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A simplified Excel tool for implementation of RUSLE2 in vineyards for stakeholders with limited dataset

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Analysis with simulation models is in many situations the only way to evaluate the impact of changes in soil management on soil erosion risk, and the Revised Universal Soil Loss Equation RUSLE (Renard et al. 1997, Dabney et al. 2012) remains as the most widely used. Even with their relative simplicity compared to other, more process based, erosion models proper RUSLE calibration for a given situation outside the modelling community can be challenging, especially in situations outside of those widely covered in the USA.
An approach pursued by Gómez et al. (2003) to overcome this problems for calibrating RUSLE, specially the cover-management factor, C, was to build a summary model using the equations defined by the RUSLE manual (Renard et al. 1997) but considering that the basic information required to calibrate the subfactors, such as soil surface roughness and ground cover, soil moisture, . . . were calculated (or taken from available sources) elsewhere and added to the summary model instead of calculated by the RUSLE software. This strategy simplified the calibration process as well as the understanding and interpretation of the RUSLE parameters and model behavior by on-expert users for its application in olive orchards under a broad range of management conditions. Gómez et al. (2003) build this summary model in Excel and demonstrated the ability to calibrate RUSLE for a broad range of management conditions. Later on several studies (Vanwalleghem et al., 2011, Marin, 2013) demonstrated how this summary model successfully predicted soil losses at hillslope scale close to those determined experimentally.

Vines are one of the most extended tree crops covering a wide range of environmental and management conditions, and conceptually present in terms of soil conservation several analogies with olives especially in relation to soil management (Gomez et al., 2011). In vine growing areas, besides topographic and rainfall characteristics, the soil management practices adopted in vineyards could favor erosion. Cultivation with rows running up-and-down the slope on sloping vineyards, maintenance of bare soil, compaction due to high traffic of machinery are some of the vineyard's management practices that expose soil to degradation, favoring runoff and soil erosion processes. On the other side, the adoption of grass cover in vineyards has a fundamental role in soil protection against erosion, in case of high rainfall intensity and erosivity. This communication presents a preliminary version of a summary model to calibrate RUSLE for vines under different soil management options following an approach analogous to that used by Gómez et al. (2003) for olive orchards in a simplified situation of an homogeneous hillslope, including the latest RUSLE conceptual updates (RUSLE2, Dabney et al., 2012). It also presents preliminary results for different values of the C factor under different soil management and environmental conditions, as well as its impact on predicted soil losses in the long term in vineyards located in Southern Spain and N Italy.

Keywords: vines, erosion, soil management, RUSLE, model.

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