

UNIVERSITI TEKNOLOGI MARA

**PROPERTIES OF MELAMINE UREA
FORMALDEHYDE
PARTICLEBOARD MADE FROM
NEOLAMARCKIA CADAMBA AND
*LEUCAENA LEUCOCEPHALA***

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ABSTRACT

Basic wood properties and particleboard properties made from two fast growing species, *Neolamarckia cadamba* and *Leucaena leucocephala*, with three different particle size and bonded with melamine urea formaldehyde resin were studied. The physical and chemical properties of *Neolamarckia cadamba* and *Leucaena leucocephala* wood were determined according to Technical Association of the Pulp and Paper Industry (TAPPI) standards. Furthermore, the bending strength, internal bonding strength and dimensional stability of particleboard were tested based on European Standard. The results show that, species and tree portion were found to significantly affect the physical and less significant on chemical properties of wood. For particle analysis, species and particle size have a significant effect on bulk density. Species and tree portion were found to be significantly affect the specific gravity and moisture content for both species. In particleboard manufacturing, variable of species mixing, particle size and resin content were found to significantly affect the physical and mechanical properties of particleboard. From the results, it shows that all the particleboards mechanical properties meet the minimum requirement standard value. All the TS values were found higher than the maximum value set in BS EN standard requirement. In addition, the water absorption of particleboards, generally, was higher than 60%. Particleboard made from *Neolamarckia cadamba* with particle size 2.0mm and 14% resin content has the highest value of mechanical properties with MOE (3978.79MPa), MOR (32.21MPa), IB (1.16MPa) and IB from cyclic test (0.52MPa). For physical properties, particleboard made from *Neolamarckia cadamba* with particle size 2.0mm and 14% resin content has the lowest percentage in TS (11.77%) and WA (63.18%). Correlation coefficient of physical and chemical properties were found to be less significant on particleboard properties. This study proved that particleboard made from both species meets the European Standard minimum requirement except TS and can be used in particleboard manufacturing with some additional improvements especially on dimensional stability aspect. These two fast growing species can be benefited and utilized as an alternative raw material in Malaysian particleboard industry in order to expand and sustain the wood materials supply.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

A composite can be defined as two or more elements held together by a matrix. Composite term has been used to describe woody materials bonded with adhesive (Berglund and Rowell, 2005). Wood composite products varies from laminated beams and components to fiberboard, including panels for both interior and exterior uses, furniture components, and support structures in buildings. According to Cai and Ross (2010), wood composite materials were categorized into different panel products such as particleboard, oriented strand board (OSB), plywood, fiberboard, medium-density fiberboard (MDF), hardboard, such as, structural timber products such as laminated strand lumber, laminated veneer lumber (LVL), glued-laminated timber (glulam), parallel strand lumber, wood and non-wood composites such as inorganic bonded composites and wood fiber thermoplastics. According to Norcahaya (2011), wood composites can be divided into two groups which are conventional composite such as plywood, particleboard, fibreboard, cementboard and advance composite, namely, natural fibre polymer composite (NFPC). Wood-based composites offer uniform and predictable in-service performance, largely as a consequence of standards used to observe and control the manufacturing process, in spite of the raw material used in their manufacture (Cai, 2006).

Wood composites from waste wood has been increasing in demand as timber resources in natural forests decline (Vanchai, 2010). Wood composites produced in large quantities that are not used in wood construction are particleboard and MDF. They are most commonly used for indoor, nonstructural applications such as in furniture (Berglund et. al., 2005). Particleboard has been defined as generic term for a panel manufactured from linger cellulosic materials, usually wood, combined with a synthetic resin or other suitable binder and bonded together under heat and pressure in a hot press by a process in which the entire interparticle bond is created by the added binder, and to which other materials have been added during manufacture to improve certain properties (Rocket, 1997).