



Influence of Topography and Land use Type on the Soil Organic Carbon Dynamics in Zala County, Hungary

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Soil organic carbon (SOC) content is an important soil property for land, plant production and environment and ecosystem management. Soil fertility and many other physio-chemical and biological properties of soils are directly/indirectly linked with carbon content of the soil. We analyze the impact of topography and land use practice on the spatial variability of top soil SOC over a mixed agricultural, forestry and grassland area from Zala County in Hungary. The spatial dynamics of SOC display a high variability over the study area. A characteristic value for the SOC of the topsoil is calculated as a weighted average of the measured SOC content of soil horizons identified within the first 30 cm of soil. Topographic features of the area are extracted from a digital elevation model (5×5 m resolution). Information on land use type is obtained on the basis of remote sensing images and is also recorded during the field sampling campaign. Classical statistical, geostatistical and Geographical Information System (GIS) based tools have been used to study the distribution and spatial correlation features of SOC as well as its relationship with local topography and land use type. The average SOC in the study area is 1.49 % and is associated with a standard deviation of 0.73. SOC values display moderately high (*i.e.*, 0.48) coefficient of variation (CV). SOC is typically associated with a spherical model variogram with a relatively large nugget (*i.e.*, 0.42). The range of spatial correlation for SOC is found to be about 3.5 kilometers. The local ground slope and land use type are key parameters in determining the spatial distribution of SOC over the study area. The highest SOC content is found in a flat and low land area characterized by grass land whereas collected SOC values appear to gradually decrease with increasing values of local terrain slope. Crop lands show moderate amount of SOC. Peat excavation pits have also been recorded in the flat areas and are characterized by high SOC content. Organic matter rich top soil has been eroded from the slopes reducing the SOC content of the eroded areas.

Key words: Soil organic carbon content, Digital elevation model, Geostatistics, Kriging