



Effect of the slope and initial moisture content on soil loss, aggregate and particle size distribution

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Soil structure degradation has effect through the soil water balance and nutrient supply on the agricultural potential of an area. The soil erosion process comprises two phases: detachment and transport by water. To study the transport phase nozzle type laboratory-scale rainfall simulator was used with constant 80 mmhr⁻¹ intensity on an arable haplic Cambisol. Measuring the aggregate and particle size distribution of the soil loss gives a good approach the erosion process. The primary objective of this study was to examine the sediment concentration, and detect the quality and quantity change of the soil loss during a single precipitation under six treatment combinations (recently tilled and crusty soil surface on two different slope steepness, inland inundation and drought soil conditions). Soil loss were collected continually, and separated per aggregate size fractions with sieves in three rounds during a rain to measure the weights. The particle size distribution was measured with Horiba LA-950 particle size analyzer. In general the ratio of the macro aggregates decreases and the ratio of the micro aggregates and clay fraction increases in the sediment with time during the precipitation due to the raindrop impact. Sediment concentration depends on the slope steepness, as from steeper slopes the runoff can transport bigger amount of sediment, but from the tilled surface bigger aggregates were washing down. Micro aggregate fraction is one of the indicators of good soil structure. The degradation of micro aggregates occurs in steeper slopes and the most erosive time period depends on the micromorphology of the surface. And while the aggregate size distribution of the soil loss of the treatments shows high variety of distribution and differs from the original soil, the particle size distribution of each aggregate size fraction shows similar trends except the 50-250 μm fraction where the fine sand fraction is dominating instead of the loam. This anomaly may be connected with the TC content of this fraction, but more research is needed. In agricultural areas micro aggregate fraction plays important role in nutrient supply thus understanding the erosion process is necessary because of the better protection in the future.