

UNIVERSITI TEKNOLOGI MARA

**PROPERTIES OF HIGH MOISTURE
RESISTANCE PARTICLEBOARD
FROM *Leucaena leucocephala***

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ABSTRACT

Alternative way to encounter the shortage of raw material for particleboard manufacturing is by using forest plantation species. A study on *Leucaena leucocephala* wood, as a raw material in Malaysia for the particleboard industry was conducted on the fast growing species and recycled materials. This study investigated the physical and mechanical properties of particleboard with variables of density, resin content and particle size using melamine urea formaldehyde glue. Particle recovery, bulk density and buffer capacity in acidic and alkaline environment were analysed. Physical and chemical properties for *Leucaena leucocephala* tree were determined based on TAPPI standard. Meanwhile mechanical and physical properties were tested according to BS EN standard for particleboard. From this study, the analysis revealed that tree portion significantly effect on chemical properties. In manufacturing of particleboard, density, resin content and particle size showed significant effect on mechanical and physical properties. The best performance was *Leucaena leucocephala* particleboard with density of 800 kgm^{-3} , resin content 14% and particle size of 2.0 mm. The MOR and MOE was 4183.64 MPa and 27.84 MPa respectively. Internal bonding and cyclic test pass BS EN standard. The optimum board treatments were on T5. The analysis proved that *Leucaena leucocephala* is suitable to be use as a raw material for high moisture resistance board using melamine urea formaldehyde (MUF).

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CHAPTER ONE

INTRODUCTION

1.1 General

A composite defined as two or more different type of materials that are combined together to create a superior and unique material (Bhargava, 2012). This is extremely broad definition holds true for all composites (Kandpal, 2016). The history of composite seen in the ancient times used straw mixed with the mud to form the building material known as bricks or board.

In wood industry, the terms composite refers to the combination of material from reconstructed wood bonded together with adhesives. The common types of adhesive used are urea formaldehyde (UF), melamine formaldehyde (MF), melamine urea formaldehyde (MUF) and phenol formaldehyde (PF). These composites require specific temperature to be bonded. According to Brent, Youngquist and Krzysik, (1994), engineered product normally known as wood-based composites is the wood from plants that have lower quantity, smaller of diameter and faster growth that can be more environmentally appealing.

Particleboard is defined as wood that change into particle size, bonded together with resin and compressed at high temperature to became a panel product (Youngquist, 1999). Particleboard or also known as chipboard is preferred because of its durability, suitability and better consistency of quality for making furniture, wall, cabinets, kitchen and flooring (Salthammer, 2010).

1.2 Particleboard Industry in Malaysia

Nowadays, in Malaysia the demand of particleboard as panel product is increasing by the market growth. According to Oggiano, Agelini and Cappelletto, 1997, fast growing species is becoming popular material for making particleboard. The consumption of wood from fast growing species is increased and demand of wood chips had increased (Whiteman and Brown, 2000). Ministry of International Trade and Industry (MITI, 1990), mentioned that wood based industry in form of panel board aims