

Spatial distribution of C organic contents on loess hillslope in respect to severity of erosion in Poland

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Soil erosion corresponding to long term agricultural land use has caused a substantial transformation of soils in hilly loess area of Lublin in Poland. Nowadays, even on uniform slope and at the same landscape position, upper soil layer could be formed from different soil genetic horizons. In consequence some soil polygons of the investigated area have various properties and may erode with different intensity. The aim of the studies was to characterize relations between erosion intensity and the spatial distribution of C organic.

The studies were carried out on a part of small loess catchment near Lublin (south-east Poland; 51°22'N; 22°44'E). The studied area covered a slope of southern inclination of 4 ha, functioning for a long time as a one field. Soil samples for determination of C organic content were collected from upper soil layer (2-7cm) in a grid of 25 by 25 m (totally 61 samples). On chosen positions of the field, 12 runoff plots of 3 x 20 m were established. To compare the results of water erosion, plots were established at slope of 9-10 %. Runoff plots were localized on slightly, moderately, very severely eroded and colluvial soil. Each of the erosion class was represented by three plots. From these plots, one was kept as a continuous bare fallow and two with plants. At the lower parts of the plots, runoff collection installations were established. Soil loss was usually collected in 2-week periods. In collected sediment, C organic content was determined. During vegetation period soil cores (100 cm³) were taken from plots with plants to the depth of 30 cm, and OM and dry root mass was determined.

Results showed that soil C organic content was dependent on severity of erosion and was the highest on non-eroded soil (C = 1.06 %), then with severity of erosion C organic content decreased and was the lowest on very severely eroded soil (C = 0.86 %). C organic content in colluvial soil was close to the values found on non-eroded soil. Soil losses were twice bigger on very severely eroded and colluvial soils than on slightly and moderately eroded soil. Enrichment ratio of C organic in sediment towards soil content was similar for all soils and was depended on intensity of erosion. Tendency to decrease of enrichment ratio was observed in winter periods. Areas of decreased C organic content were found below polygons with severe erosion i.e. where upper soil layer was formed from parent loess material. It suggested that eroded sediment was transported over short distances.

Key-words : Poland, Loess area, Erosion, Carbon of topsoil, Carbon sed/soil enrichment ratio

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