Soil C sequestration of forest-cardamom systems in Knuckles Forest Range, Sri Lanka

R. P. S. K. Rajapaksha[a], S. D. Saputhanthri[c], H. M. S. P. Madawala[b], S. K. Gunathilake[c] and R.R. Ratnayake[a]

[a]National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka; [b]Department of Botany, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka; [c]Department of Natural Resources, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya; krajapaksha58@gmail.com

To mitigate the risks of global climate change, many studies are being focused on reducing emissions of CO_2 and other greenhouse gases. One way of reducing atmospheric CO_2 is through increase in the global storage of carbon in soils. Forest soils play an important role as a carbon sink, by absorbing and holding carbon for a long time without releasing as CO_2 into the atmosphere.

The aim of this study was to estimate the soil C sequestration in forest-cardamom systems in Knuckles Forest Range (KFR) where cardamom cultivation has been banned since 1985 after acknowledging its conservation value. Forest-cardamom systems located in Gomare, Thangappuwa, Kalupahana, Kalugala and Gombaniya in KFR were selected for the study. Soil samples were collected from two depths; upper layer (0-15 cm) and lower layer (15-30 cm), using a soil auger and analyzed for different C fractions including total organic carbon (TOC), microbial biomass carbon (MBC), labile carbon (LC) and water soluble carbon (WSC) to estimate soil C stocks in these forest-cardamom systems.

The TOC content in upper soil layer was 3.62% while it was 3.35% in the lower layer. Microbial biomass carbon content in the upper layer was 0.032%. In the upper layer, LC content was 708.44 mg/kg and WSC was 0.041%, while in the lower layer they were 681.90 mg/kg and 0.040% respectively. Soil C stocks in the upper soil layer was 47.7 t/ha and 44.6 t/ha in the lower layer. These C stocks are higher than the C contents of tea and pine plantations in KFR according to the literature. The results suggest that forest-cardamom systems sequester C efficiently and therefore would contribute continuously to C sequestration. Thus, these forest-cardamom systems may contribute significantly to mitigate climate change.

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References:

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