

**EXTRACTION OF LIGNIN FROM *LEUCAENA LEUCOCEPHALA* PODS BY
FORMIC ACID FRACTIONATION PROCESS**

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ABSTRACT

Lignocellulosic biomass has been acknowledged for potential use to produce chemicals and biomaterials. This part of plant composed of three components known as cellulose, hemicellulose and aromatic biopolymer of lignin. In plant, lignin fills the spaces in the cell wall between cellulose and hemicellulose. In this study, lignocellulosic samples of *Leucaena leucocephala* pod underwent fractionation process with 85% formic acid at ratio 10:1 of liquid to solid to extract lignin content. Different development stages of samples were categorized based on size of the seed at 4 mm, 5 mm, 6 mm, 7 mm, 8 mm, 9 mm, 10 mm and fully matured. The effect of treatment process with formic acid on structure of lignin was investigated by using Fourier transform infrared spectrometer (FTIR) and x-ray diffractometer (XRD). Based on structural analysis, lignin extract derived from this experiment showed similar characteristics with lignin obtained from other sources. The objective of this research work was to investigate the potential effect from development stage of *Leucaena leucocephala* pod on lignin yield and the effect of strong acid treatment (85% FA) on the structure of lignin. It was found that 10 mm samples yield the highest amount of lignin in throughout the study.

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CHAPTER I

INTRODUCTION

1.1 Research Background

According to Tan (2009), many research had been focused on lignocellulosic substances for their capacity as starting materials for biofuels and different commodity chemical substances. Agricultural wastes offer economical supply of lignocellulosic biomass which can be transformed into many products. The carbon-based polymer of cellulose, hemicellulose and lignin offers rigidity in vascular and support tissues such as xylem, vessel elements and sclereid cells. Collectively, these subunits called lignocellulosic biomass (Sanderson, 2011). Lignin fills the distance among cellulose and hemicelluloses, and cross-links with hemicellulosic polysaccharide particularly thru covalent bonds (ether and ester) and phenyl glycosidic linkages (Buranov & Mazza, 2008). As a natural and renewable raw material with great chemical and physical properties, lignin's substitution potential extends to any product currently sourced from petrochemical substances.

Malaysia has a tropical equatorial climate, with high temperatures and wet months throughout the year. Temperatures range from 21°C to 32°C and receives annual rainfall varies from 2,000 mm to 2,500 mm provides optimum conditions for *Leucaena leucocephala* plants to grow year-round. Here in Malaysia, *Leucaena leucocephala* trees are known as Petai Belalang. These plants provide various functions to ecosystem as well as to human being. The seeds are edible and can be used to cure multiple diseases such as diabetes and high blood pressure