



Changes in hydraulic soil conductivity in the walls of zoogenic macropores due to the soil compaction

Igor Pelíšek

Research Institute for Soil and Water Conservation, Prague, Czech Rep. (pelisek.igor@vumop.cz)

This study focuses on assessment of the hydric functions and effectiveness of the preferential zoogenic routes (preferentially lumbricid burrows), with primary focus on the hydric functions and parameters of individual vertical tubular macropores and on the analysis of selected possible detailed effects on these functions. The effect of earthworms (Lumbricidae) on the physical soil properties is notable. During burrowing, earthworms press the material in the vicinity of the hollowed burrows.

Several variants of the relationship between the macropores and the soil compaction, permeability and erodibility were verified. Both measurements in the field and laboratory tests of intact collected samples and engineered samples were performed. With regard to preferential focus on the hydraulic processes in gravity macropores, to the limits of the instrumentation and the size of individual earthworms in agricultural soils in the Czech Republic, we assessed the processes in the macropores with diameter of ca 5 mm or larger. In some cases, saturated hydraulic conductivity of zoogenic macropore walls was reduced in order of tens of percent compared with hydraulic conductivity of soil matrix, and the increase of bulk density of soil in the macropore vicinity achieved 25%. The effect of repeated rise and water level stagnation (repeated macropore washing during multiple wetting cycles) was tested. Investigation of water erosion of macropores was limited by adjustable flow, vessel capacity and pump capacity of the accurate continuous infiltrometer. Investigation of the water inlet from above gave more data on the washed-off material in the selected time intervals. Analysis of water rise from below and macropore sealing provided one cumulative data for each testing period.