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Tools for the adaptation to climate change and monitoring of soil environmental quality.

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The use of indicators for soil monitoring is a long-established methodology that can be applied in the context of climate change. It makes it possible to establish the state of the variable to be measured and to obtain an objective signal of the changes that occur over time. Obtaining a climate adaptation indicator (CAI) for Mediterranean rainfed soils is a very useful monitoring tool for decision-making and for the incorporation of mitigation measures.

Within the LIFE AMDRYC4 project, a framework has been outlined in which a) environmental indicators of the chemical degradation of soils (salinity, alkalinity, fertility, phytotoxicity) and the erosion indicator, b) biodiversity indicators (vegetation indices, Shannon-Weaver indices, Simpson, ...) and c) organic carbon indicator have been used. These primary indicators can be summarized resulting in a higher rank one represented by the soil ecosystem services indicator (SESI) which reflects the soil global condition obtained from the base data for each established monitoring point. By combining the SESI with a transformative indicator such as the one calculated on the basis of the increase of organic C in the soil (mitigation indicator, MI), the indicator of climate adaptation is obtained, using a procedure based on fuzzy methodology.

In the calculation of the phytotoxicity indicator, the assimilable values of selected trace elements that can cause phytotoxicity are determined and their variation over time is monitored. The selected trace elements, in this case Pb, Cd and B, may vary from one area to another depending on the geochemical background of the soil.

The results obtained for several soil plots that have been subjected to organic matter incorporation treatments (sewage sludge, manure from different animals, composted plant remains) and their untreated counterparts (blank) clearly show an improvement of the soil characteristics after the application of the mentioned soil treatment strategies. The soils are not affected by the polluting processes, both in terms of potentially toxic elements and other emerging pollutants. The experimental data obtained indicate that the remediated soils can be useful to reduce the concentration of greenhouse gases in the atmosphere and represent a good tool for combating climate change.

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