



Impacts of the conventional tillage tools and reduced tillage on the soil fertility preservation: critical review

REVIEW PAPER

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ABSTRACT

Objective: The long-term impacts of conventional tillage through compaction, soil erosion and loss of soil fertility have led to evaluation of this system. To mitigate these problems, simplified cultivation techniques (SCT) are increasingly practiced. The objective of this review is to clarify the effects of conventional tillage and minimum tillage on soil fertility.

Methodology and Results: The methodology is based on a documentary research through a synthesis and a confrontation of the researches results of different authors. It is found that, after 5 to 6 years, conventional tillage lowers the fertility of the soil and reduces its productivity. There is a diversity of SCT with convincing results. These techniques leave more agricultural residues and allow an improvement of the indicator of organic matter on the soil by reduction of the mineralization. The SCT, such as zero tillage, increase soil fertility and have the potential to reduce greenhouse gas emissions. Improving soil fertility increases yield with a saving in working time. Hydraulic conductivity increases when switching from conventional tillage to direct sowing. Compared to conventional tillage, SCT provide an ideal environment for soil fertility recovery. However, the adoption of SCT and no-till is subject to a constraint on the agricultural equipment used. The design of effective equipment remains the challenge to facilitate large-scale application of SCT.

Conclusion and application of results: It is noticed that conventional tillage induce long-term disturbance of soil properties and reduce fertility. Simplified cultivation techniques and particularly a direct sowing have a positive effect on the amount of soil organic matter, its density and water retention, and final production. The specific direct seeder must be designed to accompany the mechanization of these techniques.

Keywords: conventional tillage, direct sowing, soil fertility, conservation agriculture.