Colouring Bamboo Strips With Natural Dyes

Instruction Manual

Industrial Design Centre, IIT Bombay

IDC IIT UNDP

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Industrial Design Centre
Indian Institute of Technology Bombay
Mumbai

The Dyeing procedures are developed at BambU Studio, IDC, IIT-B, under a UNDP project on Cane and Bamboo, sponsored through Development Commissioner (Handicrafts), Ministry Of Textiles, Govt. of India.

Orange colour (Alta + Haldi), Manjishta and Indigo were tried and developed at Bambu Studio IDC IIT-Bombay.
The recipes of the other colours listed are taken from BCDI and other places.

We thank Shri. MSG Rajan (IDC), Shri. Navle(IDC), Shri Niranjan Rudrapal(IDC) and Shreemati Gangamma (Visiting staff, IDC) for always being ready to dye patiently.

We thank all persons who helped in making the bamboo strips, mats and products colourful.

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Introduction

Bamboo craft in India has acquired a new significance with the international recognition of bamboo, as an eco-friendly future material. Bamboo being one of the fastest growing biomass can replace wood in many applications, thereby preserving precious forests. Bamboo has a special place in crafts. Bamboo traditionally has been used to weave baskets used for storage and other purposes all over the country. Wide variety of bamboo products is used in tribal homes of Northeastern states of India.

However bamboo craft with over 13 lakh craft persons in the country needs 'repositioning' to be part of urban and export markets to offer a meaningful future for the craft persons.

In this context colouring of bamboo with natural dyes for craft purposes assumes an important role in creating value-added products in bamboo.

Research and Training of using natural dyes for colouring bamboo was taken up by IDC as a part of the UNDP supported project "Tools small technologies and finishes" sponsored by Development Commissioner (Handicrafts). Systematic studies and documentation were done in colouring methods. The processes developed by other agencies like BCDI (Bamboo and Cane development Institute) Agartala were verified. Tests for fastness of colour to light as well as acceptability for common use were also conducted for certain dyes.

Fungal growth and insect attack are serious problems affecting bamboo products. Natural dyeing process involving boiling offers limited protection from these problems. Hence methods to preserve bamboo from fungal attack were developed by treating bamboo with Alum or Borax-Boric acid. Details of 'Alum treatment' as well as 'Borax-Boric Acid' treatment for prevention of fungus and insect attack are also given. Systematic tests for fungal growth at different humidity rates and temperatures were conducted at IDC using a controlled humidity chamber to validate the recommendation made.

The present manual is intended to act as a guide for craft persons and others to carry out dyeing of bamboo using natural dyes.

Preservation of Bamboo

Bamboo is a natural material with certain inherent properties such as high moisture, sugar and starch content which make it vulnerable to attack from various pests, like termites, borers and fungi.

Hence bamboo and bamboo craft products have to be treated to increase their durability, by protecting them against attack by fungi and borers.

Preservation methods have to be carefully selected. Some chemicals can be effective, but toxic and polluting to the environment and hence cannot be used for treating bamboo that is to be used in handicrafts.

Borers are responsible for over 90% of insect damages on harvested culms and finished bamboo products.

By and large all species of insects have very similar life cycles. The life cycle consists of various stages beginning from egg to a larval and then pupa and finally an adult insect. It is the larval stage that causes most damage. The adults burrow through wounds, cracks or cut ends into the culm and makes horizontal tunnels around culms, where eggs are deposited. Larvae bore longitudinally in the culm. Heavy infestation results in numerous criss-crossing tunnels, which are tightly filled with excreta. The fully developed larvae make chambers in which they pupate. Adults emerge out through the external rind just above their pupal chambers.

Some preventive and preservative measures have been developed against these borers in the pre-harvest phase and post-harvest stage.

Pre-harvest treatment measures are taken largely at the time of harvesting. It is generally believed that the attack of borers on bamboos is highest when the harvesting is done during the full moon phase. Some studies have shown that the moisture level in culms increases with the waning of the moon and decreases with the waxing of the moon. This fortnightly rhythm in relative moisture content is the only lunar periodicity known to occur in the metabolism of the growing bamboo. Nevertheless, felling of bamboos based on the moon's phases is a traditional practice to reduce borer incidence, and seems to be effective in certain species of bamboo.

The timing and age of felling are very important. Culms will have less soluble carbohydrates, proteins and moisture as they get older, and they are less active physiologically in winter season and thus more resistant to the timber borers. Hence, harvesting only culms over 3-4 years old and felling at winter season are particularly recommended.

After felling, treating culms physically or chemically can significantly improve their resistance to borers as well as to fungus.

Traditional methods
The traditional and most simple method is to immerse felled culms in water. This method may be effective only in preventing damages from bostrychid beetles.
Heating of culms by fire or boiling water, or putting them under direct sunlight in hot summer can kill borers in the culms.

Chemical treatment
Chemical treatment using various insecticides and preservatives has been the most widely used method in controlling post-harvest pests of bamboos.
Various preservatives have been recommended and used in different countries: 5% water solution of copper-chrome-arsenic composition (CCA); 5-6% water solution of copper sulphate-potassium dichromate-borax (CCB); 5-6% water solution of boric acid-borax-sodium pentachlorophenate in 0.8 :1:1 or 1:1:5 ratio (BBP); 2-3% water solution of borax:boric acid in 5:1 ratio; and 10% or 20-25% water solution of copper sulphate. These are mostly applied by soaking under normal temperature, cold or heated conditions, or under high pressure.

However use of chemicals in post harvest bamboo may not be advisable for bamboo to be used in handicrafts.

Chemical Treatment of cut bamboo and bamboo strips
We have used alum, borax-boric acid treatment for both cut bamboo and for strips. A six percent aqueous solution is made by dissolving 3 grams of boric acid and 3 grams of Borax in 100 ml of water. The cut bamboo and the strips are boiled in this solution for 20 minutes. Soaking of the bamboo and the strips can also be done. This treatment is effective against borers.

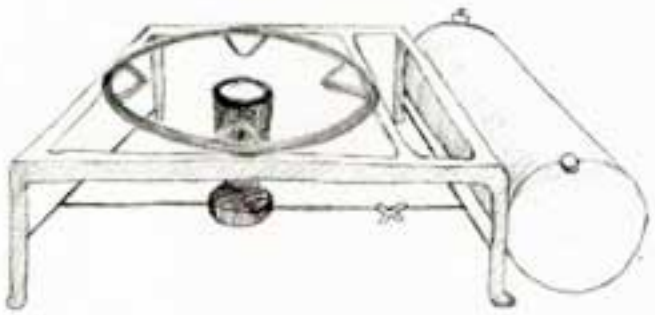
Boiling strips and cut bamboo in 5% to 10% Alum is effective against fungal growth up to a humidity of 80%. No treatment is effective above a Humidity level of 80%.

In the BambU Studio in IDC these experiments have been conducted in a controlled humidity chamber. In this chamber both temperature and humidity can be controlled and hence the efficacy of the treatment studied at various levels of humidity.

Simple methods such as storage of the bamboo in a dry and well lighted place, can also prevent fungal growth.

