

Benefits of conservation tillage for soil erosion control

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Soils are one of the most valuable resources on Earth, but endangered in their substance by human activity. Particularly, soil degradation by erosion causes severe environmental impacts, reduces productivity and thus impedes social and economic development. High soil erosion rates are usually associated with intensive agricultural practices and especially the advent of mechanisation in farming has accelerated sediment transport. Agriculture affects soil erosion not only by the mechanical processing of topsoils through tillage, but also by removing soil-protecting vegetation layers. Whereas tillage operations generally redistribute soil material within agricultural fields without further transport, they prepare and predispose the soil surface for further removal by climatic agents such as water and wind. Individual erosion events with rates of more than 100 Mg ha⁻¹ yr⁻¹ have been measured on agricultural land.

In this context, conservation tillage and particularly no-till farming are considered to be major improvements regarding soil erosion control. No-till practices reduce soil disturbances to the very moment of planting, maintain vegetation cover and thus effectively mitigate all forms of erosion caused by machinery and climate. Reduced erosion rates are widely observed after adoption of no-till and partly up to one order of magnitude lower than in conventional agriculture. At the same time, no-till is used very little in some regions of the world and reports on erosion rates under no-till for larger areas or whole countries are often scarce. In this context, it is noticeable that no-till systems are not widespread in larger parts of Asia, Africa or Central America, which are in turn mostly areas with erosion-prone soils and high annual rainfall. Furthermore, it has to be stated that even though no-till appears to be the best method to combat soil erosion, it might hamper other aspects of farm management. These problems are mainly related to weed control and thus declining crop yields with higher weed infestation, as weed abundance in no-till can be higher than in plough-based systems. This is particularly evident in organic farming systems, where herbicides are generally not foreseen and farmers are encouraged to periodically use ploughs. Nevertheless, there is great potential to introduce no-till in farming systems around the world for soil conservation. The further acceptance of such practices by farmers is one of the most important measures to successfully tackle the threat of soil erosion globally.

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