

UNIVERSITI TEKNOLOGI MARA

**OPTIMIZATION OF OIL PALM AGE
RECOGNITION USING SENTINEL -2A AND
LANDSAT-8**

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ABSTRACT

Oil palm (*Elaeis guineensis*) trees have made significant contributions to Southeast Asia recent economic development. Malaysia has made significant strides in the oil palm industry. It began as an ornamental plant in Malaysia and has since grown into a multibillion-dollar industry. It has the highest global demand as an ingredient in food, cosmetics, animal feed, bioenergy, and other products. Malaysia currently ranks second in palm oil production after Indonesia, accounting for 39 percent of global production and 44 percent of palm oil exports. Thus, Malaysia has an important role to play in achieving the growing global demand for oils and fats because it is a major producer and exporter of palm oil and palm oil products. The purpose of this study is to identify the parameter and characteristic of the age of oil palm based on literature research as well to quantify the oil palm trees based on age distribution derived from satellite and UAV imagery and to compare both Sentinel - 2 and Landsat 8 imagery in their efficiency of age recognition for oil palm trees towards crown diameter extraction from UAV imagery. The satellite images were used are Sentinel-2, Landsat 8, and Unmanned Aerial Vehicle (UAV) dataset imagery were used on the same year in 2018. The process used two methods which are Remote Sensing techniques and Geographic Integration System (GIS) in monitoring and detecting oil palm plantations to maximise productivity. The study outcome is a map distribution of oil palm age and Normalized Differences Index Vegetation (NDVI) in the study area.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

The oil palm known as *Elaeis Guineensis* Jacq is an oil palm species that originated from the tropical rainforest of West Africa and grows well in South-East Asia's tropical climate that are particularly in southern Malaysia, Thailand, and Indonesia. They are the plants that produce the most produce per unit area when compared to other cultivated oil crops. Besides, palm oil has the highest production among other oil crops, such as soybean, rapeseed, and sunflower (Chong et al., 2017). Most of the crude palm oil is used in food and biodiesel production, whereas palm kernel oil is used in detergents, cosmetics, plastics, and chemicals. Thus, the plantation of oil palms requires moist equatorial conditions to grow, and the conditions in Southeast Asia are perfect. For example, Malaysia has very high climate suitability for oil palm plantations. Nowadays, Malaysia is considered as the second biggest country to export palm oil products (Marzukhi et al., 2018). This show Pahang is one of the states in Peninsular Malaysia second place with a total area of 725,239 hectares of palm oil plantations in Peninsular Malaysia (Palm & Industry, 2020).

Commonly, oil palm trees have an economical lifespan up to 25 years. One of the most important factors influencing fruit bunch production is age. Generally, production begins around two years old and reaches a peak between six and ten years after planting. As a result, oil palm age is an important parameter that must be considered in the oil palm industry. For instances, anyone could predict the yield that is expected for a specific age, and the age of the palm tree can be monitored if there is any yield anomaly. This has led to the existence of precision oil palm farming. Furthermore, studies have revealed that age is a parameter in allometric equations for estimating oil palm biomass and carbon stocks, which is an important issue in carbon studies. The ages of oil palm plantations are important for biomass estimation and carbon stock inventory for oil palm plantations, which is significant for biodiversity conservation and lowering greenhouse gas emissions from palm oil production.