



Research Article

Assessment of soil organic carbon (SOC) stock in different agro-climatic zones of Tamil Nadu

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Received : 26.11.2011; Revised : 21.02.2012; Accepted : 26.02.2012

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Summary

Soil map prepared on 1:50,000 scale for natural resources information system (NRIS) employing satellite data (IRS-1C/1D-PAN sharpened LISS-III image) was used to estimate SOC stock upto 50 cm depth in different agroclimatic zones of Tamil Nadu. Among different agroclimatic zones of Tamil Nadu, hilly zone registered the highest SOC stock followed by north eastern, southern, western, cauvery delta, north western and high rainfall zone. SOC density was higher in high rainfall and hilly zone than other agroclimatic zones of Tamil Nadu. Among low rainfall regions, cauvery delta zone recorded higher SOC density.

Key words : SOC stock, Soil map, Agroclimatic zones

How to cite this article : Rajeswari, R. and Sivasamy, R.(2012). Assessment of soil organic carbon (SOC) stock in different agro-climatic zones of Tamil Nadu. *Asian J. Soil Sci.*, 7(1): 23-26.

Introduction

Restoration of soil quality through SOC management has remained the major concern for tropical soils. The comprehensive knowledge on SOC stocks forms an essential prerequisite in future land resource management programmes. CO₂ is by far the largest contributor to the anthropogenically enhanced green house effect. The importance of CO₂ to the climate has provided the impetus for research on the global 'C' cycle with particular attention on 'C' stocks in main terrestrial compartments, mainly soils and phytomass. The increasing interest of the contribution of terrestrial ecosystems to mitigate climate change has given rise to the possibility of emission credits for SOC sequestration. Carbon sequestration in terrestrial ecosystems being considered as a way to mitigate green house gas effect and simultaneously combat land degradation. Thus, an attempt was made to estimate the SOC stock in different agroclimatic zones of Tamil Nadu with the help of soil map prepared on 1:50,000 scale using natural resources information system (NRIS) employed under satellite data (IRS-1C/1D-PAN sharpened LISS-III image) and effect of climate on SOC stock is discussed.

Resources and Research Methods

Tamil Nadu lies between 76° 14' and 80° 21' E longitudes and 84° and 13° 54' N latitude. It has a total geographical area of 129.91 L ha. Based on the altitude, annual rainfall and annual PET (Potential Evapotranspiration), Tamil Nadu has been divided into seven agroclimatic zones viz., western zone, southern zone, north eastern zone, Cauvery delta zone, north western zone, high rainfall zone and hilly zone (Fig. A).

The soil map on 1:50,000 scale for Tamil Nadu was prepared under NRIS (Natural Resources Information System) project by employing satellite data (IRS-1C/1D-PAN sharpened LISS-III image) (Natarajan *et al.*, 2008). The soil map has the description of 326 soil series distributed in different agroclimatic zones. The information on soil depth, horizons and bulk density were collected from NRIS project. The soil samples for the horizons upto 50 cm depth of each series were taken and analysed for organic carbon content. Soil organic carbon stock (Pg) was calculated for solum depth of 50 cm to each soil series and total soil organic carbon stock (Pg) for different agroclimatic zones of Tamil Nadu were also calculated following standard methods described by Batjes (1996) and Bhattacharyya *et al.* (2000).