

Impact of Inorganic N Fertilizer on Soil Organic Carbon and Physico-chemical Properties of Alluvial Soil of Assam

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Abstract

The physico-chemical quality of soil and its carbon sequestration potential of the upland agroecosystem of Assam have not been yet studied in details. Although some studies are available on the effect of organic manures on soil physical quality but that of inorganic fertilizers is studied to a lesser extent. The present study carried out in new alluvial (sandy loam) soil during 2012-2013 aims to characterize the soil physical and chemical quality and soil organic carbon(SOC) sequestration in relation to various doses of inorganic N fertilization during maize cultivation in two depths: top soil (0-15cm) and sub soil (15-30cm). Treatments included i)Unfertilized control(T₁), ii)80kg/ha N, 40kg/ha P&K(T₂) iii)100kg/ha N, 40kg/ha P&K(T₃), iv)72kg/ha N, 40kg/haP&K(T₄), v)60kg/ha N, 40kg/ha P&K(T₅) and vi)40kg/ha N, 40kg/ha P&K(T₆). The treatments were replicated three times in randomized block design. At the end of the growing season, results showed that the highest N fertilized plots (T₃) resulted in the highest increase of SOC in both top (4.08%) and sub (1.16%) soil. Mineral associated organic carbon (AOC) increased in top soil and particulate organic carbon (POC) in sub soil except in T₅ and T₆. Bulk density (BD) and soil pH decreased while total porosity, water holding capacity (WHC) improved with the application of increased level of N fertilizers. Root and shoot biomass was found to be more under higher N fertilization that contributed to soil organic carbon pool. Recorded soil respiration showed lowest value in T₃ and highest in T₁ depicting the role of N fertilization on soil microbial community. Available N, P and K, WHC and total porosity showed positive correlation with N fertilization as well as with SOC enhancement while negative correlation was observed for BD, pH and soil respiration. We conclude

that N fertilization have a positive significant effects on SOC enhancement which improves soil physico-chemical qualities and contributes to C sequestration.

Keywords: Key words: Maize, Root and Shoot biomass, Physical properties, Soil organic carbon sequestration, Particulate organic carbon.