

USES OF NATURAL FRUIT (*DIOSPYROS EMBRYPTERIS PERS*) AS A ROT-PROOFING AGENT

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Abstract :Two different types of hessian fabrics (sized and desized) were treated with unripe natural fruit juice (Botanical Name: *Diospyros embrypteris_Pers*) and copper sulphate solution. The physico-chemical properties of the treated fabrics were determined and made nursery pots for seedling to improve the longevity of rot-proof nursery pot. It was observed that 5% copper sulphate solution treated nursery pots possess longevity 5.5 months but the extract of natural fruit juice mixed with 5% copper sulphate solution treated sample increases the longevity of nursery pot about eleven months. At the same time 8% copper sulphate solution treated nursery pots longevity more than nine months but natural fruit juice mixed with 8% copper sulphate solution treated nursery pot is required to achieve longevity about fourteen months. Uses of natural fruit gaab have no critical steps to environment, free from health hazard and durable. That's why it has some potentiality to use for making nursery pots with less chemical materials .

Keywords : Rot-proof, Gaab, Copper sulphate, Longevity, Nursery Pot, Hessian, Sized, Desized,

1 Introduction

In the world, there is a great demand for rot-proof jute fabrics. There are many diversified uses of rot-proof jute fabrics such as: nursery pots/sheets, sand bag, fishing net, tents etc.[1]. Nursery pot is one of the basic requirements for plantation. Once, plants were sown in earthen pots, which is now costly. Polythene bag/pots were being used as nursery pot for seedling. There are some drawbacks of using polythene as a nursery pot. Polythene destroys roots due to excess water content in the soil. On the other hand jute is biodegradable natural and environment friendly fibre [2]. As a result excess water can easily pass through the jute nursery pot. Rot-Retardant jute fabric reduces the growth of micro-organism and fungi. The pots become degraded after certain period and

ultimate converted into biomass [3]. The useful life of jute materials can be increased by effective rot-proofing treatments. Several rot-proofing agents mixed together improved the rot-proofing efficiency. Copper sulphate is a common rot-proofing agent [4].

From literature review, it was found that the fruit juice of *Diospyros embrypteris_Pers* [5] acted as a rotting agent and boatmen rub the fruit juice on the undersurface of boats to protect the wood from rotting and fishermen use the same in their fishing net for the same purpose. For this reasons we investigated, natural fruit juice and lower percentage of copper sulphate solution used as a rot-proofing agent for optimize the longevity of nursery pot.

The present work has been taken to use natural material (gaab) as a rot-proofing agent and decrease the uses of chemicals, to save our environment from the pollution.

2 Materials And Methods

2.1 Sized:

The specification of the gray hessian was 13 ends/inch, 12 picks/inch and 19 oz/yd². 4 sample specimens of 16 inch width and 5 meter length were prepared from the above grey hessian for sized samples.

2.2 Desized:

Desized sample was prepared by treating sized sample with 2-gm/lit diastage at temperature of 50-60°C for 45 minutes [6]. 4 sample specimens of 16 inch width and 5 meter length were prepared from desized sample.

2.3 Natural unripe fruit juice:

Natural fruit was collected from local market.

Bengali Name: Gaab

Scientific Name: *Diospyros embrypteris_Pers* [5]

Ingredients: Fruit (fresh)

2.4 Extraction of Natural fruit juice:

- (a) 1 kg of fresh fruit was taken and chopped into small pieces.
- (b) Water was taken (5 litres) and heated upto 45°C.
- (c) The chopped pieces of fruit was added to the heated water and stirred it well.
- (d) The solution was boiled for 2 hours till the solution become approximately 1 litre.
- (e) Then the solution was cooled and filtered.

2.4 Chemical:

- a) Commercial grade copper sulphate (CuSO₄)
- b) Soda ash (Na₂CO₃)
- c) Diastage

2.5 Machine:

Mini padding Machine
Tensile Strength Tester, Good Brand and Co. Ltd (UK).

2.6 Experimental Procedure:

Five different types of solutions were prepared for treatment.

These are-

- a) Natural fruit (Gaab) juice
- b) 5% (CuSO₄) solution + 2 % Na₂CO₃
- c) 5 % (CuSO₄) solution + 2 % Na₂CO₃ + Natural fruit solution (Gaab)
- d) 8% (CuSO₄) solution + 3 % Na₂CO₃
- e) 8 % (CuSO₄) solution + 3 % Na₂CO₃ + Natural fruit solution (Gaab)

The samples were made in a padding machine at the speed of 2 m/min under 2 bar pressure and finally the fabrics were dried in the sunlight.

2.6.1 Determination of tensile strength:

The tensile strength of the control and treated samples were determined by standard method [7].

2.6.2 Copper content determination:

The copper content of the treated samples were determined by Iodometric method [8] and the results were summarized in Table 1 and 2.

2.6.3 Preparation of nursery pots:

Sixty nursery pots were prepared from two different types of fabrics. The size of each nursery pot was 6 "× 7 ".

2.6.4 Preparation of compost:

The compost was prepared by mixing equal ratio of cow dung and soil.

3 Results and Discussion

Sized and desized fabrics were treated with copper solution and unripe natural fruit (*Diospyros embryteris_Pers*) solution for determination of liquor pick-up, copper content and tensile strength of treated and untreated fabrics. The results were summarized in Table-1 and 2.

