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**RELATIONSHIP OF CARBON WITH THE
BIOMASS AND VOLUME FOR
Pinus caribaea PLANTATION.**

By

G. B. Munasinghe

B.Sc. Biology (USJP)

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Forestry and Environmental Management,
Department of Forestry and Environmental Science,
Faculty of Graduate Studies,
University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
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University of Sri Jajewardanapura, Nugegoda, Sri Lanka.

ABSTRACT

Since the beginning of the twentieth century the atmospheric concentration of carbon dioxide has increased due to combustion of fossil fuel and deforestation. Green plants absorb CO₂ from the atmosphere through photosynthesis. Investigating the effects of increasing atmospheric carbon dioxide on tree species are important as trees play a major role in maintaining the ecological balance. Carbon sequestration capacity of trees which influence carbon absorption rate include, temperature, precipitation, soil, slope, elevating site conditions, growth rates age and forest type.

Twenty six years old even aged *Pinus caribaea* (Morelet) plantation in Yagirala Forest Reserve was selected to this project. *Pinus caribaea* is a fast growing an exotic species. The main objectives of this project (i) to quantify the amount of carbon in pine plantation of Yagirala Forest Reserve and other pine plantations of Sri Lanka, (ii) to build up a relationship of stem carbon with the stem biomass and volume and (iii) to build up a relationship between above ground carbon and above ground biomass for the selected pine plantation in Yagirala Forest Reserve.

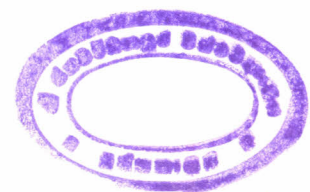
Three plots were randomly selected representing all three sites, i.e., valley, slope and ridge top. 0.05 ha circular plots were used for collecting data. Stem biomass, volume, height and dbh data for individual trees in sample plots were obtained from a previous study carried out by Haripriya, (2003). Canopy biomass of trees was calculated assuming the pine canopy is a cone. Carbon composition is different in various parts of the tree. Therefore carbon was determined for all parts of each tree separately by using walkery and Black method.

Carbon content was more than half of the biomass in the *Pinus caribaea* in Yagirala forest pine plantation and leaves have the highest carbon content per unit mass. According to the results, the carbon content of *Pinus caribaea* in Yagirala forest is 103.63 metric tons and carbon content of pine plantations of Sri Lanka is 1,719,182 metric tons. Further regression analysis was carried to build the empirical models to predict the stem carbon and above ground carbon from stem biomass, stem volume, total height and diameter at breast height. In order to select the best model, R² and residual distribution were tested. Finally the following models were selected to predict stem carbon of *Pinus caribaea* in Yagirala pine plantation. $\sqrt{C} = 0.755\sqrt{m}$; $\sqrt{C} = 17.8\sqrt{V}$; $\sqrt{C} = 4.30\sqrt{h} - 188\frac{1}{d}$. The following models were selected to use to predict the above ground carbon content of *Pinus caribaea* in the Yagirala Forest Reserve. $\sqrt{C} = 0.777\sqrt{m}$; $C = 364V$ and $\log C = 1.60 \log d$. Where, C = amount of carbon (kg), m = biomass (kg),

V=stem volume, h=total height, d=diameter at breast height.

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