The SHARInG-MeD project: the trade-off between Soil Health, Land Use, Soil and Crop Management from and agronomic, economic and environmental point of view in the Mediterranean Area

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The Mediterranean area is characterised by a plenty of soils, ecosystems and agro-ecosystems, and historical, and societal features, including a high anthropic pressure, which are posing hard concerns For the soil and diversity conservation and agricultural resilence. These aspects acquire further importance if considering that 25% of the global biodiversity and broad aspects of the soil functions are presently uncovered (Guerra et al. https://doi.org/10.1038/s41467-020-17688-2). At the same time, human pressure on this biome demands for an increased land use land use for agriculture, further fragmenting the habitat and reducing its resilience for biodiversity conservation. (https://doi.org/10.1126/science.abl9127). The concept idea of the SHARInG-MeD project (PRIMA 2022 GA n 2211) arose from these issues, and by taking into account that any policy measure requires models from integrated dataset built on standardized, or at least harmonized, datasets of multiple ecosystem services. In the Mediterranean areas, a standardized monitoring strategy of soil assessment is lacking. Present wide soil monitoring networks provide a starting point for an integrated assessment of the Mediterranean soils and ecosystems. These networks are namely the Land Use and Coverage Area frame Survey (LUCAS) and the Horizon 2020 Soils4Africa, which however follow different sampling strategies. In addition, LUCAS presently does not cover West Asia and North Africa, and Soils4Africa is being run only in Africa. The SHARInG-MeD will thus create a comprehensive and harmonized soil monitoring scheme, integrating physico-chemical, biological (microbes, nematodes, invertebrates, plants), agronomic, economic and environmental indicators for a better wide scale management of the Mediterranean cropland. Also, soil and plant sampling from this scheme will be conducted on paired land uses; especially agricultural uses paired with forest or grassland as a benchmark, or field and pot experiments pointing out to 2 most important and easily applicable soil-improving management practices (conservation agriculture and application of organic amendments) and the inoculation of the soil with beneficial microbes. These practices, along with the land use dimension, are crucial for the building of the soil organic carbon (SOC) fraction and reduce soil erosion, the latter of which is can strongly impair SOC accumulation (Beillouin et al. https://doi.org/10.1038/s41467-023-39338-z; Mhazo et al. https://doi.org/10.1016/j.agee.2016.04.033, Lugato et al https://doi.org/10.1126/sciadv.aau3523).

SHARInG-MeD will also integrate the information from the above-mentioned soil properties, including soil life indicators, with potential GHG emissions from the soil, and the economic fluxes and Life Cycle Assessment (LCA, including the global warming potential) in an effort to (1) harmonize various sampling schemes across the Mediterranean countries and (2) study the relationship between soil health, agriculture resilience and sustainability, (3) provide models of the relationship among the soil health, agronomic applicability of these practices, and their profit and environmental impact and thus providing indicators and tools to follow.