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Effect of soil tillage system on selected water erosion parameters

I. Bertol (1), W.A. Zoldan (1), E. Zavaschi (1), E. Bosetti (1), R.V. Luciano (1), **A. Paz González** (2)

(1) Universidade do Estado de Santa Catarina-UDESC, Santa Catarina, Brazil. a2ib@cav.udesc.br / Fax: 55-4921019122 / Phone: 55-4932219235 (2) Universidad de La Coruña- UDC, La Coruña, Spain. tucho@udc.es / Fax: 34-981167065 / Phone: 34-981167000

Tillage influences surface soil physical conditions, and consequently factors related to water erosion. A field experiment using simulated rainfall was conducted from October, 1999 to May, 2000, in the Santa Catarina highlands region, southern Brazil, in order to evaluate some parameters related to water erosion under steady runoff-rate. At the experimental site, soil type was a clayey Typic Hapludox with 0.14 mm^{-1} slope. The treatments consisted of: (a) reduced tillage (chiseling + disking), (b) typical conventional tillage (plowing + double-disking), and (c) modified conventional tillage (plowing + double-disking + double hand-harrowing). The first two treatments were on continuously cultivated soil and the last one was on bare soil (control treatment). Both, soil surface roughness and soil residue cover were measured immediately before and after tillage. The rainfall test was applied by the time of soybean planting, at a constant intensity of 64 mmh^{-1} and varying duration, until completing 30 min of constant runoff in each treatment. Soil tillage increased the random-surface roughness and decreased surface cover to different degrees, depending on the type of equipment. Reduced tillage was the most effective treatment in terms of both increasing random surface roughness and maintaining the soil surface cover. The time to start runoff and to reach runoff-peak were relatively long and little affected by tillage treatments. Runoff velocity, sediment concentration and size of eroded sediments in the runoff-water, and soil loss rate increased as both surface roughness and surface cover decreased, while rainfall-water infiltration in the soil decreased as a function of these two parameters. Runoff discharge and its associated runoff coefficient parameter -C in the Rational Equation– also increased as surface roughness and surface cover decreased.