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Sustainable Land Management in SE-Spain: effective and feasible measures to reduce soil and water loss for agriculture

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In close collaboration with stakeholders, during a series of two workshops, a selection was made of the most promising and feasible soil and water conservation measures to be implemented and monitored in the upper Guadalentin catchment in SE-Spain, as part of the EU funded DESIRE project. Five Sustainable Land Management (SLM) measures were implemented in three field sites. Four of these measures were on rainfed almonds: a) reduced tillage, b) green manure, c) straw mulch, d) traditional water harvesting. The fifth SLM technique (e), is reduced tillage in a cereals field and is compared to conventional mouldboard tillage. Here, we present the first results after almost 2 years of monitoring (15 rainfall events) according to ecologic and economic criteria.
SLM measures a, b and e, aim to reduce soil and water loss through runoff. To measure their effect, for each measure three replica erosion-runoff plots and a control plot were installed to monitor soil and water loss and soil moisture content at two depths. SLM measures c and d aim to increase soil water content by preventing evapotranspiration and adding additional water by water harvesting respectively.
In the almond fields, green manure and reduced tillage significantly reduced soil and water loss during the period of monitoring as compared to the control plot with normal tillage operations. Also for the cereal field, first results indicate reduced erosion rates under reduced tillage as compared to traditional tillage operation. In two successive years, the highest almond harvest was found in the field with water harvesting (d), followed by the green manure field (b), though no significant differences were found in soil water content with their control plots. Mulching did not show a significant effect on soil water content.
Overall, the selected SLM options seem to have a positive effect on the protection of soil and water resources, and at the same time are beneficial for crop yield. Whereas, reduced tillage also results in lower production costs, the other measures (green manure, mulching and water harvesting) require some initial and/or maintenance costs. Therefore, a more in depth cost-benefit analysis is required to demonstrate their feasibility for rainfed (marginal) agricultural production schemes in semiarid SE spain.