CERTIFICATE

Presented to

Kartika Sari

in recognition and appreciation of your contribution as

Presenter

with a paper entitled:

"Mechanical Properties of the Palm Fibers Composite (Arenga Pinnata)"

Soedirman's International Conference on Mathematics and Applied Sciences

on October 20 - 21, 2021, Universitas Jenderal Soedirman

Dean The Faculty of Mathematics and Natural Sciences

Drs. Sunardi, M.Si

Conference Chair

Jamrud Aminuddin, Ph.D

MECHANICAL PROPERTIES OF THE PALM FIBERS COMPOSITE *(Arenga Pinnata)*

Yazid Zainur Isnen[1], Kamila Fatma Adira[1], Arifin Nur Muhammad Haryadi[1], Nur Khusaenah[1], Kartika Sari[1,*]

[1]Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Jenderal Soedirman, Purwokerto 53123, Indonesia

[*]E-mail: kartika.sari@unsoed.ac.id (corresponding author)

Abstract **–** Composite is a combination of two or more materials of reinforcement and matrix in which the carrier properties of the constituent materials still exist. The developing composite technology can be supported by constituent materials, reinforcing materials such as fibers that are most widely used to give new properties of composites. One type of fiber that can be developed is natural fibers. Natural fibers commonly used to form composites are palm fibers because these materials are still abundant and easy to obtain. In this research, the fabrication and characterization of mechanical properties of fibers reinforced composites were carried out. The test parameters were used tensile test and bending test on 2 mm composites with fibers 0%, and 2.5% fiber volume fraction. The results of the tensile test are stress and strain values. The stress results in the 2 mm composite of tensile test with 0% and 2.5% fiber volume fraction was 2.64 MPa and 6.29 MPa.The strain results are 1.06% and 4.59%. The results obtained in the bending test are the stress value and the deflection value. The value of stress in the 2 mm composite bending test with 0% and 2.5% fiber volume fraction is 6.35 MPa and 10.85 MPa. The deflection values obtained were 1.45 mm and 7.35 mm. Based on the results obtained, it can be concluded that the composite with 2.5% fiber volume fraction has the optimum value.

Keyword: *composites, mechanical properties, stress, strain, natural fibers, deflection*

1. INTRODUCTION

Composite is a combination of two or more materials that still has their constituent properties [1]. Composite formation elements consist of reinforcement and matrix, both parts have their own characteristics. Combination of both materials is expected to complete each constituent material properties so it produces an improved material. The benefit of composite is light weight, rigid, and high durability [2]. The uses of fiber as a reinforcement can make composite that has a maximum strength and rigidity. The matrix functions as a fiber barrier so the fibers are united, distribute the weight and be a wrapper [1,2].

Fiber function as a power buffer in composite structure, the initial weight that go through a matrix pass the fiber, so that the fiber must have a higher tensile strength and elasticity than the matrix [3]. The fiber uses as a composite reinforcement material is expanding, especially those that are being developed are natural fibers. The benefit of natural fiber is cheap, light weight, have a good thermal properties, high toughness, not irritating, have relatively high specific mechanical properties and biodegradable. Natural fiber such as palm fiber (*Arenga pinnata Merr*) is one of fiber that is potential to be developed as composite reinforcement [4].

Palm fiber has a high mechanical properties and abundant availability make this fiber potential to develop as a reinforcement composite [4]. Palm fiber production nationally reaches 14.000 tons per month or 165.000 tons per year [5]. Palm fiber has a diameter range starting from 99 μm to 400 μm, often in 250 – 400 μm. Palm also has an advantage is high durability, slow down the weathering, resistance to acids and sea salt water and can prevent termite [5,6]. High mechanical properties and the advantages in palm fiber make it potential as reinforcement composite.

Fiber-reinforced composite structure can be divided to: continuous fiber composites, woven fiber composites, chopped fiber composites, and hybrid composites. Composite in general used for many needs such as automotive, aviation, marine, and architecture. Composites are also widely used in consumer products such as skis, golf clubs, and tennis rackets [1].

Previous research conducted by Sudarisman (2020) about pressure and impact test for palm fiber-reinforced polymer composite soaked in NaOH 5% resulted in bending strength with polyester resin 25,17 MPa and epoxy resin 16,43 MPa. The strain values obtained were 55.8 percent and 34.0 percent for polyester resin and epoxy resin.