

PDF - THE EFFECT OF TILLAGE ON SOIL ORGANIC MATTER - researchcub.info

CHAPTER ONE

INTRODUCTION

Tillage is identified as an asset of operation performed on the soil to prepare seed bed, weed control, and improve soil properties by enhancing the burying residues, germination, growth and yield of crops as well as conservation soil moisture (FAO, 1989).

Tillage can act as a major new control on soil biogeochemical cycles by making available previously protected soil organic matter (SOM), which changes net nitrogen mineralization and gross nitrogen immobilization (Ladd et al., 1993).

Soil tillage has a major influence on the microbial activity, which influences soil aeration, moisture, and temperature (Larsen, 1967). Loss of soil organic matter (SOM) has been associated with tillage intensity. However, soil organic matter (SOM) loss due to tillage can be expected to be a function of soil type, climate and cropping practice (Lal et al., 1998).

A better understanding of soil organic matter (SOM) is vital for development of effective soil conservation practices. Recently concern for global climate change, however emphasizes the importance of conservation tillage and how it can be implemented in many soils to help reduce organic matter (OM) losses and hence increase soil organic matter (SOM). Conservation tillage has proved to have the potential for converting many soils from source to sink of atmospheric nitrogen (Kern and Jonson, 1993). In this context, a criticism of recent developments in the soil concept has been aimed at more clearly defining the role of soil organic matter (SOM) towards increasing agriculture productivity and environment quality (Sojka and up Church, 1999).

Tillage has been an important aspect of technological development in the evolution of agriculture, in particular in food production. The objectives of tilling the soil include seedbed preparation, water and soil conservation and weed control. Tillage has various physical, chemical and biological effects on the soil both beneficial and degrading, depending on the appropriateness or otherwise of the methods used. The physical effects such as aggregate stability, infiltration rate, soil and water conservation, in particular, have direct influence on soil productivity and sustainability.

Tillage technology began with the use of stick or metal jab for seeding and with gradual agricultural development the technology passed through a phase of ploughing – animal-drawn ploughs, subsequently followed by tractor-drawn implements and recently with more powerful machinery. At the centre of all this development, is the availability and employment of energy sources. In developed countries and in some developing countries today, fossil fuel is the main energy source, whilst in most developing tropical countries human labour is still predominant. However, animal draught power has been the tradition in many developing countries, particularly in the semi-arid tropics. A major constraint on the use of animals is and has been the availability of adequate fodder.

Recently, many developing countries have introduced tractors and various implements in attempts to increase food production. The general lesson learnt in most such countries is that often the machinery chosen has not been matched to the various agro-ecological zones and soil types. Furthermore technicians engaged in the tillage operations have not been properly trained. This has resulted in widespread soil degradation and loss in soil productivity.

STATEMENT OF PROBLEM

Today there are major problems facing the modernization of African agriculture. Food production must

necessarily keep pace with population growth. Many countries will soon have limited new land for agricultural development leaving no alternative other than intensifying yield per unit area. Soil management and conservation must play a major role in increasing crop yields and soil productivity on a sustainable basis. Tillage and residue management which have direct influence on soil and water conservation are two important components of soil management in Africa, especially in the semi-arid tropics. This agro-ecological zone has a great potential for increased agricultural productivity but at the same time poses a major challenge due to the various soil and climatic constraints, and the ease with which serious soil degradation occurs if farm operations are not carefully managed.

RESEARCH OBJECTIVES

Therefore, the objective of this study was

1. To determine the effect of tillage on soil organic matter
2. To determine the effect of soil tillage on nitrogen mineralization, potential of rain-fed vertisols.
3. To determine the effect of tillage on soil properties
4. To determine the effect of soil tillage on crop yield

RESEARCH QUESTIONS

1. What is the effect of tillage on soil organic matter
2. What is the effect of soil tillage on nitrogen mineralization, potential of rain-fed vertisols.
3. What is the effect of tillage on soil properties
4. What is the effect of soil tillage on crop yield

SCOPE OF STUDY

The study was aimed at finding the effect of soil tillage on soil organic structure with special reference to farmlands in Nigeria. The study will look at other areas like tillage effect on soil texture and crop productivity and also on nitrogen mineralization.

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