

RELATIONSHIP OF SOIL MOISTURE AND SOIL TEMPERATURE  
FOR HARUMANIS TREE HEALTHINESS USING GRAVIMETRIC  
METHOD AND UNMANNED AERIAL VEHICLE (UAV)  
MULTISPECTRAL

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**Thesis submitted to the Universiti Teknologi MARA Malaysia  
in partial fulfilment for the award of the degree of the  
Bachelor of Surveying Science and Geomatics (Honours)**

**AUGUST 2023**

## DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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## ABSTRACT

Harumanis plantation growth depends on several factors including soil moisture content, soil temperature, soil nutrients, etc. The Harumanis mango variety is quite sensitive to weather conditions, especially when it comes to flowering and fruiting. These critical stages in its growth cycle require a prolonged period of dry weather. The lack of enough moisture in the soil reduced the availability of water for the mango trees, causing stress and obstacles in the tree's growth and development. Thus, this research aim to assess the relationship between the soil moisture and soil temperature on Harumanis healthiness. In this research, the soil moisture content has been extracted using a gravimetric method, while soil temperature has been collected using a soil temperature instrument. The sample data was collected from two plots which are Plot A and Plot C in UiTM Perlis Harumanis plantation area, where plot A with an estimated area of 216m x 93m consists of 212 trees, and Plot C with an estimated area of 283m x 75m consists of 260 trees. The soil samples have been collected using the soil coring method. Around 55 soil samples from Plot A and 75 soil samples from Plot C have been collected. The soil moisture content and soil temperature data were then interpolated and mapped using the Inverse Distance Weight (IDW) interpolation method. The results show that the soil temperature ranges from 26.1°C to 27.9°C, which is a suitable temperature for the flower development to continue growing. Meanwhile, the highest soil moisture content is 24.1% and the lowest content is 9.7%. This value indicated that the area ranges from severely dry soil to dry/well-drained soil. Most tree species require around 21% to 40% soil moisture levels. Thus, the Harumanis tree in severely dry soil might require a proper watering system to ensure the tree's healthiness and good quality crop. The relationship of soil moisture, and soil temperature with NDVI showing not significance with only 1.75% of the variation NDVI can be described by soil temperature and only 0.4% of the variation NDVI can be described by soil moisture. This indicates a very weak relationship between NDVI with soil moisture and soil temperature.

**Keywords:** Soil Moisture, Soil Temperature, Gravimetric Method, Soil Coring Method, IDW, NDVI

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