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Effect of Cropping System and Contouring or Download Sowing on Soil Water Erosion under no Tillage

J. Marioti (1), J. Padilha (1), I. Bertol (1), F. T. Barbosa (1), J. C. Ramos (1), R. S. Werner (1), E. Vidal Vázquez (2), and M. S. Tanaka (1)

(1) Dept. de Solos e Recursos Naturais, CAV, Universidade do Estado de Santa Catarina, Lages, SC, Brazil, (2) Facultade de Ciencias, Universidade da Coruña, A Zapateira, 15008 A Coruña, Spain

Water erosion is the main responsible factor of soil and water losses, thus also causing soil degradation, especially on agricultural land, and it is also one factor of degradation outside the place of the origin of erosion. No tillage agriculture has been practiced in the last few decades for the purposes of water erosion control in various regions of Brazil. However, it has been shown that no tillage does not adequately control water erosion unless other complementary conservationist practices such as contour tillage or terracement. Although the erosion problem is widely recognized, there are still difficulties in estimating their magnitude, the environmental impact and the economic consequences, especially when it occurs in a conservation system like no tillage. The aim of this study was to quantify runoff and soil losses by water erosion under five different soil tillage treatments at Santa Catarina State, Southern Brazil. A field study was carried out using a rotating-boom rainfall simulator with 64 mmh^{-1} rainfall intensity for 90 minutes. Four rainfall tests were applied over the experimental period, one in each of the successive soybean and maize crop stages. Both soil cover by surface crop residue and soil cover by soybean and maize plant canopy were measured immediately before each rainfall test. Soil and water losses were smaller when sowing in contour than when sowing downslope. Contouring has promoted an average reduction of 42% in soil losses and 20% in water losses. Maize crop has promoted an average reduction of 19% in soil losses and 12% in water losses, in relation to the soybean crop. Therefore runoff rates and soil losses were higher in the downslope plots and in the soybean crop. Soil cover by previous crop residue was an important factor for reducing soil losses. Runoff rates were influenced by the soil water content before each rainfall test (R^2= 0.78). The highest runoff occurred during the third simulated rainfall test, with the 83% of the total rain applied; immediately before the test the soil moisture was 36%. The smallest losses occurred in the fourth test, with 55% of the total rain applied where the soil moisture immediately before the rainfall test was 25%.