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Managing soils for mitigation and adaptation of rainfed olive trees to climate change

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The olive sector has an important economic, social, cultural and ecological relevance in the Mediterranean region, where tillage still is a generalized practice, although the recommendations of UE policy for a more sustainable agriculture. In fact, tillage has negative side-effects, including increased soil erosion and high labor and fuel requirements, and relevant changes on soil quality indicators, as bulk density, porosity, water-holding capacity, organic matter content and microbial activity. The study conducted in two different rainfed orchards (cv. Cobrançosa) of Northeast Portugal revealed that cover crops with self-reseeding legumes of short-cycle, with mulch of dead vegetation during the dry season, and a permanent sward grazed with a flock of sheep, are better options for soil management in olive tree rainfed orchards. Both practices influence positively the olive tree water status during the drought season, as well the nutritional status, contributing to greater physiological performance during the summer, as evidenced by higher net photosynthetic rate, mainly due to inferior stomatal limitations, and enhanced yield. Moreover, these less disruptive agronomic practices increased the levels of total and easily extractable glomalin, a thermostable hydrophobic glycoprotein produced by arbuscular mycorrhizal fungi, that play an important role in the stability of soil aggregates and in the sequestration of nitrogen and carbon. These results indicate that these practices should be included in the portfolio of management strategies against climate change, contributing to the sustainability of rainfed orchards under a changing environment.

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