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AN APPRAISAL OF TWO TRACER METHODS FOR ESTIMATING TILLAGE EROSION RATES UNDER HOEING TILLAGE

Jianhui Zhang *, Fucheng Li

*Institute of Mountain Hazards and Environment, Chinese Academy of Sciences and Ministry of Water Conservancy,
Chengdu 610041, China*

Abstract

An increasing recognition of tillage erosion processes has shown that soil redistribution by tillage directly contributes to soil loss in mechanically and nonmechanically agricultural areas worldwide. Soil translocation by tillage is normally measured by means of tracers, with which a volume of soil is labeled, and therefore yielding tillage erosion rates in a field. Two tracer methods for estimating tillage erosion rates were appraised to understand the adaptability to local conditions in the hilly areas, southwestern China, in terms of the accuracy, measurement sensitivity, manipulation facility, and time cost. The two tracer methods had a similar measurement accuracy of soil translocation. However, for the magnetic tracer method the result of tracer distribution after tillage was immediately obtained in the field, while there was a need to do a follow-up indoor determination for the stone chip method. The magnetic tracer method only required collecting a small volume of soil samples, while a large quantity of soil (i.e. all the soils into which tracers possibly redistributed) was collected to recover all the stone chips from tilled soils. As a result, the magnetic tracer method would be much time saving compared to the stone chip method. It is suggested that the magnetic tracer method would rather be used when there are large quantities of sampling plots to be measured on steep hillslopes of the hilly areas where hoeing tillage is practiced.

Key words: hillslope, hoeing tillage, magnetic tracer, tillage erosion, tillage translocation

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* Author to whom all correspondence should be addressed: e-mail: zjh@imde.ac.cn; Phone: +8628 85238973; Fax: +8628 85238973