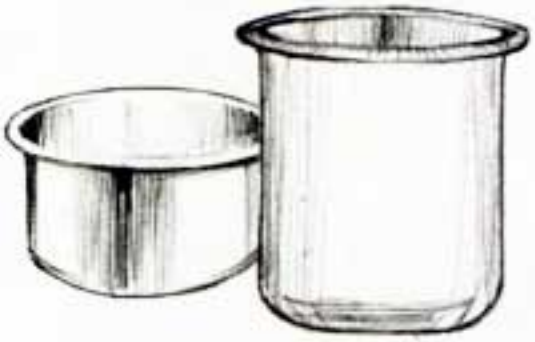
Smoking of Bamboo reduces the moisture content thereby providing prevention of fungal growth.

Required Equipment

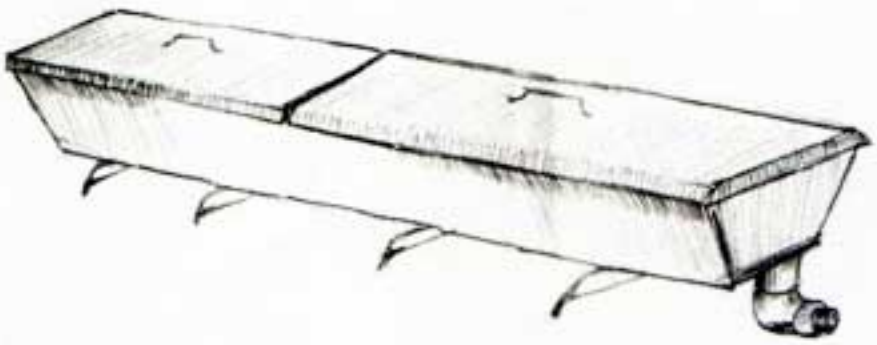


· **Heat source:** This can be any type of cooking stove; gas, wood, kerosene, charcoal or electric. This is used for heating the water and the dye solution.

· **Pestle and mortar:** Used for powdering natural materials such as Harda, haldi

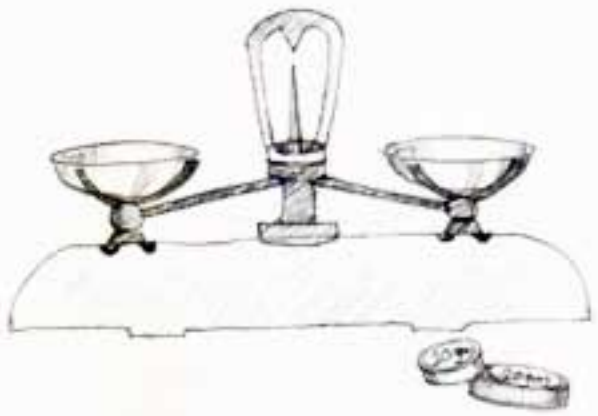


· **Vessels for dyeing:** Stainless steel or enamel pans are the most suitable for dyeing. Use of copper, Aluminium, Iron vessels can change the colour.



For dyeing very long strips, it is advisable to use long horizontal tanks [refer to the figure]. In a long tank we can keep the strips straight unlike in the steel vessel where we have to coil them.This will ensure that the strips are coloured uniformly.

· **Stirring rods** of stainless steel are the best as they can be cleaned and reused for different colour dyes.
· If wooden stirring rods are used then there should be a different spoon for each colour.
-Bamboo sticks can be conveniently used as throw away stirrers



· **Weighing scales / balance**
It is used to weigh the dyeing materials, mordant chemicals accurately

-If a weighing balance is not available, following approximate measures can be used.

15 gms Soda : 1 Handful

25 gms Manjistha : 7 Heaped tablespoons

8 gms Alum : 1 Heaped tablespoon

Heaped tablespoon

A tablespoon is a medium sized spoon, little bigger than a teaspoon

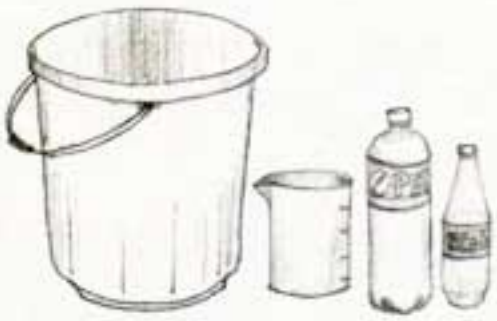
12 gms Coarsely powdered
Potassium Dichromate : 1 Heaped tablespoon

10 gms Iron Sulphate : 1 Heaped tablespoon

10 gms coarsely pounded
Copper Sulphate : 1 Heaped tablespoon

· **Thermometer:** This is used to measure the temperature of the dye solution in a range of 0 - 100° C. A long thermometer would be better as it will reach the bottom of the vessel.
-If a thermometer is not available, then feel the water on skin, it should feel hot. The water can be maintained hot by putting the flame of the stove on and off.

Personal Notes----------



· **Measuring cups or measuring cylinders** are used for measuring the quantities of water

-Readily available 1Litre or 1/2 Litre bottles such as the ones used for mineral water or soft drinks [Bisleri or Pepsi] can also be used for measuring quantity of water. Plastic buckets of 10 litres capacity are available in the market, which can be used for larger quantity.

· **Storage containers:** Store the dye material and chemicals in closed glass or plastic containers, and keep them away from children in a dark place.

· **Gloves for holding hot vessels**
-If gloves are not available, use a separate cloth or pakkad

· **Rubber gloves** will prevent any skin irritation that can be caused from the chemicals and from colouring your hands

· **Use an apron to protect your clothing**
-Or wear some old clothes as it may get coloured and soiled during dyeing.

· **A face mask** can protect from inhalation of powdered material
-If a mask is not available, use clean, white muslin or cotton cloth to cover mouth and nose.

General
Precautions

· The natural dye material is harmless, however the mordant chemicals, such as Ferrous sulphate, Copper sulphate, Potassium dichromate must be handled with care

· Do not eat or drink while handling chemicals

· Wash your hands well after the use of these chemicals

· Label the bottles containing the ingredients and keep it out of reach of children

· Never use the spoons, cups, vessels used for dyeing for eating purposes

-Vessels used for treatment or dyeing can be used for bathing water after washing it thoroughly with detergent

-The vessels used for Treatment with Alum, or Borax-Boric acid, can be used for dyeing

· Work in a well ventilated area or in an open area

· Wear a mask while measuring powders or cover your mouth and nose with a clean cotton cloth

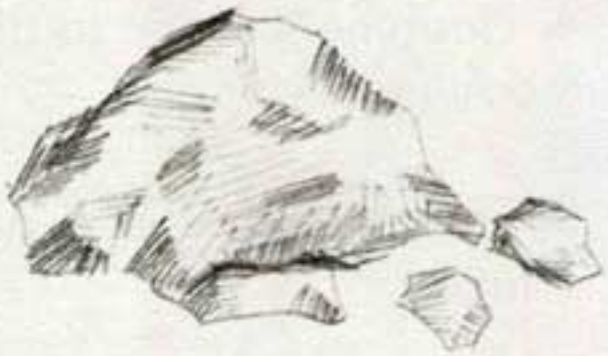
· Containers used for dyeing must be non-reactive such as stainless steel or enamel

· Use gloves if you do not want your hands to get coloured

· Wear an apron if you want to protect your clothes from getting coloured

Personal Notes----------

Treatment With
Alum



Alum is available locally in any grocery store or a chemist shop and can be used effectively and safely for treatment against fungal growth in Bamboo strips.

