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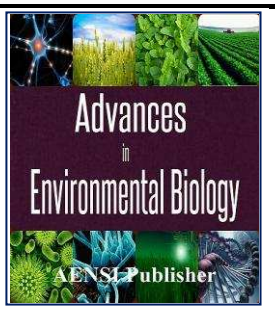

The Investigation of Mechanical Properties on Natural Fiber Composites for Recurve Bow Material Selection

[1]F.A. Fauzi, [1]Z. Ghazalli, [1]J.P. Siregar, [2]Z. Taha, [1]K. Kadirgama, [1]N.H. Johari

[1]Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia,
[2]Faculty of Manufacturing Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia,

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ABSTRACT

Substitution of synthetic fiber composites with natural fiber in the applications such as automotive and construction are increasing. However, the usage of natural fibers in sports applications are still in its infancy stage. In this paper, the investigation of mechanical properties of the untreated and treated short kenaf fiber, pineapple leaf fiber (PALF) and mengkuang fiber reinforced epoxy composites were presented. These fibers were treated using sodium hydroxide (NaOH). The NaOH concentration were varied from 1%, 3% and 5%. The mixture of natural fibers reinforced composites were poured into the glass mould and left to dry in a room temperature for 24 hours. The fibers were soaked in 1%, 3% and 5% NaOH concentration and was dried in aging oven. Results showed that tensile strength and flexural strength increase with increasing NaOH concentration. It was concluded that kenaf fiber, PALF and mengkuang fiber have different optimum NaOH concentration

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INTRODUCTION

The substitution of synthetic fiber with various natural fibers have increased the interest of many researchers after the attempts on substituting automotive parts were greatly success. In addition, the added-value of this fiber such as biodegradable, renewable, low cost and lightweight make it more noticeable [1, 2]. Kenaf fibers (*Hibiscus cannabinus, L. family Malvaceae*), pineapple leaf fiber (*Ananascomosus*) and mengkuang fiber (*PandanusAtrocarpus*) are some of the natural fibers that have high commercial potential and are widely cultivated in Malaysia. Despite of the hydrophilic nature of the natural fibers, their mechanical properties may be enhanced through interfacial treatment. Nonetheless, the usage of natural fibers in various applications such as sports, automotive and constructions are restricted because only fibers with strength properties were selected. Wood, flax, bagasse, hemp, kenaf and abacca are the examples of fiber that have an opportunity to be applied on various applications [3]. However, further study need to be conducted on these types of natural fibers. More types of natural fibers must be tested, so that the number of natural fibers used in various applications can be increased. Furthermore, the reinforcement of natural fiber with thermosetting polymer such as the reinforcement of unidirectional kenaf fiber/epoxy, Palmyra palm leaf stalk fiber/jute fiber/ polyester, woven coir fiber/polyester, bamboo/polyester [4-7].

Many researchers presented their works related to properties of the natural fiber composites. Yan *et al*. [8] studied the effect of alkali treatment of flax, linen and bamboo single-strand yarns on their mechanical properties. Mylsamy and Rajendran[9] studied the effect of alkali treatment and fiber length on short Agave fiber/epoxy hand lay-up and compression mould technique. The study shows that alkalization process using 5% NaOH concentration increase the mechanical behavior of the fiber. Kenaf/glass fiber produce a similar flexural strength, flexural modulus, Young's modulus and tensile strength with glass mat thermoplastic (GMT), material used for car bumper manufacturing [10].

The objective of this paper is to investigate the effect of different NaOH concentration on mechanical propertiesof the kenaf fiber, pineapple fiber (PALF) and mengkuang fiber composites. The tensile properties and flexural properties of the untreated fiber, 1%, 3% and 5% NaOH concentration are discussed in this section

Corresponding Author: F.A. Fauzi, Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang DarulMakmur, Malaysia.
Tel: +6013-6394126; E-mail: farahayunifauzi@gmail.com