Estimating Above Ground Biomass (AGB) and Stand Volume of Oil Palm Plantations using Landsat Thematic Mapper (TM)

Nazlin Asari[1], Mohd Nazip Suratman[1], Jasmee Jaafar[2]

[1]*Faculty of Applied Sciences and Centre for Biodiversity and Sustainable Development, Universiti Teknologi MARA, 40450 Shah Alam, Malaysia*, nazlinasari@yahoo.com, nazip@salam.uitm.edu.my
[2]*Department of Surveying Sciences and Geomatics, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia,* jasmee@salam.uitm.edu.my

Abstract: Oil palm agricultural tree crops have been extensively studied in the aspect of botanical and cultivation due to its socio-economic and commercial values. Malaysia is known as the world's top producer of palm oil with current planted area of plantations around 4.69 million ha. There is an abundance potential of biomass including oil palm in the country. Despite the importance of oil palm to the country, an accurate and reliable assessment method in resource availability is lacking. Therefore, the need for more efficient method of inventory is an impetus of this research into supplementing ground-based survey with information from satellite remote sensing. Remote sensing technology offers a cost-effective ways to monitor natural resources. The frequency of remote sensing data acquisition couple with the availability of data for extensive area increases its attractiveness for inventory and monitoring purposes. The objectives of this study are (1) to estimate the above ground biomass (AGB) and stem volume of oil palm plantations of different ages based on ground data, and (2) to investigate the relationships between spectral radiance recorded by Landsat TM imagery and oil palm stand parameters. This study was conducted in the selected oil palm plantations in Selangor, Malaysia. The field stand parameters collected include stand age, oil palm trunk radius, height, diameter at breast height (DBH), density, crown width and crown closure. Parameter variables related to AGB and stand volume include Landsat TM bands and several vegetation indices such as simple ratios, greenness indices, Normalized Difference Vegetation Index (NDVI), modified vegetation index and transformed NDVI. The established relationships between the parameters will be useful for the development of predictive models for estimating the AGB and stand volume of oil palm plantation

Keywords: Oil palm plantations, above ground biomass, stand volume, Landsat TM