

UNIVERSITI TEKNOLOGI MARA

**CHARACTERIZATION OF
CASSAVA STEM AND ITS
POTENTIAL AS LAMINATED
PRODUCT**

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Msc

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any 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 lack of wood supply and higher demand for wood product has encouraged the researchers to find alternative materials for wood composite industry. Cassava (*Manihot esculenta*) stem from agricultural waste is a potential alternative to become a value-added product. The cassava stem was regarded as waste and burned when its tuber is being harvested. It was great idea to use cassava stem as laminated product. This research is aim to investigate the fundamental characteristics of cassava stem at different sections along the height and evaluate its relations on adhesive bonding performance due to lack of information for composite production. The fundamental characteristics (microscopic and macroscopic characteristics, chemical, mechanical) and surface properties (pH, buffer capacity, wettability and surface roughness) were investigated and analysed. In adhesive bonding performance as laminated product, the shear and delamination test were conducted. SEM observation shows that the bottom and middle sections had higher amounts of starch. The bottom section is more preferable for laminated products due to its macroscopic characteristics. Holocellulose content mostly showed no significant differences in terms of difference sections. Meanwhile, the average results of mechanical properties which were flexural modulus of elasticity (MOE), flexural modulus of rupture (MOR), for compression of parallel and perpendicular to the grain were 5.01 N/mm², 359 N/mm², 23.28Mpa and 2.0 N/mm², respectively. The average value of pH, alkaline and acidic buffer capacity were pH 5.59, 0.89 m.e and 3.17 m.e. While, for contact angle of cassava stem using distilled water and MUF adhesive were 53.59° and 82.3°. Shear and delamination tests were also found in an increasing pattern from the bottom to the top sections. The average value for shear strength were 6.1Mpa, 5.24 Mpa and 3.67Mpa respectively. Meanwhile, the delamination rate were 7.35%, 6.29% and 5.55% respectively. It has passed JAS standard. Furthermore, the results revealed that there were no significant differences for delamination in all sections. It is hoped that the findings from this study can contribute to the new body of knowledge and value- added to agriculture wasted residue.

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