



Runoff, sediment yield, and nutrient losses as affected by crop residues on a loamy soil prone to crusting

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Crop residue application may improve the resilience of soils against degradation processes, while increasing soil organic matter content. Degraded soil surface conditions favor surface runoff, thus enhancing sediment and nutrient losses. This study was conducted to evaluate the effect of crop residues on surface runoff, sediment yield and nutrient losses during four consecutive rainfall events. Steady state infiltration was also quantified at the end of the experiment. A conventionally tilled loamy soil with a low structure stability and prone to crusting was packed on 1m² microplots provided with a collector to about 0.12 mm⁻¹ slope. Microplots were subjected to four consecutive rainfall events (65 mmh⁻¹ intensity), the first three ones 25 mm each and the last one 65 mm, thus cumulative 140 mm rainfall. Five treatments without replication were tested with corn straw residues quantities varying from 0 to 4 t ha⁻¹. Measurements of surface runoff and soil losses were carried out at fixed intervals. Moreover, the effect of crop residues on C, N, total P (TP) and total dissolved P (TDP) losses by surface runoff was also examined. Cumulative runoff after one hour simulated rainfall was between 55.50 and 98.78 mm and decreased linearly with increase in maize straw addition. Soil losses varied between 9.16 and 68.32 t ha⁻¹ and they were negatively correlated with maize straw by an exponential relationship. Organic C, N and TP concentrations in runoff decreased with increasing corn residue amount. However, TDP concentration increased with increasing crop residue. Thought sedimentary P constituted the major proportion of total P in runoff, TDP contents were in runoff water were of minor importance. Organic C, N, TP and TDP loads also decreased as a function of corn straw addition. After 140 mm cumulative rainfall, nutrient losses were as

follows: organic C from 137.7 to 792.7 kg/ha, N from 16.65 to 88.82 kg/ha, TP from 1.72 to 7.87 kg/ha and TDP 57 to 87 g/ha. Total nutrient losses were highly correlated with soil losses. These results confirm that it is possible to adopt alternative management systems to prevent further soil degradation and soil losses by erosion and that the application of organic residues is essential to restore soil structure quality.