

The Role of Sustainable Agricultural Soil Management in Enhancing Ecosystem Services

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Over many centuries, agricultural soil management has led to wind and water erosion of soil and to degradation of soil physical, chemical, biological, and hydrological qualities. This is because the dominant farming paradigm is based on mechanical tillage of various types to control weeds and to soften the top soil to serve as a seedbed for crop establishment, and to loosen the compacted subsoil layer. Consequently, tillage is still considered to be normal and necessary, and mechanized tillage is considered to be a symbol of ‘modern’ agriculture. However, it is also known to be the major root cause of soil degradation, leading to loss of many of the ecosystem functions and services, including biological production.

Over the last few decades, the concept of sustainable production intensification (SPI) has taken shape. SPI methods aim at supporting productive agricultural systems capable of delivering maximum yields and ecosystem services while being resource efficient and resilient. Overall, this translates into producing more from less, and sustainably, primarily with regards to soil and water, but also from other inputs such as fertilizers, plant protection products, energy, labour and capital. It also means that certain ecosystem services that are soil-mediated, such as carbon sequestration, water resource quantity and quality, water regulation, control of erosion, biological nitrogen fixation, control of certain weeds, insect pest and diseases, can be enhanced.

The three interlinked principles of Conservation Agriculture: (i) minimal soil disturbance (based on no-till), (ii) permanent soil cover; and (iii) crop diversity, are increasingly being accepted as constituting the core or foundation elements that simultaneously improve the overall soil conditions necessary to enhance its ecosystem functions while allowing for increased levels of productivity with reduced inputs. This communication discusses the evidence on the role of Conservation Agriculture in sustainable soil management for enhancing ecosystem services and production intensification.

Keywords: soil degradation, sustainable production intensification, ecosystem services, conservation agriculture