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GROUND BEETLES (*COLEOPTERA*, *CARABIDAE*) IN SHORT-ROTATION WILLOW BIOMASS PLANTATIONS

Many pests of willows lay their eggs on the soil surface or in its upper layer. Their larvae also develop in soil. Therefore ground beetles may have a strong effect on numbers of these pests. Observations of species distribution and numbers of the Carabidae family occurring on plantations of Salix viminalis were conducted during 2003-2004 in S-E of Poland region. Beetles were caught in Barber's soil traps. The dominant species were Harpalus rufipes (De Geer), Pterostichus melanarius (Ill.), P. niger (Schall.), Carabus granulatus L. and C. ullrichi Germ.

Key words: Ground beetles, Carabidae, willow, pests, predators

I. INTRODUCTION

Research results presented in this paper are a part of broader observations on the occurrence of *Carabidae* in various biotopes in south-eastern Poland and apply to Short-rotation Willow Biomass Plantations.

Short-rotation Biomass Plantations, otherwise called Short-rotation Coppices (SRC), are the crops of rapid growing plants, which may be utilised as a source of energy. In the temperate climate zone they are most often osier willows (various clones of *Salix viminalis*). Willows harbour many pests, among them species that lay their eggs on the soil surface or in its upper layer (e.g. *Chlorophanus viridis* L., *Lepyrus palustris* Scop., *Phyllobius* sp. and *Polydrusus* sp.). Their larvae also develop in soil [2]. Therefore, the rhizosphere related predators - ground beetles (*Col.*, *Carabidae*) - may have a strong effect on their numbers, as was found in the case of other weevils of *Sitona* genus [4].

II. MATERIAL AND METHODS

Observations of species distribution and numbers of ground beetles of the *Carabidae* family occurring on plantations of *Salix viminalis* were conducted during 2003-2004 in the Zalesie suburb of Rzeszów. The plantation was established in 2002. In autumn of 2003 the osier plants were cut out. By this time they have reached a height of approx. 3 m.

* *Pracę recenzował:* prof. dr hab. Kazimierz Wiech, Uniwersytet Rolniczy w Krakowie

Carabidae were caught in Barber's soil traps, i.e. plastic cups 8cm in diameter, filled with 25% ethylene-glycol solution up to ¼ of their volume. Two traps were arranged in the central part of the stand, 2m apart from each other. Captured adults were removed from traps every two weeks. The species names of carabids described in this paper were specified according to Aleksandrowicz[1].

III. RESULTS

253 specimens of the *Carabidae* family, representing 15 species, were caught in 2003. *Harpalus rufipes* (De Geer) appeared to be the dominant species. *Pterostichus melanarius* (Ill.) and *P. niger* (Schall.) species were also quite numerous (Tab.1). In 2004 as many as 135 specimens of ground beetles (representing 15 species) were caught. Maximum numbers of ground beetles were observed at the turn of July and August (Fig.1).

Table 1 – Tabela 1

Dominance structure of ground beetles within energy willow plantation
Struktura dominacji biegaczowatych na plantacjach wierzby energetycznej

Dominance classes <i>Klasy dominacji</i>	Species* / Year <i>Gatunek*/Rok</i>	
	2003	2004
Eudominants <i>Eudominanty</i>	<i>Harpalus rufipes</i> (De Geer) – (47,0%) <i>Pterostichus melanarius</i> (Ill.) – (19,3%) <i>Pterostichus niger</i> (Schall.) – (11,8%)	<i>Harpalus rufipes</i> (De Geer) – (61,5%)
Dominants <i>Dominanty</i>	not appeared / <i>nie wystąpiły</i>	<i>Pterostichus melanarius</i> (Ill.) – (8,9%) <i>Pterostichus niger</i> Schall. – (5,2%) <i>Carabus granulatus</i> L. – (7,4%) <i>Carabus ullrichi</i> Germ. – (5,9%)
Subdominants <i>Subdominanty</i>	<i>Carabus granulatus</i> L. – (3,2%) <i>Carabus ullrichi</i> Germ. – (2,7%) <i>Platynus assimilis</i> (Payk.) – (3,2%) <i>Chlaenius nitidulus</i> (Schrank) – (2,7%) <i>Anisodactylus binotatus</i> (F.) – (4,7%)	<i>Stomis pumicatus</i> (Panz.) – (2,2%)
Recedents <i>Recedenty</i>	<i>Clivina fossor</i> (L.) – (1,6%)	<i>Amara plebeja</i> (Gyll.) – (1,5%) <i>Amara similata</i> (Gyll.) – (1,5%) <i>Anisodactylus binotatus</i> (F.) – (1,5%)
Subrecedents <i>Subrecedenty</i>	<i>Nebria brevicollis</i> (F.) <i>Carabus cancellatus</i> Ill. <i>Dyschirius globosus</i> (Herbst) <i>Pterostichus vernalis</i> (Panz.) <i>Anisodactylus signatus</i> (Panz.) <i>Harpalus affinis</i> (Schrank)	<i>Leistus ferrugineus</i> (L.) <i>Nebria brevicollis</i> (F.) <i>Clivina collaris</i> (Herbst) <i>Poecilus cupreus</i> (L.) <i>Agonum muelleri</i> (Herbst)

