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Soil structural degradation due to intensive soil tillage and its impact on soil moisture regime

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Food production and agricultural activity depends on good soil quality and access to soil moisture. Agricultural production of Hungary suffers from the unbalanced temporal distribution of soil moisture. There is excess water in the spring resulting ponding water on the agricultural fields, while the summer period is very dry and soil moisture scarcity is the major limiting factor. These extremes are partly due to the climatic conditions, but soil structural degradation due to intensive agricultural cultivation is a major factor as well. Soil porosity and soil water holding capacity of the agricultural soils is significantly less than a natural one.
Four heterogeneous agricultural parcels have been selected for the study with different soil types and soil forming conditions. Approximately 100 Soil profiles have been opened with the depths of 100 to 150 cm. All of these profiles have been described in the field and all soil morphological features have been recorded and interpreted. Profiles have been sampled by genetic horizons and chemical and particle size analysis have been performed. Lab data and morphological characterization were interpreted together to understand and identify the degradation processes
The results clearly confirmed, that human induced soil degradation is a major factor of the decreasing soil water supply for the agricultural production. Morphology has proved in several cases, that spring water ponding is the result of limited infiltration caused by very low porosity of the surface horizons. Very low porosity with dominating fine pores increases the capillarity rise and lead to the loss of soil moisture in the dry periods.