

## Interrelationships between soil biota and soil physical properties in forest areas of the Pieniny National Park (Poland)

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The study area was located in the Pieniny National Park (PNP) in the Carpathian Mountain (Southern Poland). Investigated soil belonged to Eutric Cambisols and had silt or silt loam texture. The purpose of this research was to investigate relationship between soil biota, such as microbial activity, soil *Oligochaeta* (*Lumbricidae* and *Enchytraeidae*) and soil physical properties, such as water retention or aggregates stability.

This research was conducted at six forest monitoring areas of the PNP. Sampling was collected in the September 2016. For each of the 6 places, undisturbed and disturbed soil samples were taken from the 0-15-cm and 15-30-cm layer in 3 to 5 replicates. Undisturbed soil was taken: i) into Kopecky cylinders to determine soil physical properties; ii) a soil cores to determine enchytraeids and fine roots biomass (RB). Disturbed soil was collected in 3 reps and homogenized. Next such soil samples were divided into three parts: i) fresh one to determine dehydrogenase activity (ADh), microbial carbon biomass (MC) and labile carbon (LC); ii) air-dried, passed through a sieve (2-mm mesh size) and used for analysis: pH, organic carbon and bulk density; iii) last part air dried was used to determine stability of different size aggregates. In field, earthworms were collected in 3 reps using hand sorting method.

Investigated soils were strongly acidic to neutral (pH 4.8-6.8). Organic carbon ( $C_{org}$ ) content was varied from 0.8% to 4.5% and was higher in 0-15-cm layers than in 15-30-cm layers. Higher  $C_{org}$  content was connected with lower bulk density. Enchytraeids density was ranged from 1807 ind.  $m^{-2}$  to 88855 ind.  $m^{-2}$  and was correlated with microbial activity (ADh and MB) and RB. Earthworms density (ED) was ranged from 7 ind.  $m^{-2}$  to 507 ind.  $m^{-2}$ . In investigated soil was 6 genus and 7 species (*Octolasion lacteum*, *Aporrectodea caliginosa*, *Aporrectodea rosea*, *Aporrectodea jassyensis*, *Lumbricus rubellus*, *Eisenia lucens*, and *Fitzingeria platyura depressa*). ED was closely related with soil moisture and water field capacity.

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