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- Short Communication

SHELF-LIFE STUDY OF BLEACHED AND RAW JUTE KEEPING IN NORMAL AND AIR TIGHT CONDITIONS

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ABSTRACT

When the raw and bleached jute were kept in air tight and normal conditions it was found that in normal condition the tensile strength of raw jute decreased with increase of times. But in air tight condition the decreasing rate of tensile strength of both kinds of jute was approximately similar.

Key words: Shelf-life, Tensile strength, Raw and bleached jute, Normal and airtight condition

Jute is a kind of fibre obtained from the bark of jute plant. There are about 100 species of the genus *Corchorus* of them only two, *Corchorus capsularis* and *C. olitorios*, are cultivated in Bangladesh for their fibers of commerce (Rahman 1987).

Jute fibre is composed of lignocellulose (Thrope 1941) and a group of lignifide cellulose (Watt 1972). The physical and chemical properties of jute fibre are different from other natural fibres. Jute fibre is used more extensively than any other fibre except cotton (Hill 1951). Among the main groups of cellulosic fibre, like jute, leaf and seeds fibre, the fibre jute ocupies the first position on the basis of its wide use (Ranjan 1973). Nearly 80% of raw jute is used for packing services and the rest to the manufacture of special productions (Kassem 1972).

Jute fibre is generally delignified with concentrated alkali and bleached with concentrated hydrogen peroxide, potassium chloride and different bleaching powder. Jute fibre is degraded during chemical treatment. As a result, its quality is decreased.

The objective of the work was to observe the shelf-life (tensile strength, elongation, tenacity, shrinkage etc.) of the raw and bleached jute keeping in normal and air tight conditions.

Jute fibres were collected from the Rajshahi Jute Mill and washed with hot water to remove adhering materials, and air-dried. About 500 g of jute fibre was soaked in 5 (five) litres of 0.01% (v/v) hydrogen peroxide solution in a 10 litre stainless steel pan for four hours at room temperature (30^0C). Then the solution was decanded to another container and the jute fibre was treated with 5 litres of 2% (w/v) urea solution of pH 8 for two

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hours at room temprature. The jute fibre thus bleached was separated, squeezed and dried in sun light. The dried raw and bleached fibres were then bundled and stored in normal and air tight conditions for the experiments.

The resistance of a material to fracture is called tensile strength or mechanical strength which is expressed in kg/yarn (Moncrieff 1957). A jute fibre of length about 25 cm and weight 0.5 g considered as a yarn in the related experiments. Tensile strength of the jute fibre was measured with the help of "Schopper type tensile strength tester." The sample (0.5 g fibre, 25 cm in length) was fixed in between the two jaws of the instrument that were placed at a distance of 10 cm apart from each of fibre between the jaws. Different loads were then applied successively and the operation was started in the instrument. At a certain load the sample yarn ruptured. This breaking load of the yarn is known as its tensile strength.

Tenacity of a yarn is defined as the strength per unit yarn number and the another term of yarn number is denier. The denier of a yarn is the weight in grams of a length of 9000 meters of that yarn (Moncrieff 1957) and tenacity is expressed in grams/denier.

So, denier (D) = —— × 9000 (m)

Denier (D) = 0.5/0.25 × 9000 = 18000

and tenacity = $\frac{\text{Breaking load in g}}{\text{Denier}}$

$= \frac{\text{Breaking load in g}}{18000}$ (for the particular cases)

Elongation is the deformation of load caused by a tensile force. The deformation strain may be measured at any specific load or at rupture. It is expressed as percentage of the original length.

So, percentage of elongation = $\frac{L_r - L_i}{L_i} \times 100$

where, L_r = Length of fibre in cm between two jaws just at rupture.

L_i = Initial length in cm between two jaws.

The jute fibre was cut to a size of 25 cm for the experimental purpose. It was treated with various chemical reagents. The treated fibre was then washed with water, dried and finally the length was measured. The percentage of shrinkage was calculated from the following relation:

Length shrinkage in percentage, $L_{sh} = \frac{L_r - L_i}{L_i} \times 100$

where, L_{sh} = Length shrinkage in percentage.

