Innovative soil management practices across Europe (i-SoMPE)

At-a-glance

Objective: Documentation of innovative soil management practices in Europe to provide information on regional and local practices and conditions.

Lead countries/organization(s): Wallonia/Belgium, Italy, and Switzerland (coordinators), 50% co-funded by the EU from the "Horizon 2020" framework programme through EJP SOIL

Place: 25 countries, incl. most EU Member States and Switzerland, Turkey, UK

Background and Objectives

Innovative soil management practices (SMP) and agricultural systems are promoted to enhance ecosystem services, in order to minimise soil threats and sustain agriculture in a climate change context. A comprehensive stocktake of SMPs and their ability to succeed on multiple goals, including agricultural production, ecosystem services, biogeochemical cycles, was previously missing.

By using a surveying approach, i-SoMPE is documenting innovative SMP. The data gathered is synthesized considering technical and ecological constrains and socio-economic barriers to the adoption of different SMP. Context-specific thematic maps are provided to guide farmers, researchers and policy makers towards suitable SMP for climate-smart agriculture.

i-SoMPE is part of the European Joint Programme Cofund on Agricultural Soil Management (EJP SOIL), which runs from February 2021 to January 2025 and includes a broad range of projects, with the common objective to develop knowledge, tools and an integrated research community to foster climate-smart sustainable agricultural soil management.

Actions

1 – Inventory of innovative soil management practices: Ca. 100 different SMP (incl. agricultural systems, buffer strips and small landscape elements, crop protection, crops and crop rotations, organic matter and nutrient management, tillage and traffic, water management) analysed with regard to their current (2021) application across Europe, potential areas of application (depending on climate, soil, land use/ farming systems), and adverse or beneficial impacts on soil health and other objectives.

2 – Current adoption of soil management practices: Database of 3960 records, available in static maps (images), reactive maps (app – forthcoming) and open data (data frame with raw data).

3 – Framework to assess the bio-physical limitations of SMP application: Land use, climate, topography and soil properties as bio-physical limits for the application of different practices, analysed at the level of agro-ecological zones.

4 – Analyses of barriers and opportunities: Network analysis (cognitive and social mapping) based on data obtained in qualitative interviews from case studies covering different SMP across partner countries, to identify factors facilitating or inhibiting the uptake of particular practices.

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Results

The project provides a rather complete inventory of the current use of innovative soil management practices across Europe and their impacts as analysed in various previous studies. It also identifies barriers and opportunities for the potential diffusion of climate-smart, innovative practices across different bio-physical and socio-economic contexts.

The different practices documented in the project are all linked to the main challenges on which healthy soils can have a positive impact: sustainable food production, soil biodiversity, and soil functions for ecosystem services. Collectively they can contribute to all three dimensions of sustainability (based on expert knowledge collected during surveys):

- **Social:** crop diversification (intercropping, legumes integration, rotation) can increase food availability and positively impacts nutritive values of products; practices linked to the reduction of plant-protection products can have a positive impact on farmworker health. Other practices, like conservation agriculture (e.g. reduced tillage), can also reduce the workload of farmworkers.

- **Environmental:** Most of the documented practices have a positive impact on the environmental dimension, e.g. in terms of (i) soil erosion (reduced tillage, cover crops, conservation agriculture), (ii) nutrient use efficiency (variable rate fertilize application, controlled traffic farming, etc.), (iii) soil structure (cover crops, crop rotations, grassland with legumes), (iv) water storage capacity (buffer strip, deep rooting plants, undersowing) and, for more innovative practices, (v) soil organic carbon (low emission slurry spreading, associated beets, associated rapeseed).

- **Economic:** Most of the documented practices also have a beneficial effect on crop yields and on farm profitability.

Successes and Lessons Learned

i-SoMPE has revealed the presence of a diversity of innovative soil management practices in Europe. The adoption of many of these practices among farmers could be increased. While some bio-physical limitations play an important role in the places and farming systems where particular practices are applicable, regional and context-specific socioeconomic conditions need to be taken into account when designing policies to foster the application of management practices.

The analyses of barriers and opportunities of case studies in i-SoMPE has shown the importance of the networks among practitioners and researchers for experience and knowledge sharing, and of liquidity for investments in machinery and for the risk taken in adopting innovations. Public policies to support the adoption of innovative practices should consider these aspects.