

Soil Erosion Assessment in Tea Lands of Nuwara Eliya, Sri Lanka, using the ^{137}Cs Tracer Technique

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In Sri Lanka, tea is often grown in slopy lands, which increases the risk of soil erosion. This was to assess the erosion status of selected tea plantations during 2022-2023 in Labookellie, Weddamulla and Frotoft estates. For the reference site, nearby montane forest located in Labookellie was selected. Seventy-two soil samples were collected representing two canopy categories (well-grown VP tea and marginal seedling tea) and two slope classes (0-10% and 50 – 60%). At the reference site, cores were sectioned at 5 cm intervals up to 4 cm depth, while study site sampling comprised 40 cm bulk cores. ^{137}Cs activity of soil was measured using a HPGe detector. Soil redistribution rates induced by water erosion were estimated by Mass Balance Model II. Forest area showed a lower soil erosion rate compared to the tea growing areas ($p=0.002$). Erosion rates were compared using an independent samples t-test, and correlations among parameters were assessed by Pearson correlation analysis. The ^{137}Cs inventory for the forest site was 325 Bq/m², and it was for tea lands ranged from 72-290Bq/m² (mean=182.26 Bq/m²). With increasing slope, erosion rates increased, and the slope category of 50-60% showed the highest erosion rate of 30.51 tons ha⁻¹ y⁻¹ with a sediment delivery ratio of 88% in Labookellie. Marginal tea lands had higher erosion (42.94 tons ha⁻¹ y⁻¹) compared to VP fields in Labookellie ($p=0.002$). Erosion rates showed negative correlations with organic matter ($r=-0.7$) and exchangeable K ($r = -0.75$) contents. Soil erosion in Nuwara Eliya tea lands is significantly influenced by slope and canopy cover.

Keywords: Cs-137, Mass Balance Model, Reference site, Soil erosion

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