Mapping Vegetation Cover of *Acacia mangium* Plantation by Age

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ABSTRACT This paper aims to provide a method in mapping the vegetation cover of *Acacia mangium* plantation using the advanced survey technology of satellite remote sensing. This method would serve as an alternative to the conventional field sampling which is laborious and time consuming. Satellite images obtained from Landsat 8, provide the current view on vegetation cover of the whole plantation area. Two areas were targeted for the study which was area with *A. mangium* stands aged below 5 years old and another aged above 5 years old. Image analyses performed on Landsat 8 satellite image showed that vegetation coverage in area over 5 years old stands were significantly denser compared to within 5 years old stands. Low solar radiation (reflectance) was detected on area with high vegetation cover while higher radiation was detected on lesser vegetation cover. Overall findings of the study shows that the older *A. mangium* stand age greatly decreased the transmittance and reflectance of solar radiation in the visible light spectrum due to the increase in biomass. Hence, biomass played a key factor in distinguishing the vegetation covers between the two age classes (below 5 years old and above 5 years old).

KEYWORDS: Vegetation cover; age; *Acacia mangium*; image processing; Landsat 8

INTRODUCTION

   Acacia mangium is a tropical lowland tree which had been introduced as one of the commercial timber species used in making fiberboard, pulp and paper mills. The tree has superior ability to colonize in many kind of sites such as degraded and non-degraded forest area. Therefore, Sarawak Forest Department had planted 69% with acacia trees in 335,049 hectare of forest land for reforestation up till 2014 (Wong *et al.*, 2014). Based on previous studies from Thailand, China, Indonesia and Malaysia, reforestation and afforestation were conducted by planting exotic and native quick growing timber species in order to mitigate exploitation on naturally existed forest resources (Suratman, 2003; Iglesias, 2007; Liu, *et al*, 2014). The new forest area can be assessed by conventional method using forest stand parameters such as wood volume, biomass and basal area. However conventional method for assessing the said parameters is difficult and time consuming when covering a large forest area. The advance tool of remote sensing is likely to be an alternative for conventional method, because remote sensing acquired information about an object without direct contact with the object itself. Satellite remote sensing uses multi-spectral bands that provide a summarized view on the whole planted area at an acceptance level of accuracy and cost-efficient (Lehmann *et al.*, 2017). Landsat satellites such as Landsat 4 Thematic Mapper (TM), Landsat 5 Multi Spectral Scanner (MSS), Landsat 7 Enhance Thematic Mapper Plus (ETM+) and Landsat 8 Operator Land Imager (OLI) have long been used in determining forest biomass and wood volume ever since 1989 (Sader *et al.*, 1989; Lu *et al.*, 2004; Gunlu *et al.*, 2014). This study objective was to utilize satellite images from Landsat 8 OLI to map the vegetation cover of *Acacia mangium* plantation in Bintulu, Sarawak by age.