



Biodegradability Testing of Artocarpus Lakoocha fluid and Sterculia Villosa fiber composite

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Abstract—A study was carried out for preparing the composites of *Sterculia villosa* fiber and *Artocarpus Lakoocha* Fluid from the bark of the tree. The Tensile Strength of the fiber was found to be around 1070 MPa. The bark of the *Artocarpus Lakoocha* is soaked in the water (in the ratio of 1 Kg of bark: 3 Liter of water) and kept there for 48 Hours in order to extract the maximum fluid from the bark. The liquid is then boiled with Continuous stirring till it become thick concentrated sticky substance which is dark reddish brown in color. Now thereafter a Biodegradability tests were carried out under different conditions. It was observed in the underground section of the test composite that the rate of degradation of the fiber component was faster than the aerial part of the fiber.

Keywords—*Sterculia villosa* fiber, *Artocarpus Lakoocha* fluid, Tensile Test, Biodegradability tests.

Introduction

Natural fibers come from renewable resources and are relatively inexpensive. These fibers are now well recognized to impart good reinforcing capability to composites. While their tensile strengths and moduli are generally inferior to those of polymeric fibers, they often exhibit significantly larger elongation giving them better damage tolerance. The objective of this work is to test the Biodegradability of *Artocarpus Lakoocha*[1] fluid and *Sterculia Villosa*[2] fiber composite.

Composite Preparation

The bark of the *Sterculia Villosa* is taken out of the tree; the topmost portion of the bark is sliced out and the inner fiber material is retained, it is then dried out in the sun. Small fiber strand are made by tearing the bigger fiber band to a smaller pieces as shown in the below figure:2



Fig:1 Sterculia Villosa Fiber band

The bark of the *Artocarpus Lakoocha* is taken out of the tree, it is then immersed in the water (in the ratio of 1

Kg of bark: 3 Liter of water) and kept there for 48 Hours in order to extract the maximum fluid from the bark.(Figure:3)



Fig:2 Extraction of Lakoocha fluid

It is then taken out and the liquid is filtered to remove the dirt particles from the water solution. The liquid is then boiled and stirred continuously till it become thick concentrated sticky substance which is dark reddish brown in color.



Fig:3 Sticky concentrated Lakoocha fluid

It is found that preparing 50 gram of concentrated Lakoocha fluid requires 1 Kg of Lakoocha bark.

PREPARATION OF SAMPLE IN BAMBOO MOULD

Mould is made from cylindrical bamboo (*Melocanna bambusoides*)(Figure 7) with Size 150 mm (length) and 20 mm (diameter) as shown in below figure: and the cylindrical bamboo piece is then cut through 1/3 rd section longitudinally in order to facilitate the pouring of molten mixture of *Artocarpus Lakoocha* fluid and glycerin. The two end of the

cylindrical bamboo are closed with common cold drinks Bottle cap.

Five pinholes were made in each bottle cap in order to hold the Sterculia Villosa fiber strand in longitudinal position as shown in the figure:

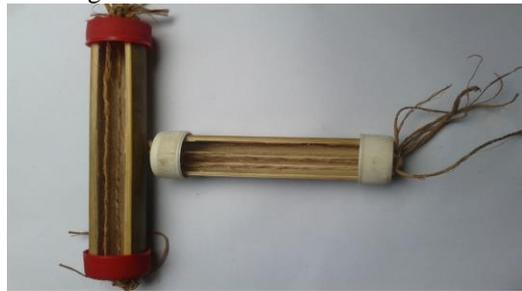


Figure:4 Mould with Sterculia Villosa fiber strand.