L_f = Final length after chemical action.

L_i = Initial length of dried jute fibre (25 cm).

Table 1. Measurements of tensile strength, calculated values of tenacity, elongation and shrinkage of bleached and raw jute under normal condition.

Time (days)	Bleached jute				Raw jute			
	Tensile strength (kg/yarn)	Tenacity (gms/D)	Elonga-tion (%)	Shrinkage (%)	Tensile strength (kg/yarn)	Tenacity (gms/D)	Elongation (%)	Shrinkage (%)
Initial	28.03	1.56	5.03	Nil	28.00	1.56	5.03	Nil
15	27.50	1.53	4.93	Nil	27.30	1.51	4.85	Nil
30	27.01	1.50	4.89	Nil	26.05	1.48	5.00	Nil
45	26.45	1.47	5.00	Nil	24.09	1.44	4.98	Nil
60	25.05	1.39	4.50	Nil	23.07	1.38	4.90	Nil
75	24.90	1.38	5.31	Nil	18.85	1.35	4.85	Nil
90	23.35	1.30	4.52	Nil	16.23	1.30	5.01	Nil
105	22.85	1.27	4.30	Nil	15.50	1.25	4.80	Nil
120	20.80	1.25	5.31	Nil	15.00	1.23	5.20	Nil
135	18.75	1.04	5.50	Nil	14.85	1.00	5.30	Nil
150	16.95	0.89	4.35	Nil	14.60	0.87	4.50	Nil
165	15.91	0.88	4.50	Nil	13.93	0.85	4.47	Nil
180	15.40	0.86	5.37	Nil	13.05	0.83	4.30	Nil

From the results in Tables 1 and 2 it was found that the tensile strengths of both the bleached and raw jute were initially similar. In normal condition, the tensile strength of both bleached and raw jute decreased with increase of time.

Table 2. Measurements of tensile strength, calculted values of tenacity, elongation and shrinkage of bleached and raw jute in air tight condition.

Time (days)	Bleached jute				Raw jute			
	Tensile strength, (kg/yarn)	Tenacity (gms/D)	Elonga-tion (%)	Shrinkage (%)	Tensile Strength (kg/yarn)	Tenacity (gms/D)	Elongation (%)	Shrinkage (%)
Initial	28.05	1.56	5.03	Nil	28.03	1.56	5.00	Nil
15	28.03	1.56	5.01	Nil	28.01	1.55	5.05	Nil
30	28.02	1.56	5.31	Nil	28.00	1.55	5.28	Nil
45	27.94	1.56	5.24	Nil	27.95	1.55	5.25	Nil
60	27.93	1.56	5.09	Nil	27.93	1.56	5.15	Nil
75	27.92	1.56	5.12	Nil	27.90	1.55	5.10	Nil
90	27.90	1.56	5.04	Nil	27.88	1.54	5.05	Nil
105	27.88	1.56	5.05	Nil	27.86	1.55	5.00	Nil
120	27.86	1.56	5..03	Nil	27.85	1.55	5.03	Nil
135	27.85	1.56	5.01	Nil	27.83	1.55	5.01	Nil
150	27.83	1.56	5.04	Nil	27.82	1.55	5.03	Nil
165	27.82	1.56	5.01	Nil	27.80	1.55	5.00	Nil
180	27.80	1.56	5.02	Nil	27.78	1.55	5.01	Nil

The other parameters such as elongation, tenacity and shrinkage were nearly the same. The decreasing rate of tensile strengths with time for both bleached and raw jute under air-tight conditions were approximately same and other parameters were identical

(Table 2). As the jute fibre was stored in normal and air-tight conditions, degradation due to heat, sunlight, and high radiation did not influence.

It may be concluded that in normal condition the tensile strength of raw jute decreased compared to bleached jute, whereas under air-tight condition the decreasing rate of tensile strength of both kinds of jute fibres were approximately similar.

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