



Vertical distribution of soil organic and inorganic carbon under silvipastoral system in a dry semiarid agro-ecological region, Tamil Nadu, India

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Abstract

A detailed soil survey was conducted in a silvipastoral system of a dry semi-arid region of Tamil Nadu, India at 1:10,000 scale to assess the vertical distribution of soil organic carbon (SOC) and inorganic carbon (SIC) and its relation with soil properties. Around 110 soil profiles were studied and horizon-wise samples were collected from 7 representative profiles. The SOC content of the surface soil was ranged from 1.5 to 8.6 g kg⁻¹ with a mean value of 4.37 g kg⁻¹ and it irregularly distributed with depth. The SOC content had significant positive correlation with total N ($r=0.513^*$), ex.Ca ($r=0.497^*$) and clay ($r=0.430^*$) ($P<0.05$) content of the soil. However, the SIC content ranged from 0.3 to 20.1 g kg⁻¹ and it either increased or irregularly distributed with depth. Correlation analysis revealed that SIC content had intricately significant positive relationship with extractable Ca²⁺ ($r=0.573^{**}$ $P<0.01$), Mg²⁺ (0.572^*), clay (0.612^{**}) and silt (0.595^{**}) ($P<0.01$). There was a good relationship observed between surface SIC and SOC content ($r^2=0.752$) compared to subsoil ($r^2=0.525$). It might be because of the potential stabilisation of SOC by calcium from SIC in the soils under silvipastoral system of a dry semi-arid agro-ecological region.

Keywords: Dry semi-arid region, Silvipastoral system, Soil inorganic carbon, Soil organic carbon, Vertical distribution