



Shadow analysis: a method for measuring soil surface roughness

R. GARCIA MORENO (1), A. PAZ GONZÁLEZ (1), M.C. DIAZ ÁLVAREZ (2), A. SAA REQUEJO (2), and A.M. TARQUIS (2)

(1) Universidade Da Coruña, Departamento de Ciencias Da Navegación e Da Terra. Facultad de Ciencias, Coruña, Spain (chgarcia@terra.es), (2) CEIGRAM (Centro de Estudios e Investigación para la Gestión de Riesgos Agrarios y Medioambientales). E.T.S. de Ingenieros Agrónomos, Universidad Politécnica de Madrid, MADRID, SPAIN.

Erosion potential and the effects of tillage can be evaluated from quantitative descriptions of soil surface roughness. The present study therefore aimed to fill the need for a reliable, low-cost and convenient method to measure that parameter. Based on the interpretation of micro-topographic shadows, this new procedure is primarily designed for use in the field after tillage. The principle underlying shadow analysis is the direct relationship between soil surface roughness and the shadows cast by soil structures under fixed sunlight conditions. The results obtained with this method were compared to the statistical indexes used to interpret field readings recorded by a pin meter. The tests were conducted on 4-m² sandy loam and sandy clay loam plots divided into 1-m² subplots tilled with three different tools: chisel, tiller and roller. The highly significant correlation between the statistical indexes and shadow analysis results obtained in the laboratory as well as in the field for all the soil-tool combinations proved that both variability (CV) and dispersion (SD) are accommodated by the new method. This procedure simplifies the interpretation of soil surface roughness and shortens the time involved in field operations by a factor ranging from 12 to 20.