
Estimating stand biomass can be performed using either terrestrial inventory method or indirect estimation using remote sensing method. In line with the development of remote sensing technology in forestry sector, the utilization of remote sensing in biomass estimation is increasingly required. Commonly, satellite imagery frequently used for estimating biomass is Landsat image. The use of Landsat image for biomass estimation has been proven to provide good results, as described in several previous studies (Yaya et al. 2005; Michalek et al. 2000; Foody et al. 2003; and Lu 2005). One disadvantage of Landsat data is the inability to record objects under clouds or haze cover. Therefore, the use of all weather image having capability to penetrate clouds or haze could be examined. One type of radar imagery is ALOS PALSAR (Advanced Land Observing Satellite Phased Array type L-band Synthetic Aperture Radar), that was launched by the Japanese government in 2006. Since the PALSAR image used relatively new technology where the development of radar image processing is within experimental stage, further examination of its application is required.

The main objective of this study is to establish the biomass estimator models of rubber and palm oil plantation using 50 m spatial resolution of PALSAR and Landsat images. The study steps include the following: a) preparation and data collection, b) data processing, c) field data survey, and d) model development. The model were developed using the following steps: selection of alternative models, the correlation coefficient evaluation, the calculation of regression coefficients and verification of the best model.

The study found that ALOS PALSAR images produce better prediction than those Landsat images. The best model to estimate the biomass of rubber using PALSAR images is \( Y = 193.1 * e^{0.277HV} \) with \( R^2 \) value of 71.74%, and \( P-value = 2.67669*10^{-18} \); while the best model to estimate the biomass of rubber using Landsat is \( Y = -358.7 + 916.6*MIR/NIR -568.7*MIR/NIR^2 \) with \( R^2 \) value of 59.2%, and \( P-value = 0.00024 \). The best model to estimate the oil palm biomass using PALSAR images is \( Y = 77.76 + 14.427*HH -4.213*HV \) with \( R^2 \) value of 76.8%, and \( P-value = 4.525*10^{-6} \); while the model of oil palm biomass estimation using Landsat is \( Y = 40.81 + 25.2*NDVI - 198.1*NDVI^2 \) having \( R^2 \) value of 60.6% and \( P-value = 1.358*10^{-10} \). Using the selected model, map of the biomass distribution could be developed.

Keyword : Biomass, ALOS PALSAR, Landsat, Rubber (Hevea brasiliensis), Oil palm (Elaeis guineensis).