



## Impact of land management on soil structure and soil hydraulic properties

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Study is focused on a comparison of a soil structure and soil hydraulic properties within soil profiles of a same soil type under different land management. Study was performed in Haplic Luvisol in Hnevceves the Czech Republic. Two soil profiles, which were in close distance from each other, were chosen: 1. under the conventional tillage, 2. under the permanent (30 years) grass cover. Soil sampling and field experiments were carried out immediately after the harvest of winter barley in 2008. The micromorphological images were used to evaluate the soil structure of all Ap, Bt1, Bt2 and C diagnostic horizons. The hydraulic properties of the diagnostic horizons were studied in the laboratory using multistep outflow experiments performed on the undisturbed 100-cm<sup>3</sup> soil samples. A tension disc infiltrometer (with a disc radius of 10 cm) and minidisc tension infiltrometers (with a disc radius of 2.2 cm) were used to measure cumulative water infiltration under unsaturated conditions created using a pressure head of -2 cm. Measurements were performed at a depths of 5, 45, 75 and 110 cm, which corresponded to the Ap, Bt1, Bt2 and C horizons of studied Haplic Luvisol at both locations. The Guelph permeameter was used to measure cumulative water flux under surface ponding conditions. The depth of the drilled well was 10, 50, 80 and 115 cm, the well radius was 3 cm, and the well ponding depth was 5 cm. Both tests were used to evaluate hydraulic conductivity (K for h=-2cm, and K<sub>s</sub>) values.

Results showed, that while properties in the Bt2 and C horizons of both soil profiles were relatively similar, properties in the Ap and Bt1 horizons were different. The fraction of gravitational pores (which may cause preferential flow) in the Ap and Bt1 horizons of the soil profile under the convectional tillage was large than those in the Ap and Bt1 horizons of the soil profile under the permanent grass. This influenced for instance the K<sub>s</sub> values measured using the Guelph permeametr. The K<sub>s</sub> values were higher and more variable in the soil profile under the convectional tillage than those in the soil profile under the permanent grass. On the other hand, due to the periodical tillage and consequent soil structure breakdown, the fraction of the large capillary pores were smaller in the Ap horizon of the soil profile under the convectional tillage than that in the Ap horizon of the soil profile under the permanent grass. As result the K (h=-2cm) values measured using the tension infiltrometer in the soil profile under the permanent grass was higher than those in the soil profile under the convectional tillage. However, the fraction of the large capillary pores and K (h=-2cm) values were similar in the Bt1 horizons of both soil profiles. Thus the land management impacted both macropores and matrix pores in the Ap horizon and macropores (prismatic structure and biopores) in the Bt1 horizon.

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