

Sustainable soil management

Projects: SoilCompaC, SCALE, SoilX

Sustainable soil management requires consideration of the multifunctionality of agricultural landscapes, where the need for efficient production of agricultural products may be in conflict with environmental and climate-related requirements. The multiple land uses place high demands on soil functions and the involvement of multiple stakeholders require an integrated approach between policy and practice to achieve sustainable soil management. The challenges presented by projected increases in the occurrence and severity of extreme events due to climate change add further complexity to achieving sustainable soil management.

Strategies for sustainable soil management that aim to prevent and mitigate soil compaction, improve soil water retention and infiltration capacity, as well as mitigate soil erosion, may be well known, but require further understanding to assess the possible gains and trade-offs with other sustainability targets.

Soil compaction is a major threat to soil productivity and ecological and hydrological soil functioning. Although adverse impacts of compaction on soil properties and functions are relatively well documented, estimates of the extent and severity of compaction in Europe remain elusive, we have limited knowledge on how compaction changes the carbon cycle, and we lack information on compaction risks for different pedo-climatic zones and cropping systems in Europe and how the risks evolve due to climate change. Especially, research results quantifying interactions between soil compaction and climate, and presenting information on how to assess, detect, recover and minimize soil compaction, thereby providing a basis for sustainable soil management in Europe, are urgently needed.

Soil management impacts the soils' structure and the soils' ability to infiltrate water during heavy precipitation events and to store plant available water for dry periods. With climate change, both drought and heavy precipitation are becoming more frequent and are threatening crop productivity and other vital ecosystem services. New evidence from field experiments, model simulation and farmer interviews identifies soil management strategies for climate change adaptation and approaches for their promotion.

The challenge of soil erosion, where on-site soil management of agricultural fields also has potential off-site impacts, is emphasized by connectivity and highlights the impact of landscape elements on the transport of water and sediment during hydrological events. Implementation of targeted mitigation measures and encouraging changes in land use practices can ensure sustainable soil protection. Improved modelling of soil erosion processes with focus on connectivity at different scales and ensuring empirical validation of erosion risk maps is essential for effective decision-making tailored to regional circumstances.

In the present session, focus is on evaluation and development of sustainable soil management, especially with regard to soil threats as soil erosion and soil compaction. We kindly invite interested parties to submit an abstract with results from their novel research dealing with any of the knowledge gaps mentioned above.