UTILIZATION OF KAONG "KABONEGRO" FIBER-REINFORCED PARTICLE BOARD USING SAWDUST AND CORNSTARCH AS BINDER

Design Project

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June 2019

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Undergraduate Design Project
Submitted to the Faculty of the
College of Engineering and Information Technology
Cavite State University
Indang, Cavite

In partial fulfilment
of the requirements for the degree
Bachelor of Science in Civil Engineering

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June 2019

ABSTRACT

CELLS, MARK FRANCIS A. and DE OCAMPO, ALVIN NOEL S. Utilization of Kaong "Kabonegro" Fiber-Reinforced Particle Board Using Sawdust and Corn Starch as Binder. Undergraduate Thesis. Bachelor of Science in Civil Engineering. Cavite State University, Indang, Cavite. June 2019. Adviser: Engr. Cene M. Bago.

Kaong or Sugar Palm (Arenga Pinnata) is a multipurpose palm species from which a variety of foods and beverages, timber commodities, biofibres, biopolymers, and biocomposites can be produced. Kaong kabonegro fiber can be considered as resilient and durable fiber because it has been used as a roofing material which sustains tropical climate and it is known as a seawater-resistant fiber. These fibers are highly durable, resistant to the sea water and because they are available naturally in the form of woven fiber they are easy to process. However, its potentiality and application are limited by its original form and physical appearance. The main objective of the study was to determine the effect of kaong kabonegro fiber on physical and mechanical strength of fiber reinforced particle board.

The highest strength of a single strand of kabonegro fiber was observed from a straight untreated black fiber that held 157.6667 grams before rupture. Through water absorption test, the researchers identified that the kaong kabonegro fiber can absorb 123.50% of water. Three treatments were conducted (3%, 4%, and 5%) and the results revealed that the treatment that have higher amount of fiber, gained the highest physical and mechanical strength strength, while the treatment with 3% of kabonegro fiber obtained the least strength. Utilization of kaong kabonegro fiber as reinforcement for particle board using cornstarch as binder yielded insignificant results in terms of increasing the mechanical strength of the particle board.

The study aimed to produce a product from kaong kabonegro fiber, to determine if kabonegro fiber can be used as a substitute for wood shavings in producing particle board, to determine if kabonegro fiber can be an effective substitute for wood shavings in producing particle board and to test the strength of kabongero fiber as component for making particle board.

The largest and lowest diameter of the kaong kabonegro fiber were 113 micrometer and 383 micrometer respectively, with an average diameter of 225 micrometer. The texture of the fiber is slightly rough, cylindrical in shape, light in weight and had a dark brown-black color. The kaong kabonegro fiber can hold up to 157.6667 grams of coins and achieved a tensile strength of 38.90 Mpa.

In all physical property tests, increasing the amount of fiber for all mix design resulted to an increasing value of each property. The thickness swelling and moisture content attained the required value of Philippine National Standard (PNS) with the value of 9.98% and 8.25% respectively. However, the density and water absorption failed to achieve the said standard. For mechanical tests, generally, the greater the amount of fiber used for all mix designs produced a higher value of the property. The MD3 have a value 36.86 kg/cm^2 in modulus of rupture attained the required value of Philippine National Standard (PNS). However, the nail-head pull through and screw holding strength failed to achieve the said standard.

Since highest kabonegro fiber reinforced occurred in third treatment, future researchers are encourage to conduct a study utilizing varying percentage of kabonegro fiber in their mixtures higher than 5% for physical and mechanical tests. Since the researchers used 3%, 4% 5 % mixture percentage of the kabonegro fiber for the study,

further studies are encouraged to use alternative design mixtures and proportions with other materials. In addition to this, they are recommended to consider the use of binder (to alter setting time, reduce the w/c ratio or improve particle board's strength)

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An undergraduate thesis manuscript submitted to the faculty of the Department of Civil Engineering, College of Engineering and Information Technology, Cavite State University, Indang, Cavite in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering with Contribution No. CEIT-2018-19-2-229. Prepared under the supervision of Engr. Cene M. Bago

INTRODUCTION

Particle board has been in used since 1940's, by the Germans and spread all over the world, up until now. It is created as a substitute for the expensive ply board. Particle board is a non-structural panel product which is produced from industrial wood residues such as shavings, sawdust, plywood trim and chips that can be produced from logs or trees. It is bonded together with a synthetic adhesive under pressure (Michael Pollick, 2014). Particle boards are made for floor and ceiling construction and industrial use for making furnitures, cabinets, and countertops.

Under economic analysis, people worldwide are always dealing with searching and developing materials to sustain their needs and to learn about new discoveries. By the non-stop improving of materials, the field of engineering is one of the raging field that focus to discover, develop, and innovate materials to most functional modern