

No-till and basin tillage for reducing runoff and sediment yield on centre-pivot irrigated maize in a Mediterranean soil

L.L. Silva^{*}, J.R. Marques da Silva, A.M.V. Pisco and C.J.V. Torres

Rural Engineering Department and Instituto de Ciências Agrárias e Ambientais Mediterrânicas (ICAAM), Évora University, Apartado 94, 7002-554 Évora, Portugal.

^{*} Corresponding author: Tel: +351 266760933, Fax: +351 266760911, E-mail address: llsilva@uevora.pt.

Abstract

Centre-pivot irrigation systems frequently cause surface runoff and erosion problems. This is more evident in complex topographies and low infiltrability soils. To overcome these problems farmers have tried different tillage systems, attaining different results, depending on soil type and irrigation management. Field tests, using small plots, were carried out in a Mediterranean soil with three different tillage systems: no-till, basin tillage and conventional tillage, as a control practice. Conventional tillage showed the highest runoff values (30 % of collected water depth) with significant differences to no-till (15 %) and basin tillage (2 %). Maximum average values of sediment yields per irrigation event were lower for basin tillage (4.46 kg/ha) and no-till (9.59 kg/ha) compared to conventional tillage (23.45 kg/ha). The no-till system showed higher soil water content along all the irrigation season compared to the other two tillage systems. From a soil and water conservation point of view the basin tillage practice is the best option. But, from an economic point of view the no-till practice can be also a good option in these conditions.

Keywords: Runoff, tillage systems, Centre-pivot irrigation.