

Impact of sustainable land-use management practices on soil carbon sequestration and soil quality in the west coast of India

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Abstract

The evaluation of sustainable land management practices is imperative under particular soil type, climate, and cropping sequence following area-specific best management practices. The alternative land-use system (ALUS-natural forest, pasture, cashew, areca nut, coconut) on hills and agricultural land-use system (AGLUS-rice-rice, rice-pulse) in the coastal plains of west coast India was evaluated in this study. The present study assessed the impact of sustainable land-use management practices on different fractions of SOC and soil quality under ALUS and AGLUS. The total SOC stocks under different land-use systems varied from 14.4 Mg ha⁻¹ in rice-rice rotations to 133.7 Mg ha⁻¹ in cashew and more than 75% of total SOC stock were found as a passive carbon pool. The higher lability index, available nutrients, and biochemical properties were found in ALUS. This variation in the levels of SOC and soil quality was due to land use and management practices. The results indicated land use with areca nut (0.8) on the hills and rice-pulses (0.25) rotations on the coast had maintained soil quality of high order. On upscaling the different land-use systems by growing cashew, areca nut, coconut, pasture, and rice-pulses rotations, SOC stocks of Goa can increase from 6.33 Tg at present to 32 Tg. We recommend promoting sustainable agriculture with ALUS on the hills and with AGLUS on the coastal plains of Goa for enhancing SOC sequestration and improving soil quality.

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