settlement requirements, ability to improve soil fertility and low costs of cultivation, it should be more appreciated in agriculture. Location of goats rue cultures between other cultures may be a reservoir for entomofaune of the surrounding fields, including ground beetles (*Carabidae*).

Carabidae have a special meaning for arable grounds due to both the noticeable number of species and their biological role. They take first place in the biomass of all arthropoda and are considered to be a bioindicator of changes taking place in the natural environment. Above 500 species were noticed within the area of Poland (Burakowski et al. 1973; 1974).

The aim of the research was to recognise *Carabidae* fauna species contents in cultures of goats rue.

II. METHODS

The research was carried out in 1997-1998, at the Testing Station of the Department of Agriculture at Mochełek. The goats rue culture was the object of the experiment.

Insect were caught from two fields with the use of Barber's traps dug into the ground and filled with the solution of ethylene glycol. The fields were equipped with four (4) traps each. Insects were taken out of the traps once a week.

Crop no. 1 with the area of 0.02 ha was contiguous to the farm buildings, cereals and lucerne plantations, and the crop no. 2 with the area of 0.12 ha adjoined cereal plantations. A single protective treatment was done on both crops just before goats rue sprouting with Roundup herbicide.

In the laboratory, the gathered fauna material was classified, the ground beetles were separated and characterised according to the catch abundance, and the species were determined with the use of the key.

To determine a relative abundance, the following scale was assumed: dominants > 10%, subdominants 4-10%, influents 1-4%, and accessoric species < 1% of their fraction.

III. RESULTS AND DISCUSSION

In 1997-1998, 757 pcs. of *Carabidae* belonging to 12 species were caught. In Table the contents of *Carabidae* caught in the period from May do July (up to swath of the goats rue) has been presented. The sequence of the presented species as well as the nomenclature was made according to the key for identification of beetles (Freude et al. 1976).

Totally 20 species of *Carabidae* were caught in both fields. The largest number of species (19) was stated in the field II, less in the field I (13). To determine a qualitative similarity between the groups of *Carabidae*, the Marczewski-Steinhaus's formula with 50% of similarity limit was used. The result we obtained made 65%. It means that the investigated settlements were visited by similar species.

Amongst *Carabidae*, the following species were dominating: *Pterostichus melanarius* III. (26.02%). *Carabus auratus* L. (16.91%). *Harpalus rufipes* De Geer (13.8%), *Harpalus aeneus* F. (10.57%). A group of subdominants included: *Bembidion lampros* Hbst. (7.13%) and *Harpalus frolichi* Sturm (4.49%).

The other *Carabidae* listed in Table are undoubtedly influents and accessory species which occur rarely.

In the first time limit of the catch, i.e. at the beginning of May, 1997 and 1998, not many specimens were collected. They were single individuals of the following species: *Carabus auratus*, *Bembidion lampros*, *Harpalus froelichii*, *H. aeneus*, *H. rufibarbis*, *Amara familiaris*, and *A. aenea*. Further, the number of the caught species of ground beetles increased. Irrespective of domination, the largest number of species was identified in June (56%). They were mainly spring species, wintering in the imago stage. In June, a species of *Pterostichus melanarius* occurred also in a large number. This is a species belonging to the so called autumn group including species wintering in a larval stage, and therefore their development comes later and their activity and abundance are perceptible in the later part of summer. However, some specimens of the mentioned above species winters in the imago stage, and for that reason they show an activity already in spring, which is characteristic for species belonging to the spring group. The rightness of these observations has been confirmed by the results of our own research.

In the literature, there is lack of data on the subject of *Carabidae* in goats rue culture.

Honczarenko (1964), investigating soil entomofauna of arable grounds, mentions most frequently species of *Carabidae* on crop of oat companion crop of: *Harpalus aeneus* F., *Pseudophonus pubenscens* Mull., *Pterostichus lepidus*, and a species of *Amara aenea* Deg. on potato cultures.