The concentrated Artocarpus Lakoocha mixture is prepared in the following composition:

1. Water – 100 ml
2. Artocarpus Lakoocha (Concentrated) - 100 gram
3. Glycerin – 05 ml

Now the mixture is stirred thoroughly and boiled till it becomes concentrated sticky fluid and it is then poured in the bamboo mould shown below. (Figure:8)

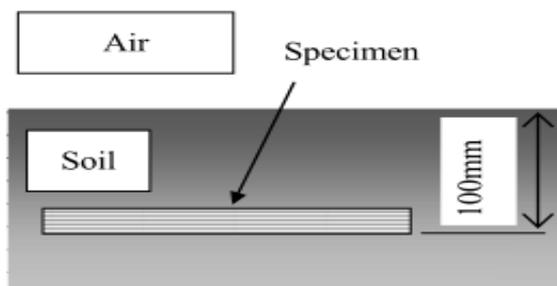


Figure:5 Mould filled with molten Artocarpus Lakoocha fluid.

BIODEGRADABILITY TESTS

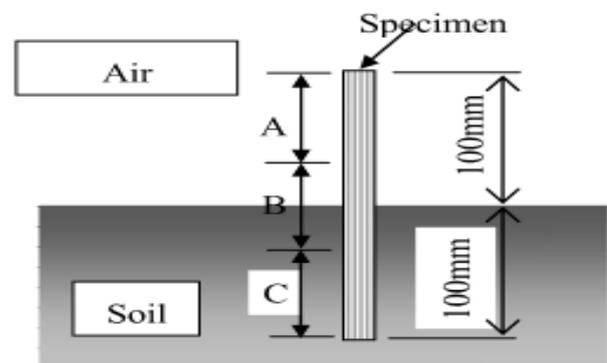
Biodegradability tests were carried out under two different conditions:

In Condition 1, specimens (pure Artocarpus Lakoocha resin) were completely buried in a natural soil at a depth of 100 mm.



• **Figure:6** Schematic illustration of the biodegradable test (Condition 1).

In Condition 2, a 100 mm section of the specimens (pure Artocarpus Lakoocha fluid and Sterculia Villosa fiber composite) were buried in natural soil. This examination under Condition 2 was to observe the biodegradability from three factors: air, air and soil and natural soil.



• **Figure:7** Schematic Illustration of The Biodegradable Test (Condition 2).

RESULT OF BIODEGRADABILITY TESTS

1. In the Test condition 1, it was found that partial biodegradation started on 10th day and complete biodegradation of the test specimen was observed on 40th day of burial of the test specimen.

2. In the Test condition 2, it was observed that partial biodegradation of the composite specimen begins on the 5th day itself (specimen portion above the soil) and the Artocarpus Lakoocha component separate out completely after 25th day from the composite leaving only Sterculia Villosa fiber strand. Further in the Test condition 2, it was observed in the underground section of the test composite that the rate of degradation of the fiber component was faster than the aerial part of the fiber. Overall it can be concluded that the biodegradability of pure Artocarpus Lakoocha fluid and Sterculia Villosa fiber composite is very good.

RESULTS AND DISCUSSION

In this study of the physical property of the Sterculia Villosa Fiber & concentrated Artocarpus Lakoocha fluid following observation may be noted: 1. For preparing 50 gram of concentrated Artocarpus Lakoocha fluid 1 kg of Artocarpus Lakoocha bark is required when the bark is immersed in the water in the ratio of 1Kg: 3 liter for 48 hours. 2.The amount of concentrated Artocarpus Lakoocha fluid vary by the variation in the seasonal weather condition, for instance during the winter season the average concentrated Artocarpus Lakoocha fluid received per Kg of bark was 40 gram. 3. In the Tensile test conducted on the Sterculia Villosa Fiber on universal testing machine of specimen size about 0.5 mm thick, 20 mm width and length of 200mm. The average Tensile strength of the Sterculia Villosa Fiber was found to be 10.70 K. Newton which is considerably high as compared to other natural fibers that are in use. 4. When dried completely the pure concentrated Artocarpus Lakoocha fluid is very hard material as shown in the figure:9



Figure:8 Solid form of Artocarpus Lakoocha fluid.

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[2] Akbar Hossain, M.A.S. Chowdhury, Mst.T. Islam P.K. Malaker and S.M. Iqbal , "Plant Diversity Of The Horticultural Farm Of Bangladesh Agricultural University," *Bangladesh J. Agril. Res.* 34(2) : 189-204, June 2009