

Pattara Sawangde 2010: Estimation of Volume and Aboveground Carbon Sequestration of *Eucalyptus camaldulensis* at Lad Krathing Plantation Using Remote Sensing Techniques.
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This study was aimed to estimate the stem volume and aboveground carbon stock of Eucalyptus trees with 1-5 years age class in Lad Krathing plantation. As a comparative study, this was done both by direct method based on standard formulas using data from field survey and by indirect method based on the relationship equations between those things and the leaf area index (LAI) as well as SPOT-5 satellite digital image including its vegetation indices.

The results of the study revealed that the relationship between LAI and stem volume was in form of power function with the correlation coefficient (R^2) of 0.62 to 0.97 for all age classes of the Eucalyptus plantation. In addition, the relationship between LAI and carbon stock was also in form of power function models with the R^2 of 0.63 to 0.94. Furthermore, it was found that G, NIR and the vegetation indices (NIR/R, NDVI) of SPOT-5 was related to stem volume and aboveground carbon stock in form of linear regression models with relatively high of R^2 (0.73-0.93) when separately analyzing by each age class, but relatively low R^2 (0.57) when analyzing by all ages.

Based on the best-fit models using field-measured LAI as an independent variable, the yield estimation of the plantation was 28,072 m³ by volume and 19,194 tons of carbon by stock. Additionally, the estimation based on the best fit models using SPOT-5 data was 27,527 m³ by volume and 19,078 tons of carbon. Meanwhile, the results of the conventional estimation based on standard equations using data from field survey were 27,607 m³ by volume and 19,060 tons of carbon. The result also revealed that the direct estimation of stem volume and carbon stock using standard equations was not significantly different from the use of the relationship equations that produced evident results with relatively low of cost and time consuming in operation. Hereby, it can be stated that modeling of an relationship equation based on satellite image would be one of the good alternative methods for the estimation of stem volume and aboveground carbon sequestration in the Eucalyptus plantation when time and budget are main constrains for decision making in plantation management.

Student's signature

Thesis Advisor's signature