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Impacts of agricultural management practices on soil quality in Europe and China – an assessment within the framework of the EU iSQAPER project

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Agricultural soils are under a wide variety of pressures, including from increasing global demand for food associated with population growth, changing diets, land degradation, and associated productivity reductions potentially exacerbated by climate change. To manage the use of agricultural soils well, decision-makers need science-based, easily applicable, and cost-effective tools for assessing soil quality and soil functions. Since a practical assessment of soil quality requires the integrated consideration of key soil properties and their variations in space and time, providing such tools remains a challenging task. This study aims to assess the impact of innovative agricultural management practices on soil quality in 14 study sites across Europe (10) and China (4), covering the major pedo-climatic zones. The study is part of the European H2020 project iSQAPER, which involves 25 partners across Europe and China and is coordinated by Wageningen University, The Netherlands. iSQAPER is aimed at interactive soil quality assessment in Europe and China for agricultural productivity and environmental resilience.
The study began with a thorough literature analysis to inform the selection of indicators for the assessment of soil structure and soil functions. A manual was then developed in order to standardize and facilitate the task of inventorying soil quality and management practices at the case study sites. The manual provides clear and precise instructions on how to assess the 11 selected soil quality indicators based on a visual soil assessment methodology. A newly developed infiltrometer was used to easily assess the soil infiltration capacity in the field and investigate hydrodynamic flow processes. Based on consistent calibration, the infiltrometer enables reliable prediction of key soil hydraulic properties. The main aim of this inventory is to link agricultural management practices to the soil quality status at the case study sites, and to identify innovative practices that have improved soil quality. The inventory and the scoring of soil quality are done together with land users at each study site. The idea is to compare the soil quality on a farm where management practices have changed 3 or more years ago with that on a control farm where practices have not changed, with both farms located in the same pedo-climatic zone and having comparable soil conditions. The case study partners were requested to identify at least 3 newly adopted management practices (or combinations thereof) and 3 related control farms.
First results show that among 88 sets of paired plots, 60 pairs (68 %) show a positive impact of innovative agricultural management practices on soil quality. 18 pairs (21 %) do not show any difference in soil quality between soils under innovative practices and soils in the control plots, and the remaining 10 plots (11 %) show an inverse effect. The non-detectable effect of the innovative practices on soil quality are due to type of tillage management, soil type and fertility that mask the effect of management practices on soil and also due to time of the assessment.

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.