



Herbicide runoff loss from no-tillage olive groves with ground cover strips

P. Galindo (1), **E. de Luna** (1), M. J. Polo (2)

(1) Agrarian Production, IFAPA, Cordoba, Spain (2) Agricultural Hydrology and Hydraulics Research Group, Department of Agronomy, University of Cordoba ,Spain

Changes in olive orchard soil management are being encouraged in Andalusia in order to reduce erosion, and no-tillage system with ground cover strips between tree rows has been adopted as an alternative to conventional tillage. As an additional benefit, these strips could reduce the agrochemical transport from olive groves to surface waters acting as natural filters.

The application of residual herbicides to keep the surface beneath tree canopy free of vegetation is common in this type of soil management. These substances are often detected in runoff flows, particularly when rainfall events occur shortly after the herbicide application.

The objective of this work was to assess the sustainability of no-tillage systems with ground cover strips from the point of view of herbicide transport by overland flow, and to study the effectiveness of two different systems of cover strips.

To this purpose, two erosion plots of 14x53 m were installed on an olive orchard with trees planted at 6x6 spacing. One plot consisted of mixed cover strips of barley and raygrass (CC) whereas the other one had strips of olive pruning waste (PW). The strips were 2m wide in both plots, and they were located perpendicularly to the maximum slope direction.

Four residual herbicides, terbuthylazine, diuron, oxyfluorfen, and diflufenican, were applied in November 2006. Runoff, sediment, and herbicide losses were monitored from that date until May 2007, with a total of five storm events recorded. The first

significant runoff register occurred 26 days after herbicide application.

Runoff coefficient was 3.5 % for CC plots, and 3.9 % for PW plots. Total soil loss mounted to 1.4 t ha^{-1} and 2.7 t ha^{-1} , respectively.

Different herbicide concentration values were observed in both sediment and water phase in runoff flow. Oxyfluorfen and diflufenican were mainly found adsorbed to sediments, whereas terbuthylazine and diuron were found in both water and sediment phases. The ratio between lost and applied herbicide ranged between 0.59-0.26% for diuron, 0.67-0.27% for terbuthylazine, 1.63-1.96% for diflufenican and 1.28-1.49% for oxyfluorfen, in CC and PW respectively.

For this experiment, olive pruning waste strips and grass strips soil managements showed similar runoff, sediment and herbicide losses. Oxyfluorfen and diflufenican showed the highest losses, mainly associated to sediments. In order to reduce the potential pollution of surface waters due to these substances, it is recommended to avoid its use in cases of high erosion risk.