

UNIVERSITI TEKNOLOGI MARA

**MECHANICAL AND PHYSICAL
PROPERTIES OF SUGARCANE
BAGASSE PARTICLEBOARD**

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ABSTRACT

Agricultural waste such as sugarcane bagasse is abundant in Malaysia and usually used as combustible material for energy supply in the sugar factory. In this study, sugarcane bagasse was used as raw material in the manufacturing of particleboard and the basic properties were determined. TAPPI standard used to determine the chemical properties of sugarcane while European standard (EN) used to determine the mechanical and physical properties of bagasse particleboard. The chemical analysis of bagasse were 18.64% for hot water solubility, 41.25% for 1% NaOH solubility, 21.22% for lignin content, 0.95% for ash content, 75.85% for holocellulose and 54.25% for alpha cellulose content. The sugarcane bagasse particleboard is manufactured at three density levels (450 kg/m^3 , 550 kg/m^3 and 650 kg/m^3), two resin contents (10% and 12%) and with (1%) or without wax addition. The boards were tested for mechanical properties (MOR, MOE and IB) and physical properties (WA and TS) conforming to the European Standard. The results revealed that board with density 650 kg/m^3 gave superior strength compared to the board with density 450 kg/m^3 and 550 kg/m^3 . From the test, the highest mechanical properties obtained from board was the one with density 650 kg/m^3 , 12% of resin content and without wax addition. The values were 9.87 MPa for MOR, 1582.20 MPa for MOE and 2.70 MPa for IB value. Addition of wax (1%) improved water repellency of board. For the WA values, the highest was 73.54% which is board with density 450 kg/m^3 , 10% resin content and without wax while the lowest (29.45%) was board with density 650 kg/m^3 , 12% resin content and with wax. It shows that the effect of density is highly significant to all the mechanical and physical properties. WA and MOR values were significant while other tests were no significant to resin content effect. Wax content effect was highly significant on WA and TS but insignificant effect on mechanical properties. Finally, IB value met the EN standard while other board properties were close to meet the standard.

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