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Zero Tillage and Soil Erosion

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INTRODUCTION

Soil erosion is a major environmental problem with severe impacts on terrestrial ecosystem (Smith et al. 2016). It is well established that agricultural practices greatly influence soil erosion. In particular, the intensification of cultivation after World War II led to increased soil losses. In this context, conventional tillage systems have drawn criticism (Gomiero 2013), because they often lead to diminished topsoil depth, degraded soil structure, soil compaction, losses of soil organic matter (SOM), and nutrient depletion (Morgan 2005). As a consequence, crop yields can be reduced and fields rendered unproductive over the long term (Bünemann et al. 2018). Soil erosion is the gradual movement and transport of the upper layer of soil; it is a form of soil degradation. This natural process is caused by the dynamic activity of erosive agents, that is, water, ice, snow, air, plants, animals, and humans. Soil erosion is a naturally occurring process that affects all landforms. In agriculture, soil erosion refers to the wearing away of a field's topsoil by the natural physical forces of water or through forces associated with farming activities such as tillage. The effects of soil erosion go beyond the loss of fertile land. It has led to increased pollution and sedimentation in streams and rivers, clogging these waterways and causing declines in fish and other species. And degraded lands are also often less able to hold onto water, which can worsen flooding. Sustainable land use can help to reduce the impacts of agriculture and livestock, preventing soil degradation and erosion and the loss of valuable land to desertification. The health of soil is a primary concern to farmers and the global community whose livelihoods depend on well managed agriculture that starts with the dirt beneath our feet. While there are many challenges to maintaining healthy soil, there are also solutions like zero tillage.

Zero tillage practices reduce erosion by protecting the soil surface by crop residues and allowing water to infiltrate instead of running off. Crop residues on soil surface under zero tillage reduce erosion of soil by both water and wind. More organic matter in form of crop residues in soil act as binding agent and increases aggregate stability and aggregates are large enough to resist wind erosion. Conventional tillage makes soil more friable and soil erosion increases by both wind and water. Under zero tillage, moisture is conserved which also decreases the soil erosion. Therefore zero tillage has potential to reduce soil erosion and can sustain the productivity of soil by maintaining proper fertility status.

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