



Tracing and modelling water and sediment dynamics in a conventional irrigated bed system under different scenarios

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Water erosion is a threat to the future of southern Spain agriculture, even in the more controlled irrigated agricultural systems, which requires more precise information to establish rational soil and water conservation strategies. This report describes the application of three iron oxides (magnetite, hematite and goethite) as tracers in several experiments in a furrow irrigated-cotton cropland and the use of an erosion model, KINEROS2 to sediment data obtained during an erosion experiment with different soil management options.

The bed system with cotton planted on the top of the furrows was irrigated in July 2009 using sprinklers. The selected plot consisted of ten furrows under conventional management. The sprinkler irrigation had an intensity of 18 mm/h during 9 hours, when the cotton crop covered the 50 % of soil surface. Each furrow was divided in three sections (upper, medium, and lower) of 2.9 m². The first 2 cm of each section was tagged using a different iron oxide. Among tagged sections, areas of 10.3 m² without any tracer were left. More details of the experiment design can be found in Guzmán 2012. Soil samples before and after the rainfall simulations were collected as well as sediment samples during the irrigation. Experimental data were used to calibrate and validate an erosion model: KINEROS2 that gives information about total runoff and total soil losses along the furrow-shoulder system. Calibration of the model was made considering wheel traffic in the corresponding furrows. Once identified the model parameters with the water and sediment yield data KINEROS2 was used to generate data for a combination of possible scenarios.

The results evaluate the combined use of three iron oxides as unexpensive sediment tracers that can provide additional information to the traditional measurements in water erosion experiments with model analysis. The results provide insight on the influence of slopes, lengths and crop covered fractions, helpful for improving soil conservation techniques in these agricultural systems.

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