Bamboo strips wherever mentioned refers to strips of 0.5 to 2 mm thickness or sticks of 2 to 4 mm diameter.

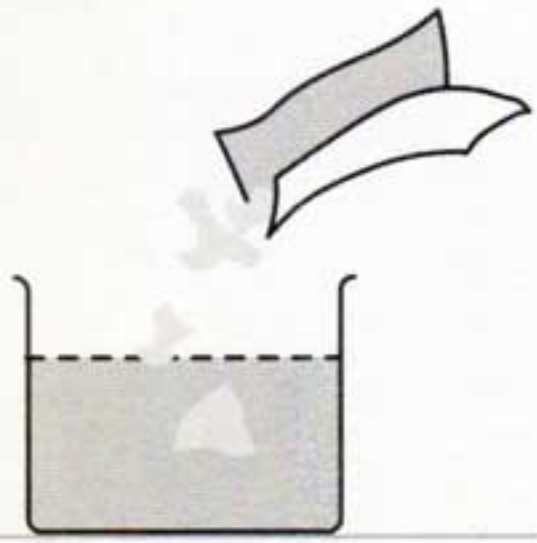
MATERIALS REQUIRED

To make one litre of 10 % solution:
Alum 100 gms
Water 1 litre

So for 10 litres of solution,
1000 gms (1kg) of Alum and
10 litres of water is needed.

STAINLESS STEEL VESSEL

Personal Notes----------

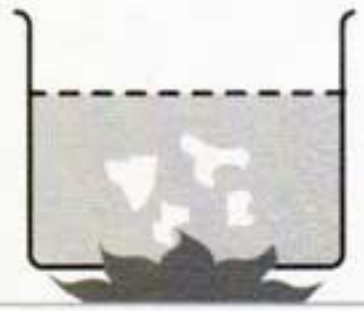


1. Weigh 100 grams of ALUM

2. Add the Alum to 1 litre of water

3. Stir the solution to dissolve the Alum

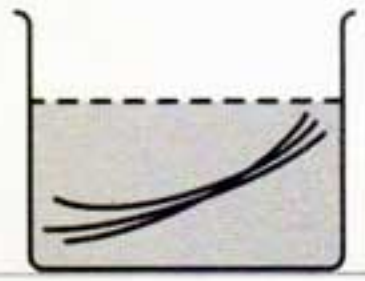
-To dissolve Alum faster, it can be powdered and added to the water.
-Do not fill the solution to the brim of the vessel as it will spill during boiling.



4. Heat the solution to dissolve the Alum

5. This solution is 10% ALUM solution

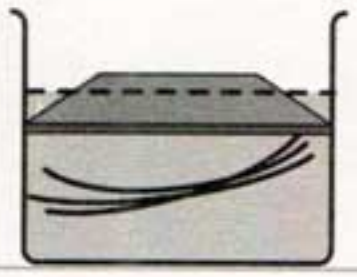
The bamboo strips can be either soaked and left or heated in the solution.
Both the methods are effective.



Soaking Method

1. Dip the strips in the solution. Allow it to be soaked in this solution for 24 hours

2. Remove the strips and dry in shade

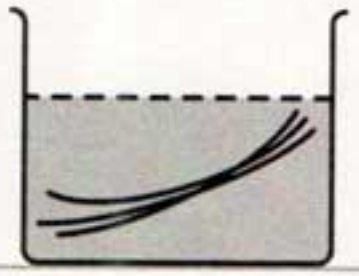


Heating Method

1. Dip bamboo strips into the treating solution so that it is completely submerged

2. Place a suitable perforated wooden plank or bamboo structure on the strips to keep them fully soaked in the solution

3. Boil the solution. Continue heating for 30minutes
- While boiling do not allow the solution to spill out



4. Cool the solution to room temperature

5. Then remove the strips and dry in shade

Treatment With
Borax-Boric Acid

This method had been developed by Bamboo and Cane Development Institute, BCDI, Agartala, under Office of the Development Commissioner (handicrafts).

This is a low cost technique for treatment of thin bamboo strips used for basketry for prevention of insect attack and mould fungus growth.

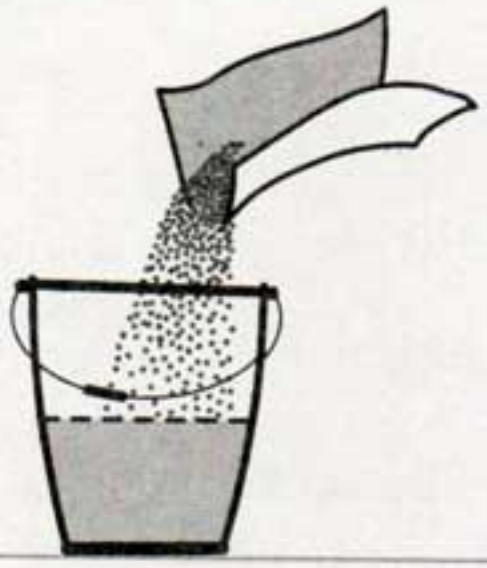
This method of treatment is particularly meant for bamboo strips to be used in making handicraft items which are likely to come in touch with edible items.

