

ESTIMATION OF TOTAL CARBON SEQUESTRATION POTENTIAL OF COCONUT-GLIRICIDIA MIXED CROPPING SYSTEMS: A CASE STUDY IN THE INTERMEDIATE ZONE OF SRI LANKA

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Offsetting Carbon footprints by sequestering Carbon through plant biomasses has become a key concern under modern thinking on climate change mitigation. Estimated Carbon stocks have a potential to be converted to Carbon credits in the near future. This study focused on estimating and comparing the carbon sequestration capacities of coconut-based agroforestry systems of the intermediate zone of Sri Lanka and importantly to develop an allometric model non-destructive estimation of Carbon. The total Carbon stocks of major age categories across intensification of agroforestry systems were measured. The age groups of coconut considered were 10, 20, 30, 40, and 50 years while the corresponding Carbon stocks were 22.60, 35.00, 53.13, 63.40 and 66.03 MgC ha⁻¹, respectively. Analogously, in gliricidia stands, Carbon stocks were 25.53, 46.16, 83.83 and 106.09 MgC ha⁻¹, respectively for age groups from 5, 10, 15 and 20 years. Gliricidia is recommended to be planted under coconut 20 years after establishment. A 30-year-old coconut and 10-year-old gliricidia agroforestry system and its ground cover was considered as the benchmark. The total soil Carbon stock at a 30 cm depth was found to be 13.39 MgC ha⁻¹ and the ground cover Carbon stock was 1.24 MgC ha⁻¹. Results revealed that the total Carbon stock in a 30-year-old coconut monocropping system was 67.76 MgC ha⁻¹ whereas the Carbon stock of the 30-year-old coconut-gliricidia mixed cropping system was 113.92 MgC ha⁻¹. In contrast, the coconut-gliricidia agroforestry system resulted in 68.12% greater C-sequestration compared to mono-cropped coconut. The coconut-gliricidia mixed cropping system yield a higher Carbon sequestration potential emphasizing its role in sustainable agricultural practices and climate change mitigation in Sri Lanka.

Keywords: Carbon stocks, Climate change, Monoculture, Non-destructive estimation, Sustainable agricultural practices