



Mulching, mowing, or mowing with compost fertilisation, which variant is the best for plants, enchytraeids and earthworms community in mountain semi-natural meadows?

Agnieszka Józefowska (1), Jan Zarzycki (2), Justyna Sokołowska (1), and Tomasz Zaleski (1)

(1) Institute of Soil Science and Agrophysics, Department of Soil Science and Soil Protection, University of Agriculture in Krakow, Poland (a.jozefowska@ur.krakow.pl), (2) Department of Ecology, Climatology and Air Protection, University of Agriculture in Krakow, Poland

Semi-natural meadows and pastures are an essential element to preserve valuable habitats that are characterised by high biodiversity. Such meadows are an integral part of the landscape of the Carpathian Mountains, and they are protected compound in the Natura 2000 network.

The main aim of the presented study was to support conservation management planning by checking the effect of different meadow management practices (A – mowing with hay removing, B – mowing with hay removing and with compost fertilisation and C – mulching) on species composition of earthworms, enchytraeids and plants. Additionally, the influence of management practice on soil physical properties and soil organic carbon stock were investigated.

Different management practices were applied from 2015 on meadow belonged to *Anthyllidi-Trifolietum montani*. Nine plots (3 reps for each A, B and C variant) were organised in the Latin square where each plot has 10m². The plants were investigated every year, the soil physical properties and humic fractions were investigated in spring 2018, basic soil properties (pH, soil organic carbon and total nitrogen content), soil microbial activity (microbial biomass carbon and dehydrogenase activity) and dissolved organic carbon content and composition of earthworm and enchytraeids were measured in spring and autumn 2018.

Soil properties such as pH, the content of total organic carbon, total nitrogen and dissolved organic carbon and the organic matter humification degree were similar in all investigated variants. The advancement of the humic acid transformation processes was positively correlated with the earthworm biomass ($r = 0.717$, at $p < 0.05$). However, the earthworm biomass from the epigeic group negatively correlated with the content of dissolved organic carbon in the soil ($r = -0.508$, with $p < 0.05$). Earthworms biomass weakly responded to management practice. The biomass of endogeic earthworms was significantly higher in C variant compared to A variant. In all investigated variants *Fridericia* spp., *Enchytraeus* spp. and *Enchironia* spp. were predominant with slight diversity in the species composition in favour of variants B and C in comparison to A. Moreover, soil physical properties (porosity and bulk density) were significantly different between variant A and C. Plant species composition was influenced mainly by mowing with compost fertilisation (B).

Based on ordination analysis in which biological activity soil properties and plants were taken into consideration, it was noted that variants with additives (as compost or mulched hay) are similar compared to a variant with mowing and removing hay. Therefore, multi-aspect studies should precede decisions about management practice.

This Research was financed by the Ministry of Science and Higher Education of the Republic of Poland, No. BM – 2111