

The effects of mulching on soil erosion by water. A review based on published data

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Among the soil conservation practices that have been recently implemented, mulching has been successfully applied in different contexts (Jordán et al., 2011), such as agricultural lands (García-Orenes et al. 2009; Prosdocimi et al., 2016), fire-affected areas (Prats et al., 2014; Robichaud et al., 2013) and anthropic sites (Hayes et al., 2005), to reduce water and soil losses rates. In these contexts, soil erosion by water is a serious problem, especially in semi-arid and semi-humid areas of the world (Cerdà et al., 2009; Cerdan et al., 2010; Sadeghi et al., 2015). Although soil erosion by water consists of physical processes that vary significantly in severity and frequency according to when and where they occur, they are also strongly influenced by anthropic factors such as unsustainable farming practices and land-use changes on large scales (Cerdà, 1994; Montgomery, 2007). Although the beneficial effects of mulching are known, their quantification needs further research, especially in those areas where soil erosion by water represents a severe threat. In literature, there are still some uncertainties about how to maximize the effectiveness of mulching in the reduction of soil and water loss rates. First, the type of choice of the vegetative residues is fundamental and drives the application rate, cost, and consequently, its effectiveness. Second, it is important to assess application rates suitable for site-specific soil and environment conditions. The percentage of area covered by mulch is another important aspect to take into account, because it has proven to influence the reduction of soil loss. And third, the role played by mulching at catchment scale, where it plays a key role as barrier for breaking sediment and runoff connectivity. Given the seriousness of soil erosion by water and the uncertainties that still concern the correct use of mulching, this work aims to evaluate the effects of mulching on soil erosion rates and water losses in agricultural lands, post-fire affected areas and anthropic sites. Data published in literature have been collected. The results proved the beneficial effects of mulching on soil erosion by water in all the contexts considered, with reduction rates in average sediment concentration, soil loss and runoff volume that, in some cases, exceeded 90%. Furthermore, in most cases, mulching confirmed to be a relatively inexpensive soil conservation practice that allowed to reduce soil erodibility and surface immediately after its application.

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