Table

Species contents of *Carabidae* in goat rue cultures in years 1997-1998 (%)

No	Species	1997		1998		Total Abundance	Per Cent Fraction
		crop I	crop II	crop I	crop II		
1.	*Carabus auratus* L.	21	42	27	38	128	16.91
2.	*Loricera pilicornis* F.	5	2	5	3	15	1.98
3.	*Bembidion lampros* Hbst.	5	19	13	17	54	7.13
4.	*Asaphidion flavipes* L.	–	2	–	3	5	0.66
5.	*Harpalus rufibarbis* F.	2	9	2	11	24	3.17
6.	*Harpalus rufipes* De Geer	12	36	15	36	99	13.08
7.	*Harpalus flavescens* Pil.	1	–	2	–	3	0.40
8.	*Harpalus frolichi Sturm*	4	12	7	11	34	4.49
9.	*Harpalus aeneus* F.	4	36	9	31	80	10.57
10.	*Poecilus cupreus* L.	–	7	–	6	13	1.72
11.	*Pterostichus melanarius* Ill.	57	39	56	45	197	26.02
12.	*Calathus erratus* Sahlb.	5	4	3	7	19	2.51
13.	*Calathus fuscipes* Goeze	–	2	–	3	5	0.66
14.	*Calathus melanocephalus* L.	–	2	–	–	2	0.29
15.	*Platynus dorsalis* (Pontopp.)	10	3	6	3	22	2.91
16.	*Amara familiaris* Duftsch.	–	4	–	6	10	1.32
17.	*Amara tibialis* Payk.	1	2	–	1	4	0.50
18.	*Amara aenea* Degeer	–	8	–	13	21	2.77
19.	*Oodes helopioides* F.	3	7	2	7	19	2.51
20.	*Syntomus obscuroguttatus* Duftsch.	–	1	–	2	3	0.40
	Total:	130	237	147	243	757	100

In the study of Górny (1971) dedicated to the *Carabidae* family of fields and the field afforestations, the following species are mentioned: *Amara aenea*, *Bembidion lampros*, *B. andreae*, which were caught on *Papilionaceae* plantations.

According to the research made by Kabacik (1962) and performed in the surroundings of Warsaw, it results that such zoophags as: *Carabus cancellatus*, *Broscus cephalotes* and *Calathus erratus* made in rye 37.9% of the caught population of ground beetles, in potatoes – 32.5%, but typical phytophags from genus of *Amara* made respectively 5.9% and 13.9%.

According to Szwejda (1984) groups of dominants and subdominants wintering in the imago stage on the onion plantation included: *Bembidion lampros*, *B. quadrimaculatum*, *B. femoratum* and *Clivina fossor*, and species wintering in the larval stage included: *Calathus fuscipes*, *Nebria brevicollis*, *Pseudophonus pubescens*, *Pterostichus vulgaris* and *Trechus quadristriatus*.

Pałosz (1995), conducting his studies on the contents of *Carabidae* caught in the period of April-July 1994 on rape plantations, mentions amongst dominants such as: *Ophonus rufipes* Deg., *Amara similata* Gryll.

According to Houpert (1983), a rape plantation in France was dominated by: *Pterostichus vulgaris*, *Poecilus cupreus* and *Agonum doralis* making together 67% of the whole population.

Summing up, as considers the presented results of the investigations and the literature data one should state that in the investigated agrocenoses similar species of *Carabidae* were noticed. Differences were marked in the abundance structure of the family. Therefore, there is lack of uniformity in the listed dominant groups of the individual arable grounds. The changes concerning intensity of occurrence of definite species of entomofauna are caused by their ecological, feeding conditions, as well as by chemical and agricultural treatments.

V. LITERATURE

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BIEGACZOWATE (*CARABIDAE, COLEOPTERA*) WYSTĘPUJĄCE W UPRAWACH RUTWICY WSCHODNIEJ (*GALEGA ORIENTALIS* LAM.)

STRESZCZENIE

W latach 1997 i 1998 odławiano do pułapek Barbera owady zasiedlające uprawy rutwicy wschodniej (*Galega orientalis* Lam.) w Mochełku.

Celem badań było poznanie składu gatunkowego fauny biegaczowatych. W laboratorium segregowano zebrany materiał faunistyczny, oddzielano biegaczowate i charakteryzowano pod względem liczebności odłowu oraz oznaczano gatunki.

Spośród biegaczowatych gatunkami dominującymi były: *Pterostichus melanarius* Ill., *Carabus auratus* L., *Harpalus rufipes* De Geer, *Harpalus aeneus* F., a do subdominatów należały: *Bembidion lampros* Hbst. i *Harpalus frolichi* Sturn.