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COMPREGNATED OIL PALM TRUNK (*Elaeis guineensis* Jacq.) WITH 20% DAMMAR RESIN (*Agathis dammara*)

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ABSTRACT

The quality increasing of oil palm trunk (*Elaeis guineensis* Jacq.) by compregnated with dammar resin (*Agathis dammara*) has been performed. Cellulose as a natural polymer of the oil palm trunk interacted with dammar resin and the mechanical properties of the oil palm trunk was increased. OPT compregnate with dammar resin was performed in vacuum compregnator. The temperature of compregnate was room temperature with 0 %, and 20 %, concentrations of dammar resin. The compregnated oil palm trunk was analyzed by measurement of mechanical analysis of Modulus Elasticity (MoE) and Modulus Rupture (MoR), functional groups analysis by Fourier Transform Infra Red (FT-IR). The result showed that differences in OPT and compregnated OPT, the compregnated OPT has increasing of mechanical properties of Modulus of Rupture and Modulus Elasticity.

Keywords: *Compregnate, Oil Palm Trunk (OPT), Dammar Resin, MoE, MoR*

INTRODUCTION

In general understanding of the wood is a material obtained from the collection of trees in the forest, which is part of the tree after deduction which parts are more able to be used for the purpose of use. Chemical components in the timber is of significant importance, because it determines the usefulness of something kind of wood. Chemical composition of wood used as an identifier resistance against wood destroying wood. In general, the chemical components of wood consists of three elements, namely:

- Elements of carbohydrates composed of cellulose and hemicellulose
- The non-carbohydrate composed of lignin
- Elements deposited in the timber during the growth process called extractive substances (Akhirawati, 2004).

Timber plantations of oil palm is a tall plant that can reach 7-13 meters and the diameter of the trunk reaches 45-65 cm. oil palm wood has parenchymal tissue and has fiber. The content of parenchyma increased in the higher part of the trunk. Parenchyma palm trees that the top containing starch to 40%. Getting up and getting into the water content and the content

of the oil palm wood parenchyma higher density while decreasing (Hasibuan, 2002). Oil palm trunk (OPT), has been identified as one of the potential biomass for wood-based industry. It is generated every year at the rate of 700,000 ha/year or 9 million trees/year (Loh, 2011).

History background compress wood known by the trade name of Lignostone is the first product in Germany in 1930. There are two methods that have been developed in the United States as the production of wood products compress, called compregnate (Stamm and Seborg 1941) and Staypack (Seborg 1962), both of which were developed at the Forest Products Laboratory in Madison (Sulaiman, 2012).

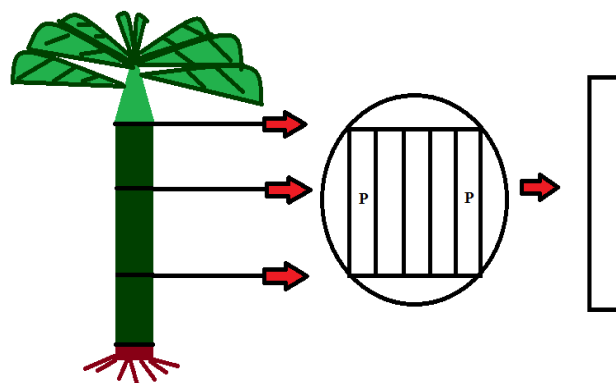
In the producing regions, resin is used as material for lighting and caulking boats. Traditionally, also traded as incense resins, dyes, adhesives and drugs. In the mid-nineteenth century and, along with the development of varnish and paint industry in Europe and America and was followed by Japan and Hong Kong, resin began to acquire new economic value. But since the 1940s, amber gets strong competition from synthetic resin petroleum processing results (petrochemical) industry preferred (Michon, 2000).

METHODOLOGY

Samples. The material that used in this researched was oil palm trunk that source from CIKAL University of North Sumatera, Medan and the dammar resin was usual dammar and methanol of Brataco Chemica.

Instrument. This researched was used compregnator and vacuum pump, instrument of mechanical analysis and instrument of functional group analysis.

