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Assessment and restoring soil functionality in degraded areas of organic vineyards. The preliminary results of the ReSolVe project in Italy

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In both conventional and organic Italian vineyards, it is quite common to have areas characterized by problems in vine health, grape production and quality, often caused by improper land preparation before vine plantation and/or management. Causes for soil malfunctioning can include: reduced contribution of the soil fauna to the ecosystem services (i.e. nutrient cycles), poor organic matter content, imbalance of some element ratio, altered pH, water deficiency, soil compaction and/or scarce oxygenation.

ReSolVe is a transnational and interdisciplinary 3-years research project aimed at testing the effects of selected organic strategies for restoring optimal soil functionality in degraded areas within vineyard. The different restoring strategies implemented in each plot will be: i) compost produced on farm by manure + pruning residue + grass, ii) faba bean and barley green manure, iii) sowing and dry mulching with *Trifolium squarrosum* L. During two years of such treatments, the trend of the soil features and the grapevine status will be monitored in detail, to reveal the positive and negative effects of such treatments.

The project involves 8 research groups in 6 different EU countries (Italy, France, Spain, Sweden, Slovenia, and Turkey), with experts from several disciplines, including soil science, ecology, microbiology, grapevine physiology, viticulture, and biometry. The experimental vineyards are situated in Italy (Chianti hills and Maremma plain, Tuscany), France (Bordeaux and Languedoc), Spain (La Rioja) and Slovenia (Primorska) for winegrape, and in Turkey (Adana and Mersin) for table grape.

Soil features before implementing restoring strategies showed lower content of soil organic matter and enzyme activities, and higher carbonates in degraded areas than in the non-degraded areas. The Biological Soil Quality values of microarthropods were always high, in comparison with data registered in similarly managed vineyards or stable ecosystems, and the data showed homogeneous patterns within the experimental plots.

Nematode abundance, taxa richness and maturity (MI) and plant parasitic (PPI) indices were higher in non-degraded than degraded areas, but differences were not significant. Grapevines in degraded areas of both farms showed less vegetative vigour and significantly lower values in the SPAD colour index. The yield and the weight of the grape bunches and berries were greater in the not degraded. The grapes of degraded areas at harvest had instead a sugar content significantly higher (on average +2.5°Brix).

The restoration techniques and the monitoring methodologies developed and tested during the ReSolVe project will be described in specific final guidelines. The restoration techniques will be accessible for all the European farmers and will be low cost and environmental-friendly. A protocol of analyses and measurements between the all partners will allow an effective and comparable monitoring of vineyard ecosystemic functioning in European countries.

Keywords: organic, viticulture, soil functionality, biodiversity, soil management

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