Summary

Energy willow plantations as a refuge for ground beetle assemblages (Coleoptera, Carabidae) in agricultural lands

MVSc. Natalia Stefania Piotrowska

Key words: ground beetles, Carabidae, energy crops, willow, *Salix viminalis*;

The study of the epigeic carabid beetles fauna (Coleoptera, Carabidae) inhabiting energy crops has been conducted in north-eastern Poland, in the Masurian Lake District. The research sites were energy crop plantations, supervised by the Department of Genetics, Plant Breeding and Bioresource Engineering. They were located in Kocibórz and Leginy, about 60 km from Olsztyn. In the study site "Kocibórz", observations were carried out on two plantations of energy willow (*Salix viminalis* L.). First, maintained in the short-rotation coppice (SRC) system and the second, maintained in the more extensive Eco-Salix system. Reference plots were fallow land and arable crops. Research at this location was carried out in two seasons, in 2019-2020. At the study site "Leginy", where observations were carried out on SRC willow plantations and perennial herbaceous energy crops: cup plant (*Silphium perfoliatum* L.), virginia mallow (*Sida hermaphrodita* Rusby L.) and giant miscanthus (*Miscanthus* × *giganteus* J.M.Greef & M.Deuter) observations were carried out in 2019.

The main goal of this study was to clarify the impact of willow (*Salix* spp.) plantations on the Carabidae assemblages in areas intensively used for agricultural purposes. The research problem was formulated in the form of a question: "Can willow plantations be a refuge for ground beetles from the Carabidae family in the agricultural landscape, and thus contribute to increasing biodiversity in the model of sustainable agriculture?". In order to answer this question, the ground beetles assemblages inhabiting different plots were investigated, taking into account their ecology and role in determining the state of the natural environment. Among the detailed objectives was also the comparison of two willow crops, planted in different systems, as well as willow comparison with herbaceous perennial energy crops.

During the experiment, a total of 13,425 Carabid beetles were caught. These numbers consisted of Carabidae collected in energy crop plantations in Leginy (2,177), and Carabidae collected in Eco-Salix (KES) and SRC (KW) energy willow plantations, fallow land (KU) and agricultural fields (KP) in Kocibórz (11,248). Finally, 45 Carabidae species were found in the study plots in Leginy and 86 Carabidae species in the study plots in Kocibórz. In total, 90 species of Carabidae were caught throughout the experiment. The distinctness of the ground beetle communities inhabiting willow plantations was demonstrated. Compared to other plots they were characterised by a significantly lower share of open-area species in the assemblage as well as the highest percentage of woodland-preferring Carabidae. Also large carnivorous species including those from the *Carabus* family were numerously represented on willow crops. Combined with the highest share of brachypterous carabids and the lowest share of macropterous ones in the assemblages, recorded on these plantations, as well as the best-balanced dominance structure, it suggests that willow crops provide beneficial habitat for Carabidae in highly disturbed agricultural areas.