

Biophysical Aspects of Soil Management for Sustainable Agricultural Productivity in the Nigerian Savanna

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ABSTRACT

Agriculture is the single largest employer and is probably the most weather-dependent of all human activities in the Nigerian savanna. Soil (and water) management practices in these agro ecosystems have historically focused on chemical fertility for yield improvement. Effective maintenance of these savanna soils requires in addition to improvement in crop yield and chemical fertility, an understanding of the soil physical processes and, how soil management practices influence more subtle indicators of soil quality particularly, aggregation and soil organic carbon sequestration. One aspect stands out, however, as critical and that is the loss of soil organic carbon from the top soil has a disproportionately large effect on vital soil physical properties. Apart from soil organic carbon effects, soil management practice has resulted in improvement of soil structural stability, infiltration, carbon sequestration, bulk density and penetration resistance. This paper outlines constraints to agricultural productivity and, discusses science-based newer soil management approaches like conservation agriculture, integrated nutrient management, water harvesting etc). These management approaches tend to facilitate soil structure and soil carbon sequestration, which is becoming a strategy to achieving sustainable agricultural productivity in the savanna through improvement in soil quality.