CLIMATE CHANGE MITIGATION: POTENTIAL ROLE OF SOILS UNDER RUBBER-BASED CROPPING SYSTEMS

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The impact of five cropping systems on total soil carbon (C) and related characters were evaluated and compared with that of a nearby forest. To assess the C sequestration potential of the systems, the distribution of the total C to different size fractions (2000-250 µm, 250-53 µm and < 53 µm) in the systems were estimated. Soil respiration rates of the systems were measured as an indication of microbial activity. It was observed that total C in surface soils declined in all the cultivated systems compared to the forest system. The distribution pattern of total C in physical size fractions were comparable in cropping systems but were different from that of the forest system. More of the total C were found in the bigger size fractions in forest system, while it was in the finer (< 53 µm) fraction in the case of the cropping systems. In rubber systems, more than 70 per cent of the total C was in the finer fraction indicating higher C sequestration potential of the systems. However, in terms of quantity of total C conserved, forest soil system conserved more C. An ideal system would be one that can conserve more C with more of its allocation to the finer (< 53 µm) fraction. There exists possibility of converting rubber systems to more environmentally beneficial one if more under flora is allowed to grow during the immature phase along with restricted weeding and tillage practices.

Keywords: Climate change mitigation, Carbon in soil size fractions, Carbon sequestration, Soil carbon

INTRODUCTION

The prime cause of climate change is believed to be the increasing levels of atmospheric CO_2. The role of increased agriculture related activities in the past 150 years towards the rise in atmospheric CO_2 levels can never be neglected. Globally, the amount of C in soils is about three times more than that in the whole vegetation and two times more than that in the atmosphere (Batjes, 1996; IPCC WGI, 2001). As the amount of C held in soil is very huge, even small losses can have significant influence on atmospheric CO_2 concentrations (Smith *et al.*, 2008). Hence in the context of climate change, nature and behavior of soil organic compounds have been widely under scientific investigations.

Soil Organic Matter (SOM) is not static in nature but dynamic especially in agrarian soils as C input and outflow processes through the addition of leaf litter or crop residues and the CO_2 emission due to the microbial decomposition are simultaneously

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