COMPARISON OF ABOVE GROUND BIOMASS CARBON BETWEEN SELECTED KANDYAN HOME GARDENS AND PINUS PLANTATION IN KANDY DISTRICT, SRI LANKA

by

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ABSRACT

Kandyan home gardens are economically viable, highly adapted and environmentally friendly agroforestry system in Sri Lanka. These gardens have higher tree and crop genetic diversity. The most predominant cropping system in the district belongs to the Kandyan home gardens. As a result of decreasing natural forest cover due to agriculture, agricultural land settlements, encroachments by landless poor people and illegal logging led to establishment of extensive plantation of exotic species of *Pinus*. This has become a controversial issue in the country. However, there are limited number of studies conducted to compare the plantations which were subjected to different siviculture management practices and the Kandyan home garden system. The present study compared ten Kandyan Home Gardens from Uda -Peradeniya and one *Pinus* plantation from Hantana. The tree biomass allometric equations were used for the calculation of tree biomass and Carbon storages. A total of 10 Kandyan Home Gardens from Kandy District were selected for the study and each home garden was divided into 10 plots of 10 m X 10 m and *Pinus* plantation was divided into 30 plots of 18 m X 18 m. In each plot tree species were identified and height and diameter at breast height of individual tree in each plot were measured. Ten soil samples were collected at random from each plots of Kandyan Home Gardens and *Pinus* plantation and analyzed for pH, Electron Conductivity (ds/m), soil texture (mechanical analysis), Water content (%), Bulk density (gcm^{-3}), Phosphorous availability (ppm), Total Nitrogen (%), Potassium availability(ppm) and soil organic Carbon content (%). Analysis of variances (ANOVA) was carried out for the purpose of comparison of chemical and physical properties, above ground biomass and carbon stocks in Kandyan Home Gardens and *Pinus* plantation.

The average total aboveground biomass (258 $kgha^{-1}$) and Carbon content (130 $kgCha^{-1}$) of the Kandyan gardens were higher than the biomass (35 $kgha^{-1}$) and Carbon content (18 $kgCha^{-1)}$ of *Pinus* plantation, indicating that comparatively higher potential of Above Ground Biomass Carbon store in Kandyan Home Gardens. The soil chemical properties greatly vary between the Kandyan home gardens (KHG) and the *Pinus* plantation where soils of *pinus* plantation showed comparatively lower values for the chemical properties such as pH, Phosphorous availability (ppm), Total Nitrogen (%), Potassium availability (ppm) and organic Carbon content (%), were measured. According to the Forestry Sector Master Plan the total extent of the Home gardens in Kandy district is 61,029 ha and therefore 7934 x 10^3kgC of total aboveground Carbon stored in trees of Kandyan Home Gardens. The soils in the KHGs are higher in soil organic carbon (SOC) compared to *Pinus* plantation and KHG stored 119.7 x 10^3 kgC ha^{-1} soil Carbon and the total soil Carbon storage in the KHGs in Kandy district is about 7300 x 10^6 kgC. The total Above Ground Biomass Carbon and total soil Carbon stock in the KHGs in Kandy district is 7308x 10^6 kgC.