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Prediction of SOC Stock using ROTH-C Model and Mapping in Different Agroclimatic Zones of Tamil Nadu

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Abstract : An investigation was carried out to know the SOC stock and its change over time in benchmark soils of different agroclimatic zones of Tamil Nadu. Roth.C model was used to assess SOC stock under existing and alternate cropping pattern. Soil map prepared on 1:50,000 scale from Natural Resources Information System (NRIS) employed under satellite data (IRS-1C/1D-PAN sharpened LISS-III image) was used to estimate SOC stock in different agroclimatic zones of Tamil Nadu. Fifteen benchmark soils were selected in different agroclimatic zones of Tamil Nadu based on their land use and the areal extent to assess SOC level and its change overtime. This revealed that, between eleven years of period (1997 - 2007). SOC buildup was higher in soils under horticulture system, followed by soils under rice cultivation. Among different agroclimatic zones of Tamil Nadu hilly zone have the highest SOC stock, followed by north eastern, southern, western, cauvery delta, north western, and high rainfall zone. Although organic carbon content in the soils of North eastern, southern, western, North western, Cauvery delta were less than high rainfall zone, the SOC stock was high. SOC density was higher in high rainfall and hilly zone than other agroclimatic zones of Tamil Nadu. Among low rainfall regions of Tamil Nadu cauvery delta zone recorded higher SOC density. Roth.C model was used to assess SOC stock under existing and alternate cropping pattern in viz., Periyanaickenpalayam series (western zone), Peelamedu series (southern zone), Vallam series (north eastern zone), Vannappatti series (north western zone) and Padugai series (cauvery delta zone). Padugai series recorded higher TOC, BIO, and HUM, followed by Periyanaickenpalayam series, Peelamedu series, Vallam series, and Vannappatti series. Vannappatti and Padugai series develop high TOC, BIO, and HUM under existing cropping pattern. Periyanaickenpalayam, Peelamedu, and Vallam series develop high TOC, BIO, and HUM under alternate cropping pattern. Among five selected soil series, Periyanaickenpalayam, Peelamedu, and Padugai series recorded 0.75 per cent TOC during 2025 and 2018, 2100 and 2035, 2013 and 2014 under existing and alternate cropping pattern, respectively.

Keywords : agro climatic zones, benchmark soil, land use, soil organic carbon
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