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Soil water dynamics during precipitation in genetic horizons of Retisol

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Retisols derived from silty deposits dominate in the soil cover of the Carpathian Foothills. The hydrophysical properties of these are determined by the grain-size distribution of the parent material and the soil's "primary" properties shaped in the deposition process. The other contributing factors are the soil-forming processes, such as lessivage (leaching of clay particles), and the morphogenetic processes that presently shape the relief. These factors are responsible for the "secondary" differentiation of hydrophysical properties across the soil profile. Both the primary and secondary hydrophysical properties of soils (the rates of water retention, filtration and infiltration, and the moisture distribution over the soil profile) determine their ability to take in rainfall, the amount of rainwater taken in, and the ways of its redistribution.

The aims of the study, carried out during 2015, were to investigate the dynamics of soil moisture in genetic horizons of Retisol derived from silty deposits and to recognize how fast and how deep water from precipitation gets into soil horizons.

Data of soil moisture were measured using 5TM moisture and temperature sensor and collected by logger Em50 (Decagon Devices USA). Data were captured every 10 minutes from 6 sensors at depths: - 10 cm, 20 cm, 40 cm, 60 cm and 80 cm. Precipitation data come from meteorological station situated 50 m away from the soil profile.

Two zones differing in the type of water regime were distinguished in Retisol: an upper zone comprising humic and eluvial horizons, and a lower zone consisting of illuvial and parent material horizons. The upper zone shows smaller retention of water available for plants, and relatively wide fluctuations in moisture content, compared to the lower zone. The lower zone has stable moisture content during the vegetation season, with values around the water field capacity. Large changes in soil moisture were observed while rainfall. These changes depend on the volume of the precipitation and soil moisture before the precipitation.

The following changes of moisture in the soil profile during precipitation were distinguished: if soil moisture in upper zone horizons oscillates around field capacity (higher than 0.30 $m^3 \cdot m^{-3}$) there is an evident increase in soil moisture also in the lower zone horizons. If soil moisture in the upper zone horizons is much lower than the field capacity (less than 0.20 $m^3 \cdot m^{-3}$), the soil moisture in the lower zone has very little fluctuations. The range of wetting front in the soil profile depends on the volume of the precipitation and soil moisture. The heavier precipitation, the wetting front in soil profile reaches deeper horizons. The wetter the soil is, the faster soil moisture in the deeper genetic horizons increase.

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