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**Author(s)** Keesstra, S.D.; Rodrigo-Comino, J.; Novara, A.; Giménez-Morera, A.; Pulido, M.; Prima, S. Di; Cerdà, A.

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**Abstract** In many Mediterranean areas, citrus orchards exhibit high soil loss rates because of the expansion of drip irrigation that allows cultivation on sloping terrain and the widespread use of glyphosate. To mitigate these non-sustainable soil losses, straw mulch could be applied as an efficient solution but this has been poorly studied. Therefore, the main goal of this paper was to assess the use of straw mulch as a tool to reduce soil losses in clementine plantations, which can be considered representative of a typical Mediterranean citrus orchard. A total of 40 rainfall simulation experiments were carried out on 20 pairs of neighbouring bare and mulched plots. Each experiment involved applying 38.8 mm of rain at a constant rate over 1 h to a circular plot of 0.28 m<sup>2</sup> circular plots. The results showed that a cover of 50% of straw (60 g m<sup>-2</sup>) was able to delay the time to ponding from 32 to 52 s and the time to runoff initiation from 57 to 129 s. Also, the mulching reduced the runoff coefficient from 65.6 to 50.5%. The effect on sediment transport was even more pronounced, as the straw mulch reduced the sediment concentration from 16.7 g l<sup>-1</sup> to 3.6 g l<sup>-1</sup> and the soil erosion rates from 439 g to 73 g. Our results indicated that mulching can be used as a useful management practice to control soil erosion rates due to the immediate effect on high soil detachment rate and runoff initiation reduction in conventional clementine orchards on sloping land, by slowing down runoff initiation and by reducing runoff generation and, especially, sediment losses. We indirectly concluded that straw mulch is also a sustainable solution in glyphosate-treated citrus plantations.