Assessment and restoring soil functionality in the degraded areas of organic vineyards.
Preliminary results of the ReSolVe project in the Italian vineyards


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INTRODUCTION

Vineyards can have some areas with problems in vine health, grape production and quality, because of sub-optimal soil functionality, often caused by an improper land preparation before vine plantation. Different causes for soil malfunctioning can include: poor organic matter content and plant nutrient availability; imbalance of some element ratios (Ca/Mg, K/Mg, P/Fe, and Fe/Mn); pH, water deficiency; soil compaction and/or scarce oxygenation.

Aim of this preliminary study was to assess soil functionality and decide the kind and amount of specific restoration practices.

ASSESSMENT OF SOIL FUNCTIONALITY IN DEGRADED AREAS

The two Italian experimental farms are located in: Fontodi (Panzano in Chianti, FI) biological farm for more than 10 years and San Disdagio (Civitella M.ma, GR) farm in biological conversion.

Nematodes

<table>
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<th>Abundance</th>
<th>Taxa richness</th>
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<tbody>
<tr>
<td>Trophic groups</td>
<td>Nematode indicators</td>
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Fontodi

Degraded 317.2±86.7 4.8±0.3 50.9±3.0 0.03±0.03 10.3±1.2 1.4±0.7 37.5±0.8 1.6±0.1 2.8±0.1
Non-degraded 416.0±16.6 5.3±0.3 40.1±2.3 0 12.3±1.9 0.1±0.1 47.8±0.44 1.7±0.1 2.7±0.2

San Disdagio

Degraded 182.4±35.8 4.0±0.4 56.3±1.7 0 8.3±1.4 0 34.7±1.0 1.6±0.1 2.5±0.1
Non-degraded 827.1±94.4 4.3±0.3 47.6±1.8 3.8±0.8 11.8±5.7 0 37.1±1.1 1.6±0.2 2.8±0.1

Soil degradation effect on total abundance, taxa richness (standard error), nematode indicators and relative abundance of trophic groups extracted by SIMO met soil. Levels of significance are indicated by letters: a, b for P<0.05. Bact., bacterial feeders; Fung., fungal feeders; Omn., omnivores; Pred., predators; MI, maturity index; PPI, plant-parasite index.

Soil chemistry and biochemistry, and grape yield

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Fontodi

Degraded 3.4±1.2 3.5±1.2 10.1±1.2 11.7±3.8 125.7±22.6 25.8±3.1
Non-degraded 11.7±4.3 4.3±1.2 26.4±1.2 17.6±3.1 214.9±22.8 32.3±3.1

San Disdagio

Degraded 4.0±1.4 2.5±1.1 17.2±1.7 16.7±1.8 163.2±1.9 27.9±1.6
Non-degraded 6.1±1.8 2.8±1.1 17.2±1.7 16.7±1.8 163.2±1.9 27.9±1.6

In the degraded areas, grape production (APP) never reached 1 kg per plant. The reduced productivity caused an excessive accumulation of sugars (> 25° brix). Acidity was similar instead.

CONCLUSIONS and TAKE HOME MESSAGE

Degraded and non-degraded surface soil characteristics differed more at San Disdagio (one year of organic management) than at Fontodi (ten years of organic management).

Nevertheless, plant production was significantly lower in the degraded areas of both farms, as conventional organic farming was not able to recover optimal functionalities of the subsoils.

Specific and intensive organic treatments were needed, that is:

- Farm Compost (3 kg/m² dry matter)
- Sowing barley+faba bean in fall (8g+8g/m²) and incorporating in late spring
- Sowing squarrose clover in fall (4g/m²) as cover crop and dry mulching

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