

Recovering of degraded soils through the combined application of plants and organic matter

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In the Mediterranean regions, inappropriate agricultural practices, combined with adverse environmental and climatic factors, make soil ecosystems susceptible to degradation processes.

A key factor in the degradation of these soils is the loss of natural plant cover, allowing increased water erosion and salinization processes and decreased organic matter content.

The main goal of this study, carried out in the framework of the European project BIOREM (LIFE11 ENV/IT/113), is to demonstrate the viability of the addition of stabilized organic matter and the plantation of autochthonous species as an environmental approach to recover and to protect the soil in areas with high risk of soil degradation. Ten experimental sites of 360 m² each, located in different topographic and climatic areas (Italy and Spain) have been selected and characterized for their chemical-physical and biological properties. The following treatments have been carried out: 1. untreated soil; 2. compost (12-25 kg/m² on the basis of initial soil characteristics); 3. *Pino halepensis* and *Pistacia lentiscus* alternately planted, 4. compost plus *Pino halepensis* and *Pistacia lentiscus*. Conventional chemical-physical parameters usually related to soil fertility along with more sensitive biochemical and biological indicators of soil quality and functionality have been used as innovative integrated characterization and monitoring methodology.

The results of soil characterization showed that microbial metabolism and carbon cycle were strictly interrelated each other and positively affected by the humic carbon content. These parameters clearly discriminated the different sites and a higher soil quality and functionality were generally observed in Spanish with respect to Italian sites. After six months, the proposed remediation strategies have already showed their effectiveness in soil quality amelioration in terms of total C and N content and biochemical activities stimulation. The experimentation is still under monitoring and other specific parameters (e.g. humic-enzyme complexes) reflecting organic matter transformation and storage in soil are ongoing.