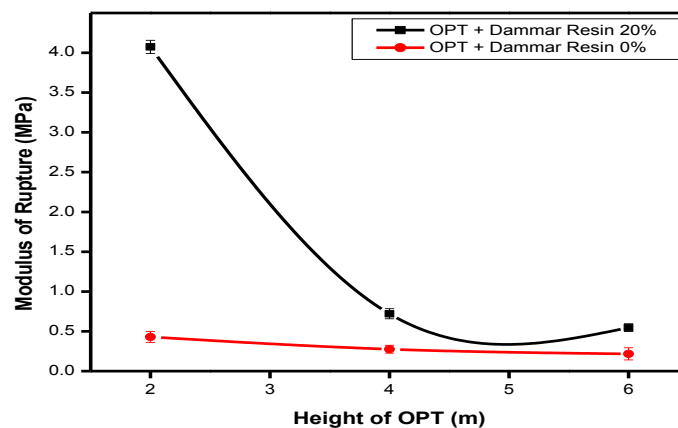
The Procedure to Make the Sample of Oil Palm Trunk (OPT). The OPT radially difference outside, middle, and nucleic, that used in this research use outside of OPT showed in Figure 2.1, dried outside along 30 days. Speciment cut like ASTM D360. The specimen dried in vacuum oven at temperature 40oC until get constant weight.



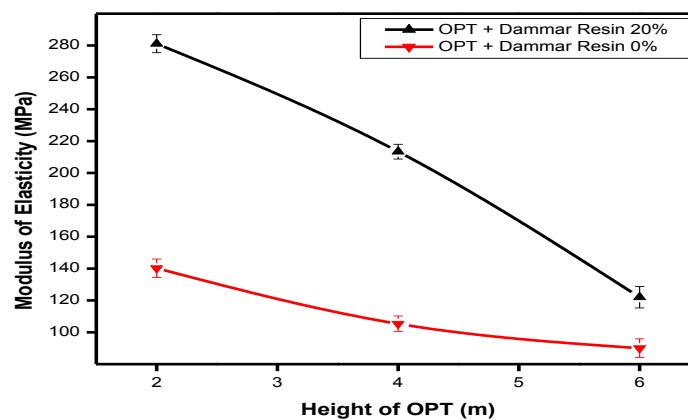
Procedure of Dammar Resin. At this stage as much as 20 grams of powdered dammar dissolved in 80 grams of methanol. Stir until dissolved. Precipitated overnight and filtered to create a 20% dammarresin. Preparation phase begins with the oil palm wood drying process until constant weight of oil palm wood, manufacture of dammar resin and oil palm wood compregnated with 20% dammar resin. Table 3. Decision Matrix of CRO for Three-Tier Disgnostic Test

Mechanical analysis. The purpose of testing is to determine the impact strength toughness of a material to dynamic loading so it can be a substance that tested fragile or robust. on this test sample taken at both ends of the fulcrum, then sledgehammer (dynamic load) is released suddenly and quickly towards the sample (Rusphiandri, 2001).

Analysis of Functional Groups. In FTIR, infrared radiation is passed in the sample. Most infrared radiation is absorbed by the sample and the others passed. If the frequency of of a specific fibrasi equal to the frequency of infrared radiation directly to the molecule, the molecule will absorb the radiation. (Hermanus, 2012).



(a) Mechanical Analysis of Modulus Rupture (MPa) of compregnated OPT with 20% dammar resin



(b) Mechanical Analysis of Modulus Elasticity (MPa) of compregnated OPT with 20% dammar resin

Figure 1. Curve Analysis Mechanical tests MoR (a), MoE (b), and the stress vs. strain curve (c).

RESULT AND DISCUSSION

Compregnated OPT tested with mechanical analysis and analysis of functional groups by FT-IR. In Figure 1 we can see that the difference in modulus of rupture, modulus of elasticity and strain vs. stress on oil palm wood before treatment with OPT which have compregnated with dammar resin, the largest of modulus of rupture occurs in compregnated with dammar resin at a height of 2 meters, the largest elastic modulus occurs in compregnated with dammar resin at a height of 2 meters and the largest stress vs. strain curve occurs at compregnated OPT with dammar resin with a height of 2 meters.

CONCLUSION

OPT that compregnated increased mechanical properties include modulus of elasticity and modulus of rupture compared with the OPT before compregnate. Results of analysis of functional groups before treatment and compregnate OPT by FT-IR showed no shift in the wave number of the case, only a reduction of the broad peak, which indicates the presence of any physical interaction, after the extraction

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