Estimation of Tree Diversity and Carbon Stocks in Organic & Conventional Tea Systems

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In Sri Lanka, tea is commonly grown as an intensive cultivation, organically & conventionally. In the present study, shade tree diversity and the biomass of shade trees were estimated, and compared between organic and conventional tea systems in Uva region of Sri Lanka. Fifteen organic and fourteen conventional tea fields were selected for the study, which were either smallholders (SH) or medium/ large estates (> 10Acres). In each field, an area of approximately 0.1 ha land was demarcated and a tree survey was conducted, beginning with species identification. For all the lands, Shannon-Wiener and Simpson Diversity Indices were calculated. The total, above (AGB) - and below-ground (BGB) biomass of each shade tree was calculated as follows: For high-shade trees, allometric equations (species specific equations wherever available, otherwise common equations) were used, and for medium shade trees, manual method and species-specific allometric equations were used. For the data analysis Nested experimental design was used. The Shanon Weiner Index of organic tea lands exhibited a significantly higher ($p < 0.05$) diversity in the organic (ORG) lands compared to the conventional (CONV) systems. There was no significant difference between smallholder and medium/ large scale farmers nested within each tea cultivation system. However, the Simpson Diversity Index showed no significant difference between organic and conventional tea system at ($p<0.05$) level of significance. Further, there were no differences in AGB/ BGB/ total biomass and carbon stocks between organic and conventional systems. Within the ORG farms, the AGB/ BGB/ total biomass and carbon stocks were significantly ($p < 0.05$) higher in ML compared to SH, which was not evident in the CONV, and the difference was identified occurring due to old shade trees in one estate. In conclusion, ORG and CONV lands exhibit differences in biodiversity, total biomass, AGB and BGB, which could be attributed to differences in the management of each plantation.

Key words: Biomass, Carbon stocks, Conventional tea cultivation, Organic, Tree diversity

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