MATERIALS REQUIRED

Borax	250 gms (1/4 Kg)
Boric Acid	250 gms (1/4 Kg)
Water	5 Litres
Bamboo Strips	

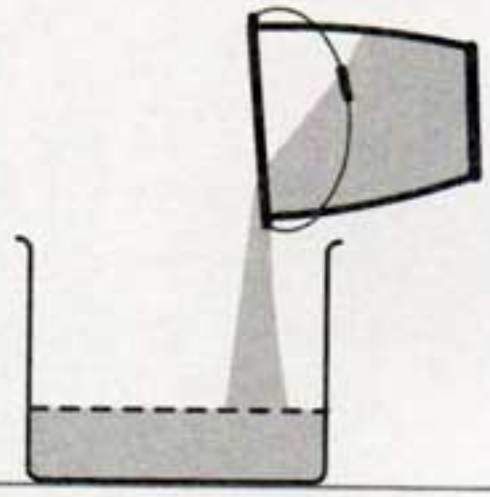
STAINLESS STEEL VESSEL

PLASTIC BUCKET OF 10 LITRES

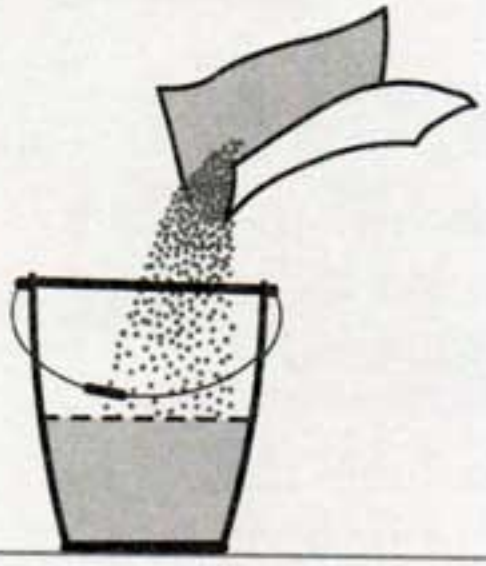


1. Take 5 litres of water in a bucket

2. Weigh 250 grams or 1/4 kg of Borax and add it to the water



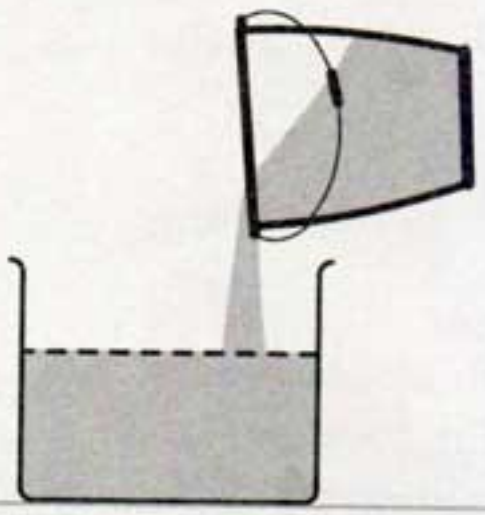
3. Stir the solution to dissolve the Borax and pour it into a stainless steel vessel



4. Take 5 litres of water in a bucket

5. Weigh 250 grams or 1/4 kg of Boric acid, add it to the water and stir the solution to dissolve the Boric acid

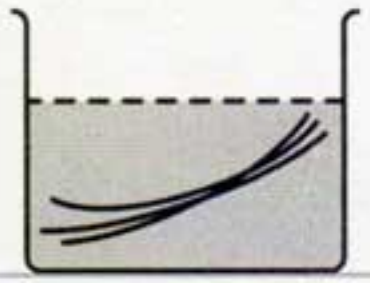
6. Pour this solution in the same vessel - This is 5% Borax-Boric Acid Solution



The bamboo strips can be either soaked and left or heated in the solution.

Both the methods are effective.

- The heating or soaking can be done in long tanks if the strips are long. If a long tank is not available, then the soaking or heating can also be done in a vessel of suitable size by coiling and immersing the bamboo strips.

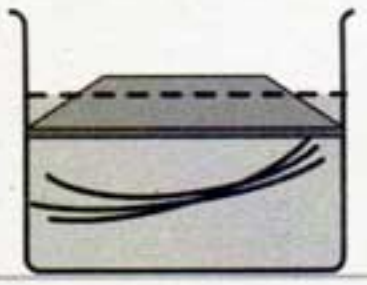


Soaking Method

1. Dip the strips in the solution

2. Allow it to be soaked in it for 24 hours

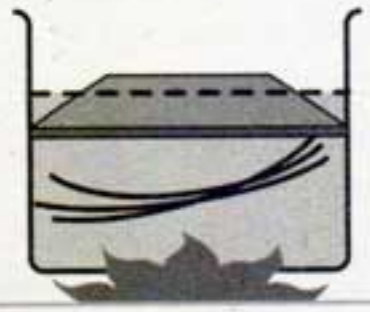
3. Remove the strips and dry in shade



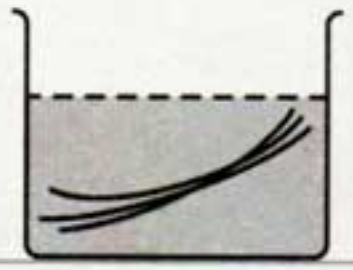
Heating Method

1. Dip bamboo strips into the treating solution so that it is completely submerged

2. Place a suitable perforated wooden plank or bamboo structure on the strips to keep them fully soaked in the solution



3. Warm the solution.
Do not boil it.
Continue heating for 30 minutes



4. Cool the solution to room temperature

5. Remove the strips and dry in shade

Precautions

1. Avoid storing the strips for too long a time before being put in the treating tank (reference - dipping in cold solution as above.). in any case they should be dipped in the solution within 24 hours.

2. Do not tie up the strips into bundles or store them in heaps before being treated.

Limitations

1. This method of treatment is recommended for bamboo strips and sticks having thickness not exceeding 2.0 mm(0.08" approximately), there being no limitation on the width of the strip.

2. The treatment is not effective on sticks and strips made out of the outer skin as well as the inner skin of bamboo.

Personal Notes----------

Colouring bamboo with
natural dyes

Dyeing with Natural Colours

Dyeing textiles with colours obtained from natural substances dates way back to 3000 BC.

Natural dyes are obtained from plants (indigo, madder, Haldi) and from animals (cochineal).

In India traditionally, natural resources such as fruits, flowers, and roots have been used for colouring. Some examples are the use of palas flowers, pomegranate rind, and manjistha root. In fact until almost the middle of the nineteenth century, natural dyes were the only choice. The synthesis of Alizarin and Indigo opened the floodgate for the entry of synthetic dyes that replaced many traditional methods of colouring.

This has resulted in the decline in traditional practices and has adversely affected the quality of the crafts in India. Use of natural resources for colouring bamboo another natural material exemplifies the perfect empathy between humans and its ecosystem and improves its commercial quality.

A large number of these natural substances such as Manjistha, Harda and Turmeric have medicinal properties in addition to being good colouring agents.

Dyes from natural material is now a preferred choice owing to its environment-friendly character.

Dyeing with natural colours can be done on various materials such as silks, wool, cotton and even bamboo. However materials such as silk and wool can be coloured by dipping in the natural dye. While other materials require an additive called mordant.

Personal Notes----------

Chemistry
of dyeing

Mordanting : A mordant is a chemical that helps the dye bond chemically to the fiber. The use of natural colours is assumed to be safe and hence is generating more interest. However, additives have to be used along with natural substances such as harada and katha, to give desired colours. These additives called mordants such as ferrous sulphate & Potassium Dichromate are used to give colour. Hence the mordants used for fixing the dye must also be safe. Most of the mordants that are used for natural dyeing are common household materials, and are not seriously toxic. Commonly used mordants are: potassium aluminum sulphate (alum) - available in any grocery store. Other mordants used are copper sulphate, salts of tin, iron and chrome, cream of tartar and tannins. In fact boiling the bamboo strips in an iron vessel can impart colour, as it can serve as a mordant.

Leach Test : It is important to know whether coloured bamboo products after mordanting with chemicals are safe to use for different purposes like storing food items. 'Leach test' is conducted on coloured bamboo items to know its acceptability for different purposes. Leach test consists of keeping the strips cut into small pieces in water that is stirred for 24 hours and testing the chemicals leached out from the object into the water.
Basically the leaching test procedure followed was the one proposed by the USEPA. The Toxicity Characteristic Leaching Procedure (TCLP). This method is intended to determine the property of the natural dyed bamboo strips to leach out metal salts when extracted in buffer solutions of low pH. This method was followed for those dyes where chromium was used to develop and fix colour.