* relative proportion of specimens in brackets / *w nawiasach - liczebność względna osobników*

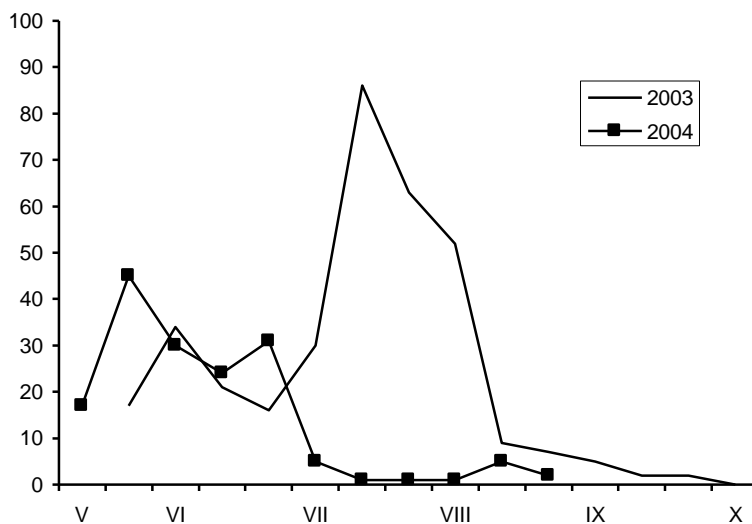


Fig. 1. Dynamics of ground beetles occurrence in *Salix viminalis* stands in 2003-2004

Rys. 1. Dynamiki występowania biegaczowatych na stanowiskach *Salix viminalis* w latach 2003-2004

H. rufipes species dominated among captured *Carabidae* (tab.1), while the *P. melanarius* was second in quantity. In the second year of observation, clearly higher relative numbers of large predators - *Carabus granulatus* L. and *C. ullrichi* Germ - deserved special attention.

IV. CONCLUSIONS

Although the richness and species diversity of ground beetles that were found in *S. viminalis* crops is low, compared to those in other biotopes in south-eastern Poland [3], in respect to trophic inter-linkage [5, 6], the presence of the above mentioned species of *Carabidae* in the period of intensive willow pest egg laying and larvae development may contribute in a special manner to the reduction in the numbers of harmful entomofauna.

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BIEGACZOWATE (*COL. CARABIDAE*) W UPRAWIE WIKLINY ENERGETYCZNEJ (*SALIX VIMINALIS*)

Streszczenie

Wiele szkodników wierzby składa swoje jaja na powierzchni gleby lub w jej wierzchniej warstwie. Ich larwy również rozwijają się w glebie. Dlatego chrząszcze biegaczowate w znacznym stopniu mogą ograniczać liczebność szkodliwych gatunków. Obserwacje nad składem gatunkowym i liczebnością Carabide występujących na plantacjach Salix viminalis, prowadzone były w południowo-wschodniej Polsce w latach 2003-2004. Chrząszcze odławiano do pulapek Barbera. Dominującymi gatunkami okazały się: Harpalus rufipes (De Geer), Pterostichus melanarius (Ill.), P. niger (Schall.), Carabus granulatus L. i C. ullrichi Germ.

Słowa kluczowe: biegaczowate, Carabidae, wierzba, szkodniki, drapieżniki