UNIVERSITI TEKNOLOGI MARA

CARBON STOCK ESTIMATION FOR HARUMANIS PLANTATION USING REMOTE SENSING

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ABSTRACT

Carbon stock estimation is a process of determining the amount of carbon stored in an environment, typically in the living biomass or soil. There are many studies that have been conducted in order to find the best method in estimating the carbon stock whether in the forest or plantation. The study was conducted in Harumanis plantation of UiTM Perlis with the aim to estimate the carbon stock of Harumanis tree. In this study, a non-destructive approach had been utilised in order to measure the aboveground biomass (AGB) and carbon stocks (CS) value of mango tree. Few data from field measurements were collected such as diameter at breast height (DBH) and position of trees. The AGB and CS was computed using allometric equation developed by Brown (1997) and FAO (1997). Besides, the UAV Multispectral image was used to determine the individual tree crown delineation of those mango trees which had been processed using eCognition software. Result showed that the total CS calculated in the study area using equation from FAO (1997) are higher than Brown (1997) which are 7758.434 kg and 5750.386 kg respectively. Therefore, it showed that different allometric equations resulted in a different estimation value.

CHAPTER ONE
INTRODUCTION

1.1 Research Background

In recent years, global warming and climate changes have become the most crucial environmental concern needed to be faced by today's generation. For the past few years, about 195 countries had agreed to cut the emission of carbon dioxide (CO_2) and other greenhouse gases (GHG) in the effort to lower down the global temperatures. This atmospheric condition is expected to continue in the future if human activities cannot be controlled. According to Guiabao (2016), the average surface temperature might climb between 1.4°C and 5.8°C in 2100, whilst sea level is likely to rise between 0.09cm and 0.88cm, drowning the low areas. Hence, the effort on reducing the excessive carbon emission in the atmosphere and fixing the carbon in plants have been globally done which is through photosynthesis as mentioned by Nimbalkar et al., (2017).

Technically, the forest ecosystem did play an important role in mitigating the carbon emission but, the agricultural system also cannot be ignored as there is vast change in crop production nowadays as an example is mango production. Mango or its scientific name *Mangifera indica* L. belongs to the Anacardiaceae family, a fast-growing tree with an evergreen canopy. Mango trees are usually between 3 to 10 m, but they can reach up to 30 m tall with a diameter up to 100 cm. As studies on carbon stock for agricultural systems are quite limited, accurate estimations are difficult to be obtained. Naik et al., (2019) stated that, even though various forest plants such as *Populus deltoids*, Acacia, *Eucalyptus*, *Grewia optiva*, *Dalbergia sissoo*, and *Tectona grandis* have had their biomass and carbon storage quantified using diameter at breast height (DBH) in various growth models, but this practice is only common in forestry, not in agricultural system. Thus, a better understanding on carbon stock especially for mango trees is needed in order to find the best allometric equation that could be used to estimate the carbon value.

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