Colourfastness to Light : Bamboo strips dyed with Natural colours can fade, when exposed to light over prolonged periods. Testing colourfastness with simulated conditions can help in choosing 'appropriate colour' while designing bamboo craft products. A protective coating of clear lacquer or melamine can reduce the fading of colour significantly.
The products dyed in natural colours were tested for colourfastness to light.
Test for colourfastness to light - MBTF was done at The Bombay Textile Research Association (BTRA),.Mumbai. This method helps in determining the resistance of the colour when exposed to weather, as simulated in a cabinet equipped with xenon lamp and a spray of water. Specimens of the coloured bamboo mats were exposed to light from Xenon arc lamp and to a spray of water. At the same time a blue dyed specimen used as standard is exposed to light under same conditions. Colourfastness is assessed by comparison with the standard. The ratings range from 1 to 7. A rating 1 indicates very poor colourfastness to weathering and 7 indicates very good colourfastness.
Another way to know the fastness of the colour is exposing the coloured strips in defined portions over a period to natural light and comparing with the unexposed area of the strips.
Some of the dyeing procedure was accordingly modified to ensure use of minimal quantities of the mordant, without sacrificing the colorfastness.

Effects of mordant on colouring
Alum (potassium aluminum sulphate), cow urine 'brightens' the colour.
Iron (ferrous sulphate) - 'saddens' colour (makes it darker).
Chrome (Potassium Dichromate)- brightens the colour.

01

Dyeing With Turmeric

Botanical name : Curcuma longa Linn
Sanskrit : Haridra
Hindi : Haldi
English : Turmeric

Part used : The root and rhizome (underground stem) of the plant is used. It is crushed and pounded to make powder.

Colour obtained : Yellow

This dye is not very colour fast to light hence is good for products that are not exposed to direct sunlight.

Turmeric is generally used as a spice and a traditional household medicine.

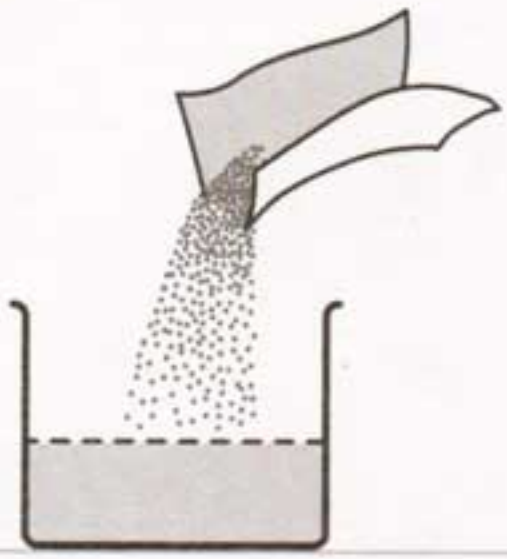
It is available in any grocery shop. The ready made powder available in masala packets or loose powder works equally well for dyeing bamboo strips.

MATERIALS REQUIRED

Turmeric	50 gms
Water	5 litres
Bamboo Strips	150
[Approximately 1 meter length]	

STAINLESS STEEL VESSEL

Personal Notes----------



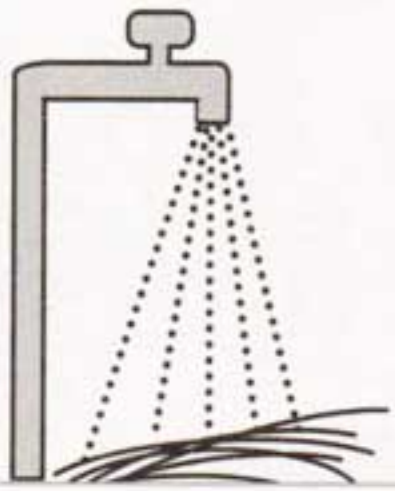
1. Take 5 litres of water in a vessel

2. Add 50 grams of Haldi to the water

3. Bring the solution to boil

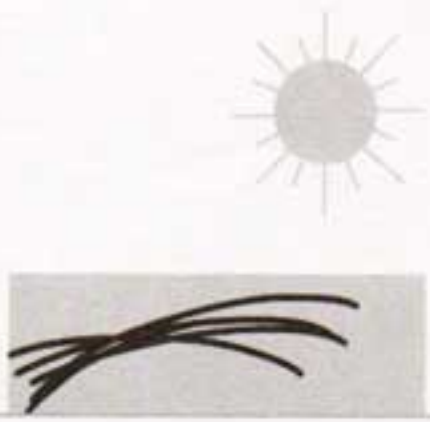
4. Dip bamboo strips in the boiling solution

5. Continue to boil for 45 minutes



6. Remove the strips from the solution

7. Wash the bamboo strips thoroughly with cold water



8. Dry the strips in shade

02

Dyeing With
Tea

Part used : Leaves

Colour Obtained : Light dull brown
This dye is colour fast to light.

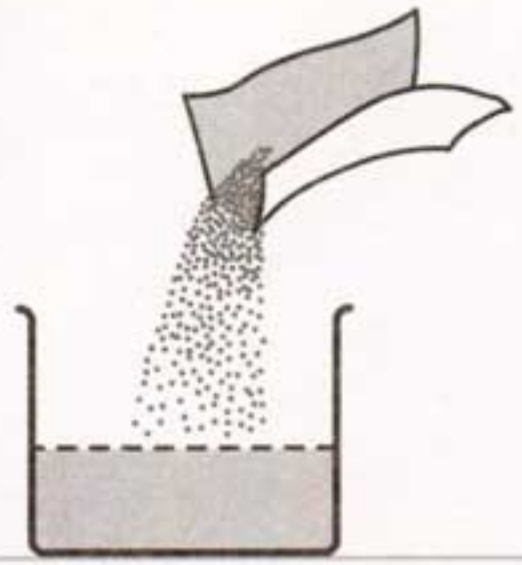
Tea leaves can be obtained from any local grocery shop.
Any popular brand like 'Tajmahal' or 'BrookBond Red label' or loosely sold tea dust can be used for dyeing.

