

EROSION AND SEDIMENT DEPOSITION EVALUATION IN TWO SLOPES UNDER DIFFERENT TILLAGE SYSTEMS USING THE “¹³⁷Cs FALLOUT” TECHNIQUE

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ABSTRACT

Soil erosion is one of the main factors responsible for soil degradation. Soils presenting unprotected surfaces, mainly during periods of high erosive rains, are more susceptible to the hydric erosion process. The conventional tillage (CT), that mobilizes intensively the soil can destroy its structure and cause compaction, causing appropriate conditions for soil losses by water erosion. The no till (NT) cropping system, that mobilizes the soil only in the sowing line, creates conditions more close to the natural environment, reducing the soil losses by erosion. With the increasing of occupation of the Brazilian “Cerrado” a series of environmental problems followed by the deforestation as soil erosion and soil compaction are appearing, and many of them are being related to the CT used. The NT cropping system which is being adopted more recently in the “cerrado” region has revealed benefic to the soil, mainly in terms of soil erosion control. However, this change in crop management still demand many studies and many questions are not yet answered. The objective of the present work was to analyze the effect of the NT and CT systems on the erosion process and to measure the efficiency of the riparian forest in trapping the sediments produced by erosion coming from crop areas cultivated by both systems. The technique used to quantify the soil erosion and deposition process was the ¹³⁷Cs redistribution analysis. The study was carried out in Goiatuba/GO in two sampling downslope transects located in areas of CT and NT cropping systems. Samples were taken from five points in transects of 160 and 115 meters long respectively, as well as from three soil profiles of a 30m transect in the downstream riparian forests of each area. Incremental depth samples were also taken from two pits inside each transect in the forest down to 40 and 60cm depth for the CT and NT respectively. The soil samples were air dried and sieved and then analyzed for ¹³⁷Cs activity in a gamma ray detector (GEM-20180P, EG&ORTEC) coupled to a multichannel analyzer at CENA/USP. The results indicate variation of ¹³⁷Cs in soil profiles and high erosion rates for both cropping areas, and clearly show that soil erosion is higher in the area of CT cropping system when compared to NT system. The deposition rates observed in the riparian forest of the conventional tillage area are much higher than the values observed in correspondent non-tillage riparian forest, indicating that the transport of sediments is higher in the conventional tillage system. It is also observed that the average sediment deposition rates are higher in the no-tillage crop area when compared to the conventional tillage area.