

Soil management: The key to soil quality and sustainable agriculture

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Today, after the International Year of Soils in 2015 and the proclamation by the International Union of Soil Sciences of the International Decade of Soils 2015-2020, much attention is paid to soil quality. Often used interchangeably, both terms, soil quality and soil health, refer to dynamic soil properties such as soil organic matter or pH, while soil quality also includes inherent soil properties such as texture or mineral composition. However, it is the dynamic or manageable properties that adequate soil management can influence and thus contribute to a well-functioning soil environment capable to deliver the soil-mediated provisioning, regulating and supporting ecosystem services and soil functions. This contribution intends to highlight the key principles of sustainable soil management and provide evidence that they are compliant with a productive, resource efficient and ecologically friendly agriculture.

Paradoxically, and despite benefitting from good soil quality, agriculture itself when based on conventional, especially intensive tillage-based soil management practices contributes decisively to soil degradation and to several of the soil threats as identified by the Soil Thematic Strategy, being soil erosion and soil organic matter decline the most notorious ones. To mitigate soil degradation, the European Union's Common Agricultural Policy has introduced conservation measures, mainly through cross-compliance measures supposed to guarantee minimum soil cover, to limit soil erosion and to maintain the levels of soil organic matter. However, it remains unclear to what extent EU member states apply these 'Good Agricultural and Environmental Condition' (GAEC) measures to their utilized agricultural areas.

Effective and cost-efficient soil management systems able to conserve or to restore favourable soil conditions, to minimize soil erosion and to invert soil organic matter and soil biodiversity decline and improve soil structure are those capable to mimic as close as possible natural soil conditions while producing food, feed, fibre and fuel. This means to establish and manage crops while disturbing the soil as least as possible, to maintain the soil permanently covered with plants or their residues and to allow for a diversity of plants either in rotation or in association. These principles also known as Conservation Agriculture have shown to be the most promising approach for a sustainable production intensification and proven to work in a wide range of agro-ecological conditions. Although adopted already on more than 150 Mha worldwide, in Europe it still can be considered a novel soil management practice as it is applied on only around 2% of the annual cropland.

A paradigm shift and innovative approaches are needed both to recognise the principles of Conservation Agriculture as the only cost-effective, and thus overall sustainable soil management practices capable to deliver the soil-mediated ecosystem services and to make Conservation Agriculture systems work and accepted as the best compromise to attain better soil quality.

Keywords: Soil threats, Soil conservation, GAEC, Conservation Agriculture, Resource efficiency