MATERIALS REQUIRED

Tea Leaves	100 GMS
Water	5 litres
Bamboo Strips	100
[Approximately 1 meter length]	

STAINLESS STEEL VESSEL

Personal Notes----------



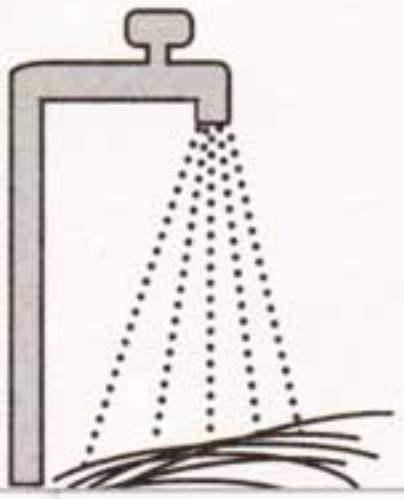
1. Add 5 litres of water into a stainless vessel

2. Weigh 100 grams of Tea leaves and add it to the water

3. Bring the solution to boil

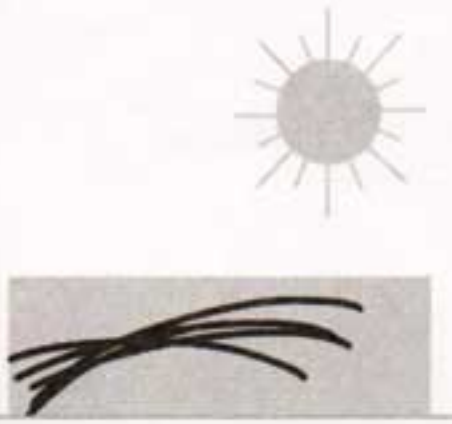
4. Dip the bamboo strips in the solution

5. Continue boiling the solution with the bamboo strips for 30 minutes



6. Remove the strips from the Tea solution

7. Wash in cold water



8. Dry in shade

03

Dyeing With
Cow Urine

Colour obtained : Very Light Brown

It is colour fast to light.

Cow urine can be obtained from any local cow shed

MATERIALS REQUIRED

Cow urine 5 litres

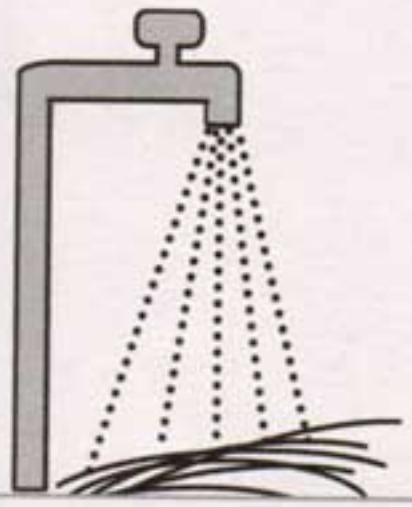
PLASTIC BUCKET / CONTAINER

Personal Notes----------

1. Take a plastic bucket
Add 5 litres of cow urine to the bucket

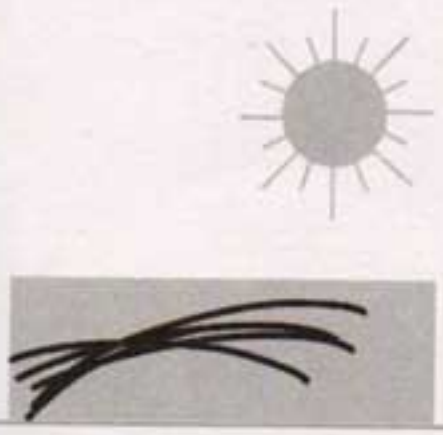
2. Soak the bamboo strips in the cow urine

3. Let it soak in the cow urine for 12 hours



4. Remove the bamboo strips from the cow urine after 12 hours

5. Wash the strips with cold water



6. Dry in Shade

04

Dyeing With Katha

Botanical name : Acacia catechu Wild
Sanskrit : Khadira
Hindi : Khair
English : Cutch tree

Part used : Bark

Colour obtained : Brown
Colour fast to light

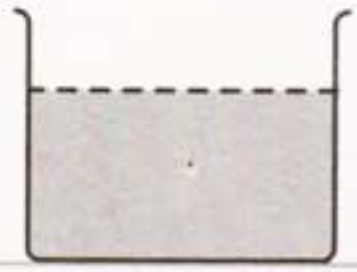
Katha is obtained by boiling the hard wood chips of Acacia catechu trees in water for several hours till a thick syrup is formed. The thick syrup is solidified into small bricks and sold as Katha. In India it is used with beetle leaves (pan leaves) and has medicinal value

Copper sulphate, Potassium Dichromate are obtained from a chemical market. In Mumbai it can be bought from Chemical Bazaar, near Crawford Market Katha is available in local grocery store all over the country.

MATERIALS REQUIRED

Katha	90 gms
Copper Sulphate	45 gms
Potassium Dichromate	90 gms
Bamboo Strips	150
Water	5 litres for each step

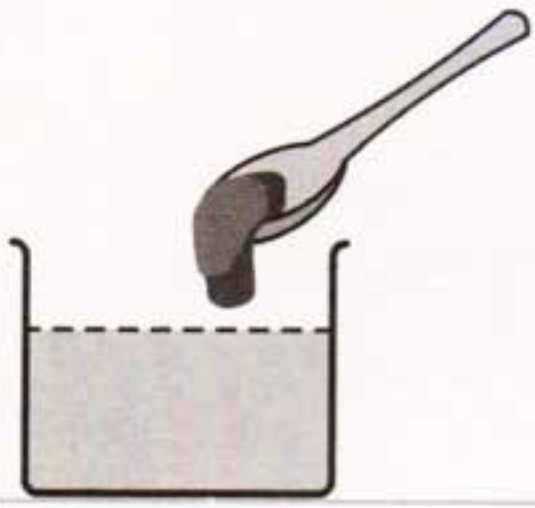
STAINLESS STEEL VESSEL



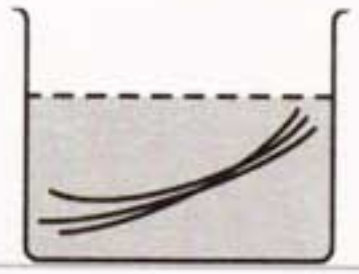
Dyeing with Katha involves three stages:

