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## Dyeing pineapple fiber with bixa orellana (Achiote) natural Dye

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### Abstract

Pineapple leaf fiber is an environment-friendly natural fiber that does not harm any natural substance, keeping that all in mind its grey yarn is dyed with "Bixa Orellana natural dye" whose seeds are extracted from its fruit pod. Two types of shades are obtained from the same amount of seeds with two different processes; this experiment is carried out to make pineapple yarn more eco-friendly also to explore Bixa seeds for textile purposes.

**Keywords:** Pineapple fiber, natural fiber, bixa orellana, sinduri, natural dye, mordant

### 1. Introduction

Now were days everyone is supporting and coming ahead to save our environment by holding hand in hand, the same support is from textiles also means fiber to fabric, everything is in support of the environment. Uses of natural dyes in textiles are improving day by day since synthetic dyes are toxic and use of these dyes are increasing health hazards and skin disease issues whereas natural dyes are extracted from minerals, vegetables, flowers, insects, etc. so these types of dyes are non-toxic and no chemical processing is required in this. Natural dyes are sustainable and very friendly to human skin wherein it has few disadvantages too, like color fixation issues, fastness properties, color shade limitations, and its dye process is also time-consuming, for the reason of multiple dyeing for better color shades, these disadvantages prevent us to use natural dyeing. In the present experiment, Bixa Orellana dye (Sinduri) is used with pineapple leaf fiber, here both substances are eco-friendly. Applications of Bixa Orellana on natural fiber are very rare and very few researches have been carried out about natural dyes on PALF. This attempt of dyeing PALF from Bixa seeds but little difference in the method of dyeing with the same amount of extracted seeds are very interesting and it was supposed to outcome with two interesting shades. These Bixa Orellana seeds are easily available online but another interesting thing is that here; seeds are directly extracted from Bixa fruit pod which are collected from own garden. Applying Bixa on PALF had given very beautiful two colors, indeed a combination of these two eco-safe materials was also very easy.

### 2. Material and Methods

#### 2.1 Materials

##### 2.1.1 Substrate

A two-ply yarn was taken out from cone to make 8 small hanks; these hanks are of equal weight i.e. - .25g (single hank weight).

##### 2.1.2. Scouring and Bleaching

Firstly, scouring and bleaching were done by adding mild detergent and hydrogen peroxide in Luke warm water, then all 8 hanks (Weight- 2gm) are dipped in prepared solution for 15 minutes. Later, they were washed with normal water.

##### 2.1.3 Mordant

Only Alum was used as a mordant.

**2.1.4 Natural dye**

Only one Natural dye was used in this work. Dye was extracted from Bixa pods in the form of seeds. The details regarding plant and dye are given below in Table no. 1



**Table 1:** Details regarding Plant Profile and Annatto Dye

**i) Plant profile**

•	English Name	Annatto Plant
•	Hindi Name	Latkan, Sinduriya
•	Common Name	Lipstick tree
•	Species	Bixa Orellana
•	Family	Bixaceae

**ii) Annatto Dye**

•	Dye type	Natural
•	Dye extract	Seeds
•	Dye Color	Orange

Treatment	Yarn Samples
Bleached (a)	
Mordant (b)	

**Fig 1:** (a) Bleaching (b) Mordant

**2.2 Methods**

**2.2.1 Bleaching of PALF hanks**

Grey yarn was dipped in a solution of Hydrogen peroxide and mild detergent in a ratio of M: L (1:2) for 20 minutes at 80-85°C, after bleaching hanks was washed thoroughly in normal water and left for drying in the air. Bleaching and mordant samples are given in Table no. 2.

**2.2.2 Extraction of Dye**

Bixa pods are collected and then left for drying, later seeds are extracted from the pod and then they are left for boiling for 30 minutes in the required quantity of water at 90-95°C. Once, boiling was done soften seeds were filtered separately, shortly seeds will be put into a grinder till seeds turned into a thick paste. Sieved water was collected into another vessel to see a different shade of dye.



**Fig 2:** (a) Dye extraction (b) Boiling dye seeds (c) Grinding seeds into paste

**2.2.3 Pre-Mordant treatment of PALF**

All hanks are dipped in Alum solution for 15 minutes and the water temperature was normal.

**2.2.4 Dyeing of PALF hanks with Bixa Orellana or Annatto seeds**

Treated pineapple fibers were dyed in two different ways. Two containers are placed on stove, only one container Fig.3 (a) was filled with liquor by ratio of 1:10, i.e. 1gm material: 1-liter water, 125 ml of dye paste, as well 1tsp lemon juice was dissolved in that liquor and burner was turned on medium flame for 1hour, simultaneously another container Fig.3 (b) was filled with dye liquor (which was separated from seeds after boiling), quantity of dye liquor was 1 liter this container was also situated on stove on high flame for boiling, once dye liquor comes into boiling stage then flame was turned medium and then 4 hanks of PALF (.25gm each) was dipped in that dye liquor and 1tsp of lemon juice is added. Required time for both the container was 1 hour, also in every 15 minutes one by one loop was taken out from both dye liquor to see the shade differences. (Time was: - 15, 30, 45 and 60 minutes). Afterward, all loops are left for drying in the air.



**Fig 3:** Dyeing of PALF yarn loops (a) Grind seed liquor (b) Boiled seeds liquor









**2.2.5 Evaluation of colorfastness**

Dried loops were dipped in Alum solution (1gm Alum and ½ liter normal water) and left for 15 minutes to see how much color was vanished from loops. Finally, after 15 minutes loops are taken out and washed with normal water. Shortly, left for drying in the air.

**3. Result and Discussion**

Dyeing PALF with Bixa Orellana (Annatto) had given very beautiful two shades from the same amount of seeds and the time gap of 15 minutes for each loop had given 4 tin tone shades from each one of the dye liquor. Dyed loops with different timings are given in Table no. 3. Grind dye solution (Sample-2) had given beautiful soft orange tin tone shades; in the first 15 minutes color was light whereas 30 and 45 minutes color shade was little deeper even they both are approximately the same in shade, last 60 minutes loop came out with dark beautiful orange shade. In the case of boiled seeds dyeing (sample-1), it had given a soothing golden shade. In this process also in every 15 minutes deeper and darker shades had obtained. In the first 15 minutes shade was lightly golden and after 30 minutes it got deep golden, in 45 minutes it obtained deeper golden and in the last 60 minutes, it has achieved deepest golden which looks eye-catching and beautiful shade. Here, in this experiment two colors are gained together with their tin tone shades on pineapple leaf fiber which had made natural fiber more sustainable and the color fastness was also very good, after alum treatment, it was revealed that it do not lighten its color and the shade remains similar.

**Table 3:** Boiled seeds dye shades (sample-1) and Grind seeds dye shades (sample-2)

S. No.	Time	Sample 1	Sample 2
1.	15 Minutes		
2.	30 Minutes		
3.	45 Minutes		
4.	60 Minutes		

#### 4. Conclusion

Bixa Orellana seeds had given very attractively two colors on pineapple leaf fiber further according to the experiment it gets proved that two colors can be obtained from the same amount of Bixa seeds. It has good color fastness after mordant none of the loops had lightened their original shade. The overall combination of these two eco-friendly materials had come out with beautiful results like shades, color, and fastness.

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