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Soil organic carbon sequestration and tillage systems in Mediterranean environments

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Soil carbon sequestration is of special interest in Mediterranean areas, where rainfed cropping systems are prevalent, inputs of organic matter to soils are low and mostly rely on crop residues, while losses are high due to climatic and anthropic factors such as intensive and non-conservative farming practices. The adoption of reduced or no tillage systems, characterized by a lower soil disturbance in comparison with conventional tillage, has proved to be positively effective on soil organic carbon (SOC) conservation and other physical and chemical processes, parameters or functions, e.g. erosion, compaction, ion retention and exchange, buffering capacity, water retention and aggregate stability. Moreover, soil biological and biochemical processes are usually improved by the reduction of tillage intensity.

The work deals with some results available in the scientific literature, and related to field experiment on arable crops performed in Italy, Greece, Morocco and Spain. Data were organized in a dataset containing the main environmental parameters (altitude, temperature, rainfall), soil tillage system information (conventional, minimum and no-tillage), soil parameters (bulk density, pH, particle size distribution and texture), crop type, rotation, management and length of the experiment in years, initial SOCi and final SOCf stocks. Sampling sites are located between 33˚00' and 43˚32' latitude N, 2-860 m a.s.l., with mean annual temperature and rainfall in the range 10.9-19.6˚C and 355-900 mm.

SOC data, expressed in t C ha^{-1}, have been evaluated both in terms of Carbon Sequestration Rate, given by [(SOCf-SOCi)/length in years], and as percentage change in comparison with the initial value [(SOCf-SOCi)/SOCi*100]. Data variability due to the different environmental, soil and crop management conditions that influence SOC sequestration and losses will be examined.