Stage 1

1. Take 5 litres of water in a stainless steel vessel

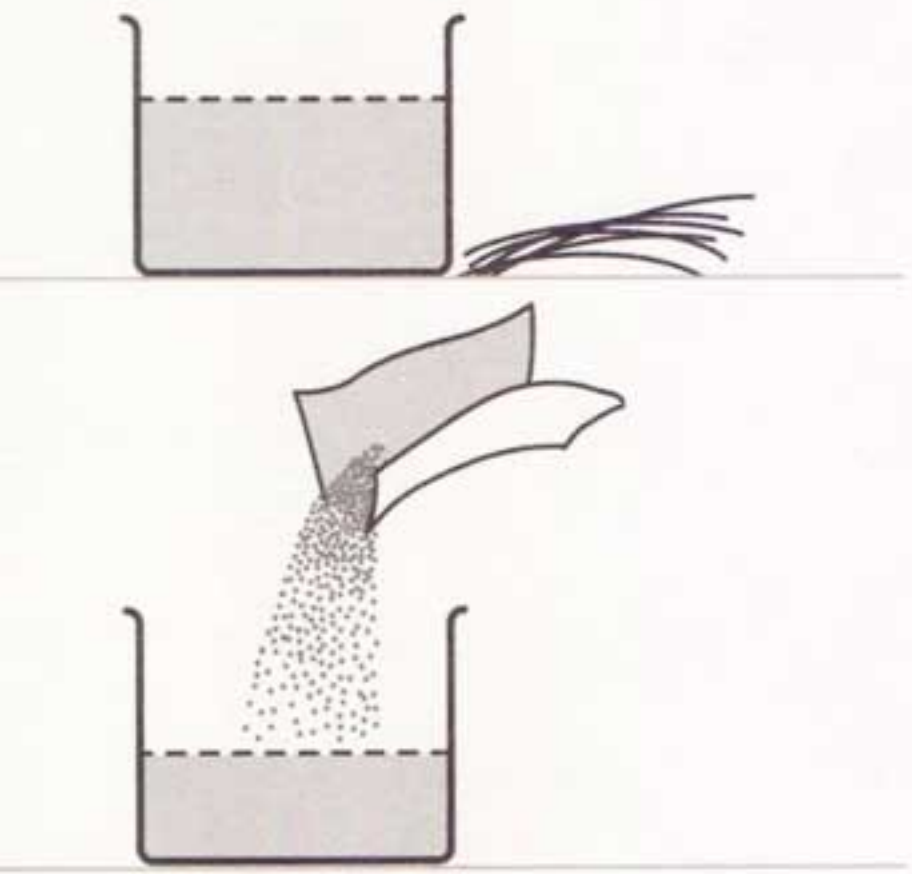


2. Weigh 90 grams of Katha and add it to the water



3. Dip bamboo strips in the solution

4. Boil the Katha solution with the bamboo strips for 30 minutes



5. Remove the strips from the Katha solution

6. Keep the strips aside for stage 2
-At this stage the strips do not have any colour

Stage 2

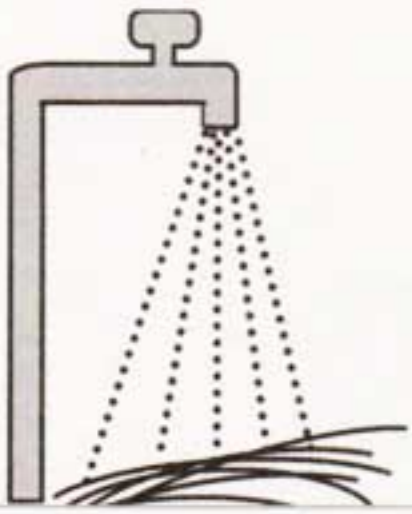
1. Take 5 litres of water in a vessel

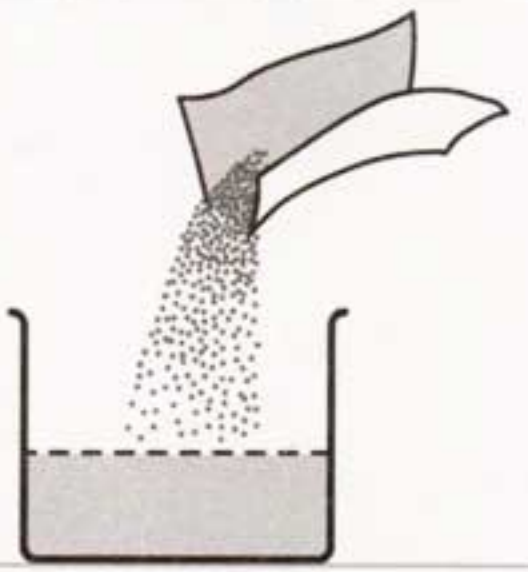
2. Weigh 45 grams of Copper Sulphate and add it to the water

3. Bring the solution to boil

4. Pick up the bamboo strips kept aside from stage 1

15 Minutes





5. Put the bamboo strips in the Copper sulphate solution

6. Boil this solution with the bamboo strips for 15 minutes

7. Remove strips from solution

8. Wash the strips in cold water

9. Keep these strips aside for Stage 3

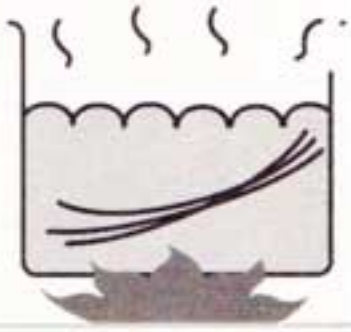
-The colour at this stage is light brown

Stage 3

1. Take 5 litres of water in a stainless steel vessel

2. Add 90 grams of Potassium Dichromate to the water

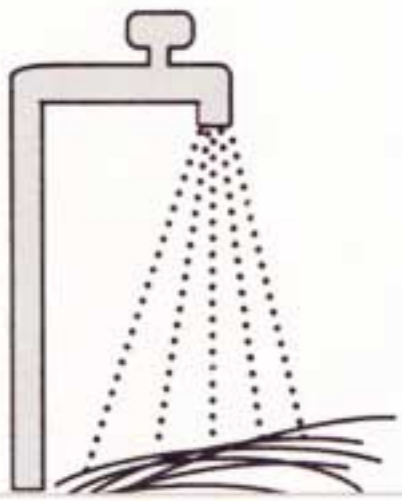
3. Bring this solution to boil



15 Minuets

4. Dip the bamboo strips kept aside from Stage 2 in this solution

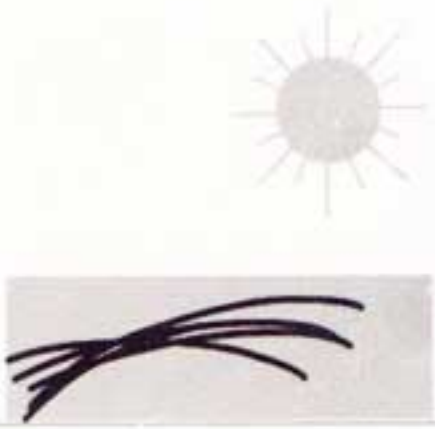
5. Boil it for 15 minutes



6. Remove the strips from this solution

7. Wash the strips thoroughly with cold water

-At this stage the strips are coloured brown



8. Dry the strips in shade

Personal Notes----------

05

Dyeing With Harda

Harda is obtained from any grocery store
Ferrous Sulphate is obtained from a chemical market

Botanical name : Terminalia chebula
Sanskrit : Haritaki
Hindi : Harad
English : Chebulic myrobalan

Part used : Fruit & flowers

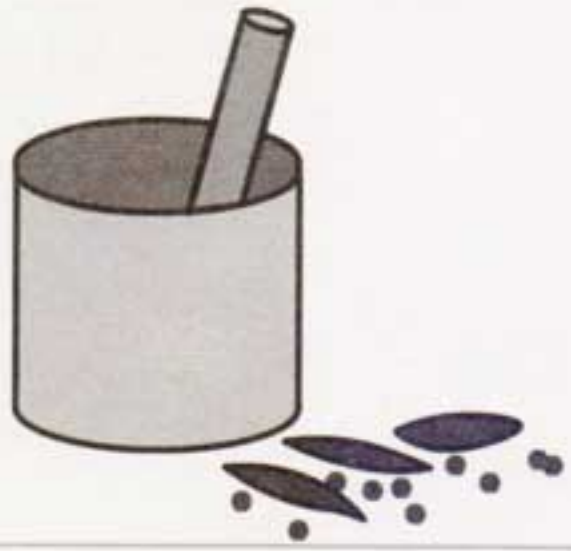
Colour obtained : black
This is colour fast to light

