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Impacts of agricultural management practices on soil quality in Europe and China – insights from the EU iSQAPER project

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Increasing global demand for food and feed production causes a wide variety of pressures resulting in severe environmental impacts, including deterioration of soil quality. To manage the use of agricultural soils well, innovative agricultural management practices (AMPs) are needed. The iSQAPER project – Interactive Soil Quality Assessment in Europe and China for Agricultural Productivity and Environmental Resilience – intends to provide context-sensitive guidance on AMPs that are promising to enhance soil quality. For this purpose, 14 study sites across Europe (10) and China (4), covering the major pedo-climatic zones were investigated.

Soil quality was assessed in the field based on Visual Soil Assessment methodology using 11 indicators: susceptibility to wind and water Erosion, susceptibility to surface ponding, presence of a cultivation pan, soil colour, soil porosity, soil structure and consistency, soil slaking test, biodiversity, pH, infiltration rate, and labile organic carbon.

The first results show that among 138 sets of paired plots (total of 276), 76.5 % show a positive impact of AMPs on soil quality, 13 % do not show any differences, while the remaining 10.5 % show an inverse effect. The indicators selected for the evaluation of the impact of the AMPs on soil quality appear to be appropriate for all study sites. The indicators related to soil structure appear to be the most sensitive in indicating soil quality for various soil and climatic conditions. The most promising AMPs that have improved soil quality were manuring and composting, crop rotation and control or change of species composition, residue maintenance and mulching, and minimum-tillage. In addition, farmer's indicators of soil quality were recorded and show differences between Europe and China especially with regard to biodiversity.

Based on the WOCAT (www.wocat.net) technology documentation at selected sites in Europe and China, we also evaluated the impacts of the AMPs on the economic (e.g., crop production, fodder production, wood production, production failure, drinking water availability and quality, farm income, and income diversity), socio-cultural (e.g., food security, conflict mitigation), and ecological (e.g., water quality, surface runoff, soil and vegetation covers) dimensions. First results include 34 documented AMPs available from Portugal, Spain, France, The Netherlands, Slovenia, Greece, Romania, Hungary, Poland, Estonia and China.

This assessment will be repeated in the coming years, with the aim of providing sound data on soil quality and its improvement through innovative management practices across Europe and China.

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