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The potential of straw mulch as a nature-based solution in olive groves. A biophysical and socio-economic assessment

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Abstract

Olive groves are characterised by intense herbicide use to avoid weeds in the fields. Bare soils result in high and non-sustainable soil and water losses, and in the end in soil degradation. There is a need to find proper management strategies to reach sustainability; and Nature-Base Solutions (NBSs) are the most appropriate options. The use of straw as a mulch can be a good option to reduce soil losses, but there is no sufficient information about how to apply a mulch cover from a biophysical, economic and perception point of view to reach a sustainable situation. Fifty paired plots under simulated rainfall showed that the use of a cover of straw mulch of 50 % (1 Mg ha^{-1}) in olive plantations results in a delay in ponding (from 34 to 61 s) and runoff initiation (from 61 to 148 s), and a reduction in total runoff (from 50 to 38 %), sediment concentration (from 15.6 to 2.09 gr l^{-1}) and sediment yield (from 3 to 0.3 gr m^2 h^{-1}). On the other hand, an economic survey based on interviews show that the use of straw mulch in olive groves will cost 174.7 € ha^{-1}, from which 54.7 € ha^{-1} is needed for the application work, 52.3 € ha^{-1} for the purchase cost and 67.7 € ha^{-1} for the transport of 20 Kg bales that allow easy spreading and management by the farmers. The 43 interviewed farmers produce an average of 1,864 Kg ha^{-1} of olives, oil richness is 18.64 %, and the final average income is 777 € ha^{-1}. Therefore the cost of the straw is 22.5 % of the total income of the farmers. The farmer's perception was surveyed by means of interviews, and we found that their perception was negative about the use of the straw mulch, as the tradition in the fields is to avoid any weed or cover, except the crop. However, farmers would use straw mulch if they would be subsidized with a minimum of 267 € ha^{-1}, 92 € ha^{-1} more than the costs estimated on the basis of the surveys. We conclude that soil erosion can be controlled by the use of straw mulches, and that there is a need to subsidize this management due to

the extra cost for the farmers. However, the negative perception of the farmers about the use of straw can only be solved with information, training and tutoring. There is a need of an extension service to update, instruct and coach farmers in the use of sustainable management such as the use of straw mulch.

Keywords: Economy, perception, soil erosion, rainfall simulation, interviews, agricultural sustainability

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