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Determination of photosynthetic biomass gain rate by leaves of selected plant species at their early growth stages

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With the present interest in global climate change mitigation, agro forestry plays an important role in carbon sequestration and carbon trading. Analog forestry is a system of farm based environmental restoration and promising management technology to help obtain photosynthetic biomass. Belipola Analog forest and home gardens at Mirahawatta, Welimada, in the Badulla district were selected as the study sites. Four highly abundant utility tree species,*Artocarpus heterophyllus*, *Toona celiata*, *Persea americana*, and *Mangiferra indica* s were selected. Purposive sampling was carried out and more than 40% of shaded trees were avoided. From each species 10 individuals from each age group were selected. Leaf samples were collected and total tree height, crown height, and light intensity values were measured. Fresh weight, leaf area and moisture content were measured from the collected leaves. The carbon content in the sampled leaves was measured by the loss-on-ignition method and aggregating that value to estimate the carbon content in the leaves of the crown. Simple linear regression in MINITAB 14 was used in developing relationships between dependent variables (photosynthetic biomass, leaf carbon content) and independent variables (age, tree height, crown height, and moisture content in leaves).The results indicated that the photosynthetic biomass of the early growth stage of four utility trees were significantly increased with the age and showed exponential growth after Age 3. Highest and lowest biomass accumulation rate were given by the *Mangiferra indica* and *Toona celiata* species respectively. Photosynthetic biomass showed a significant increase with the leaf area, tree height and crown height; from that *Persea americana* showed the highest rate of increment. The results also indicated that the carbon content of the leaves of the four selected utility tree species in the early growth stage are between 20% and 22%, and showed a significant increase of Carbon content in leaves with the tree height, crown height, and leaf area. With the leaf area *Artocarpus heterophyllus* showed lower Carbon accumulation in leaves, while other 3 species showing a high, more or less equal rate of increment. With the tree height *Artocarpus heterophyllus* and *Toona celiata* species showed highest rate of increment. Trees are not given the actual value from the services they provide. Photosynthetic biomass in terrestrial ecosystems are largely composed of leaves, this component needs a value placed on it for its 'environmental services.'

Key words: Analog Forestry, Photosynthetic biomass, Carbon accumulation

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