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Field hydrological monitoring in vineyards for the analysis of shallow slope failures susceptibility and water stress phenomena

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Vineyards cultivated in steep terrains are widespread all over the world, constituting the main economic activity and landscape element in many territories. However, these vineyards can be affected by several problems, mainly due to water stress in dry periods and shallow slope instabilities during very intense thunderstorms or prolonged rainy periods. Both these problems provoke significant damages to the grapevines and the implants, together with a general loss of fertility and biodiversity in the soil horizons. Sustainable managements of the inter-rows, which limit or exclude tillage operations in soils, can represent a useful solutions to reduce the phenomena of water stress and of the triggering of shallow slope failures. Since they could modify the soil hydrological behaviors, a continuous-in-time soil hydrological monitoring is required to highlight differences on soil moisture along different dry and wet periods between vineyards managed in different ways. The aim of this work is, then, to present the results of a field hydrological monitoring carried on vineyards managed in different ways to highlight differences on soil water content trends in different seasons. The results of this monitoring can infer to different responses in terms of possible water stress phenomena and susceptibility towards shallow slope failures. Some test-sites were selected in northern Italian Appenines, in two important wine districts very prone to water stress and slope instabilities. The field monitoring is carried out with a set of soil water content sensors, installed at different depths in the soil profile and in inter-rows characterized by different soil managements, both with traditional tillages and sustainable practices (permanent grass cover, alternation between grass cover). Soil water content trends collected at the same depth in different test-sites allow to highlight the impact of the different practices in soil hydrological behaviors and on the probability of low soil moisture (predisposing factor to water stress) or saturated conditions (predisposing factor to slope instaibilities). This work is realized in the frame of VIRECLI (funded by Regione Lombardia) and LIFE-DRIVE projects.