Table 1 Tensile strength, liquor pick-up and copper content of original and rot-proof hessian for sized samples

Sl. No	Name of Samples	Liquor Pick-up (%)	Tensile Strength (In lbs)		Copper Content (%)
			Warp	Weft	
1.	Original (control)	-	138	137	-
2.	Natural fruit (Gaab) solution	101	130	121	0.18
3.	5% (CuSO ₄) solution + 2 % Na ₂ CO ₃	102	124	111	1.3
4.	5% (CuSO ₄) solution + 2 % Na ₂ CO ₃ + Natural fruit solution (Gaab)	99	125	118	1.45
5.	8% (CuSO ₄) solution + 3 % Na ₂ CO ₃	103	120	109	1.8
6.	8% (CuSO ₄) solution + 3 % Na ₂ CO ₃ + Natural fruit solution (Gaab)	101	130	119	1.96

Table 2 Tensile strength, liquor pick-up and copper content of original and rot-proof hessian for desized samples.

Sl. No	Name of Samples	Liquor Pick-up (%)	Tensile Strength (In lbs)		Copper Content (%)
			Warp	Weft	
1.	Original (control)	-	140	132	-
2.	Natural fruit (Gaab) solution	99	136	124	0.2
3.	5% (CuSO ₄) solution + 2 % Na ₂ CO ₃	102	127	116	1.46
4.	5% (CuSO ₄) solution + 2 % Na ₂ CO ₃ + Natural fruit solution (Gaab)	102	130	121	1.63
5.	8% (CuSO ₄) solution + 3 % Na ₂ CO ₃	98	127	115	1.9
6.	8% (CuSO ₄) solution + 3 % Na ₂ CO ₃ + Natural fruit solution (Gaab)	101	134	122	2.08

From Table-1 & 2 it was found that the tensile strength of control sample is higher in warp wise than the other treated samples. It was also observed that the tensile strength of natural fruit solution treated sample is higher in the warp wise than 5% and 8% copper sulphate solution treated sample and comparable to original samples.

Seeds of Black berry fruits were sown in different treated and untreated nursery pots. . It was found that untreated nursery pots lost strength within 15 days and damages within one month of plantation. The untreated nursery pots degraded very easily due to the growth of fungi and other micro-organisms [9].

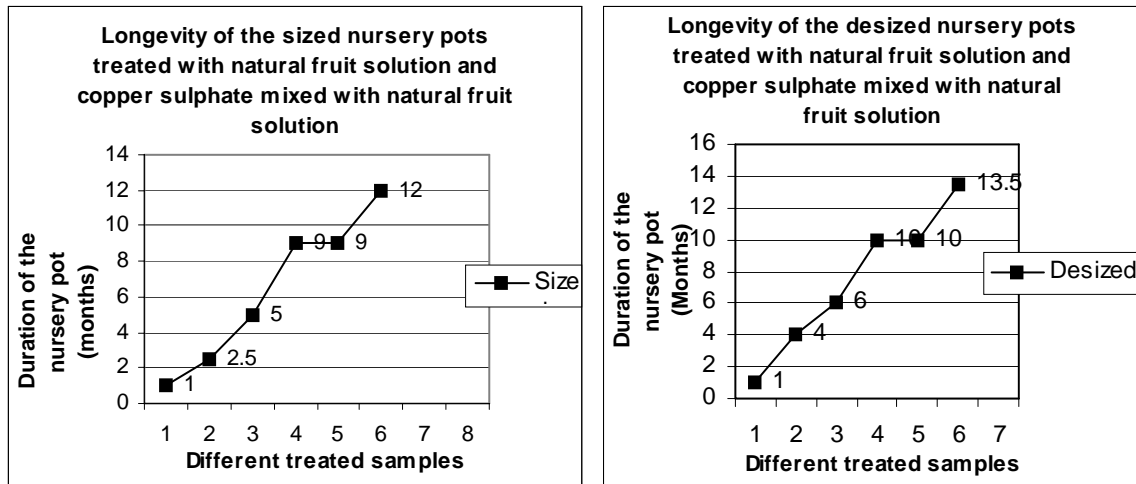


Figure-1 and 2 Longevity of the nursery pot versus different treated solution

Note : Different treated samples are (For sized and desized):

- 1 = Original
- 2 = Natural fruit (Gaab) solution
- 3 = 5% CuSO_4 Solution + 2 % Na_2CO_3
- 4 = 5% CuSO_4 Solution + 2 % Na_2CO_3 + Natural fruit (Gaab) solution
- 5 = 8% CuSO_4 Solution + 3 % Na_2CO_3
- 6 = 8% CuSO_4 Solution + 3 % Na_2CO_3 + Natural fruit (Gaab) solution

Figure-I&II show that the longevity of the desized nursery pots are greater than the sized nursery pots in case of all treatments. It was also observed that the longevity of the natural fruit solution treated pots (desized) are considerably more than one month than that of the sized nursery pots and only natural fruit (Gaab) treated nursery pot shows longevity about four months.

In this investigation it was found that the longevity of the desized fabrics treated with 5% CuSO_4 solution mixed with natural fruit solution (Gaab) was about ten months. Same longevity was found only 8% copper sulphate solution treated nursery pot. 8% copper sulphate solution mixed with natural fruit (Gaab) solution treated nursery pot increased longevity 13.5 months. From the above discussions, it was observed that 3% less CuSO_4 solution is required to achieve the

same longevity by using gaab solution mixed with CuSO_4 instead of using only CuSO_4 . Minimum dose of the chemicals is suitable for environment. That's why this process is the cost effective, no side effect, easily done by the people.

4 Conclusion

21st century's slogan is, "Save the Environment." The utilization of our natural resources will be the key factor for environmental chemical pollution. The present target is to utilize our natural resources and decrease the uses of chemicals. So, natural fruit juice and lower percentage of copper sulphate solution was used as a rot-proofing agent for optimize the longevity of nursery pot.

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