



Crop residue effects on Ca, Mg, K and Na concentrations and loads in runoff water

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Soil organic matter constitutes an important source of macro and micronutrients for plants and microorganisms while improving some physical and chemical properties of the soil. In Galicia (NW Spain), cultivated soils developed on schists from the Ordenes series show a relatively high susceptibility to surface degradation, which tends to be increased when soil organic content decreases. Therefore, management systems providing a high protection to the soil and increasing its organic matter content should also improve its quality. However, tillage practices may reduce the organic matter content in soil surface horizons, causing crust formation. Degraded soil surface conditions favor surface runoff, thus enhancing nutrient losses. This study examined the effect of applying crop residues to the soil surface on main nutrient (Ca, Mg, K and Na) losses by runoff from a tilled soil with a relatively low organic matter content. Runoff and sediment yield were made over 1 m² plots using a rainfall simulator with constant 65 mm h⁻¹ intensity. Four successive rainfall applications were performed, the first three ones 25 mm each and the last one 65 mm. Added corn straw varied between 0 and 4 t ha⁻¹ in the five studied treatments. Total and dissolved concentrations of the studied elements showed a trend to decrease due to the effect of corn straw on soil losses. After 140 mm cumulative rainfall, total nutrient losses were as follows: Ca from 12.32 to 28.94 mg L⁻¹, Mg from 20.81 to 148.90 mg L⁻¹, K from 14.20 to 35.17 mg L⁻¹ and Na from 14.99 to 23.41 mg L⁻¹. The relative contribution of the dissolved fraction to the total nutrient content loss was highly variable, being up to 90% in the case of Na. The obtained results confirmed that corn residues applied to a degraded soil, with low structural stability, prevented macronutrient losses.