TILLAGE EROSION COEFFICIENT MEASUREMENTS

J.Q. Mollinedo, J.A Schumacher, T.E. Schumacher
Plant Science Department
South Dakota State University
Brookings, SD 57007

S.Li and D.A. Lobb
Soil Science Department
University of Manitoba
Winnipeg, MB, R3T 2N2

ABSTRACT

Soil loss as a result of differential translocation of soil by tillage is widespread in regions with irregular topography. Current tillage erosion models are based on yield derived transport coefficients that are specific to the tillage tool being used. Other variables that can modify the transport coefficients include speed of operation and depth of tillage. The measurements of tillage coefficients in the field are time consuming and labor intensive. Because of these limitations determining variability of tillage coefficients has been difficult. A procedure that provides an internal estimate of variability that requires little extra labor or time is described. This method provides an indication of sampling error but does not address variability associated with operation of the tillage tool. In addition we present a modification of tillage tracer-soil separation that allows in-field processing. A method for estimating the movement of soil by tillage equipment was developed that utilized metallic washers and a magnetic sweep. The method allowed for a high retrieval rate of soil tracer (98%) for the plot treatments. The high retrieval rate and uncomplicated nature of the method allowed for the development of a regression equation describing the distance soil moves in the up and down direction through translocation by a chisel plow. The tillage translocation coefficient for the chisel plow was estimated to be 154 kg/m when operated at measured initial parameters. The initial parameter measurements included tillage speed, soil moisture content, soil bulk density, and soil texture. The derivation of the basic model for calculating tillage erosion rates and soil tillage translocation coefficient are also described.