

**UNIVERSITI TEKNOLOGI MARA**

**SYMPODIAL ORCHID WATER  
STRESS DETECTION VIA STEM**

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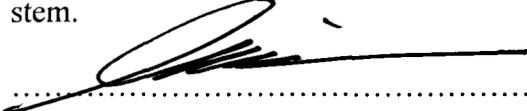
**MSc**

**May 2014**

## AUTHOR'S DECLARATION

I declare that the works in this thesis were carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own works, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted to any other institution or non-academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## ABSTRACT

The measurements of stems play an important indicator for plants' water status. Many researches have been done in terrestrial plants to investigate the stems' variation responses that inspired to develop a precise irrigation system. Hence, the works presented in this thesis were the investigations of the stems' variations in epiphyte plants which were sympodial orchids using PIC based instrumentation sensors. A strain gauge was used as a sensor to measure the orchid's stem variation for a duration of 25<sup>th</sup> October 2012 until 27<sup>th</sup> November 2012 and from the 3<sup>rd</sup> December 2012 until 19<sup>th</sup> December 2012. The other sensors were used for humidity, temperature and light measurement integrated with PIC instrumentation circuit. The Dendrobium orchid that grew from tissue culture was chosen as a sampling plant due to its popularity and demand as a cut flower in the world. Two experiments were executed within 30 days and 16 days respectively, which had involved 14 samples of orchid plants growing indoor and outdoor. The measurements were recorded every 15 minutes continuously along the experiments executed. The 2 mm aluminium strain gauge and its signal conditioning that integrated with PIC produced a significant correlation at 0.99 between its output and the changes in displacement. The results showed that the proposed instrumentation was capable to detect the stem's diameter changes and those studies have had significant impacts for triggering further researches in the developments of precise watering systems in orchid farms.

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