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Interactions between soil structure and excess water formation on chernozem soils

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The main natural resource of Hungary is soil therefore its protection is a fundamental obligation for the state and the farmers too. The frequency of the weather extremeties have increased due to the global climate change which takes effect also on the soil properties.
The hungarian agriculture was stricken with drought in the 1990's, whereas excess water has caused damages in the previous decade. According to multi-variable correlation tests, pedological parameters influence on the formation of excess water besides hydrometeorological, geological or relief factors. But not only the soil parameters can take effect on the formation of excess water, but also excess water can modify the soil parameters – causing appearance of hydromorfical characteristics or physical degradation.
In our research the interactions between soil structure, excess water and land use were investigated in the aspects of changes in the structure of the upper soil, on a cultivated study area (located on the South Hungarian Great Plain). Three excess water patches were appointed with analysis of multitemporal Landsat images in the study area and were connected a southwest-west–nordeast-east line, forming a 700 meter-long catena. In July, 2011 soil samples were collected along this catena at each 50 meters from the depth of 0–5 cm, 10–15 cm and 20–25 cm to compare the agronomical structure and aggregates stability of soils covered temporally by excess water and without it.
Furthermore, penetration resistance and relative moisture of soil were determined at the deep of 60 cm in definite points of a 25x25 m grid on the 45 hectares study field using 3T System hand penetrometer in order to create a multilayer-map from the soil compaction datas.
The results call the attention both to the physical soil degradation caused by excess water and to the risk of erosion due to inadequate tillage or cultivation.