Haritaki is used in home remedies, one of it's best use is as a mild laxatives. The fruit is an important constituent of triphala

MATERIALS REQUIRED

Harda	200 gms
Ferrous Sulphate	100 gms
Water	10 litres (5 litres per stage)
Bamboo strips	150

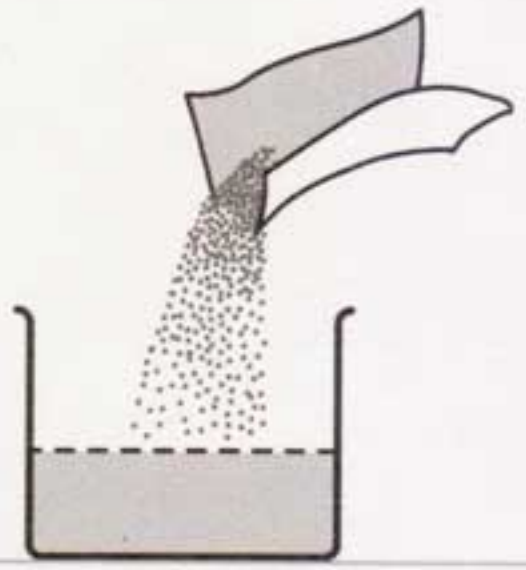
STAINLESS STEEL OR ALUMINIUM VESSEL



Dyeing with Harda is done in Two stages

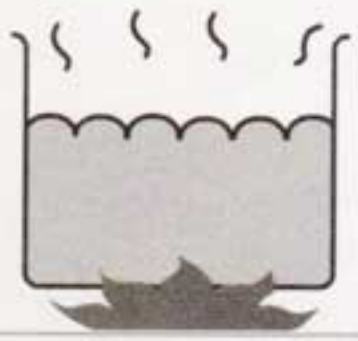
Stage 1

1. Powder the harda



2. Take 5 litres of water in a vessel

3. Add the Harda to it

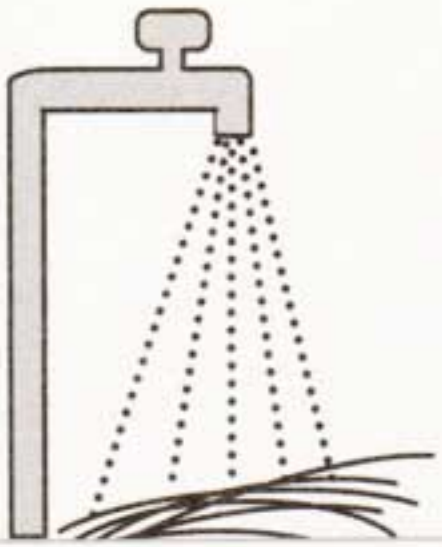


4. Bring the solution to boil

60 Minutes

5. Dip the bamboo strips in the boiling solution

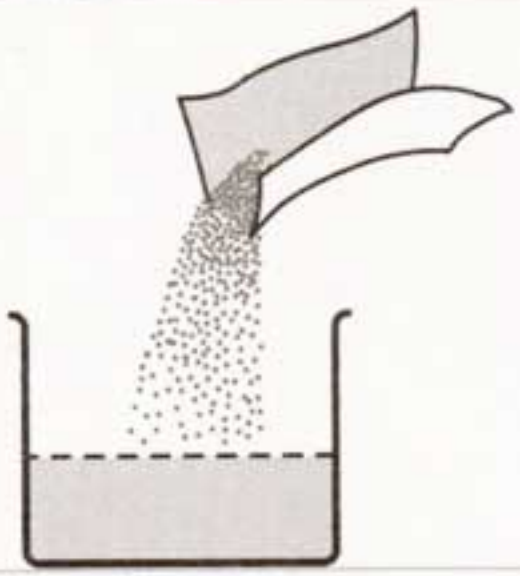
6. Continue boiling for one hour (60 minutes)



7. Remove the strips and wash with cold water

8. Keep the bamboo strips aside for stage 2

-At this stage there is no change in colour of the strips



Stage 2

1. Take 5 litres of water in a vessel

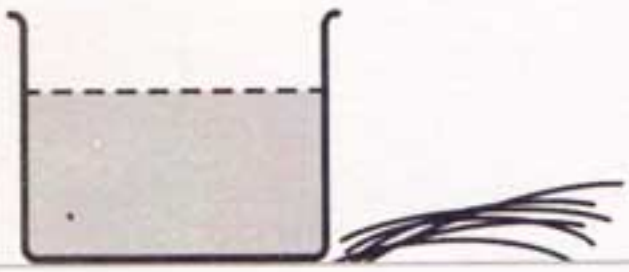
2. Add 100 grams of Ferrous Sulphate to the water

3. Bring the solution to boil

4. Pick up the strips kept aside from stage 1

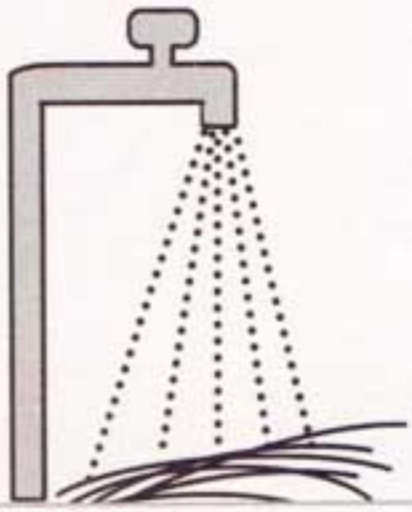
5. Dip the strips into the boiling Ferrous Sulphate solution

6. Continue boiling for one hour (60 minutes)



7. Remove the strips from solution

-At this stage the strips are coloured black



8. Wash with cold water

9. Dry the strips

Personal Notes----------

06

Dyeing With Flame of the Forest

Botanical name : Butea monosperma Kuntze / Butea frondosa Koenig
Sanskrit : Palas
Hindi : Palas, Tesu
English : Flame of the forest

Part used : Flowers

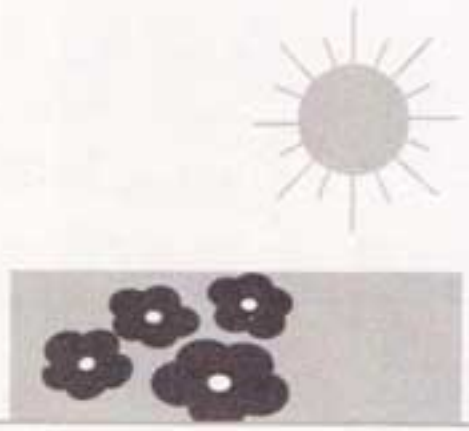
Colour obtained : Yellow / Orange

The flowers yield a brilliant colour and have a fugitive yellow colouring matter. The tree yields a gum called butea gum or Bengal kino, which is an astringent and used in diarrhea.

MATERIALS REQUIRED

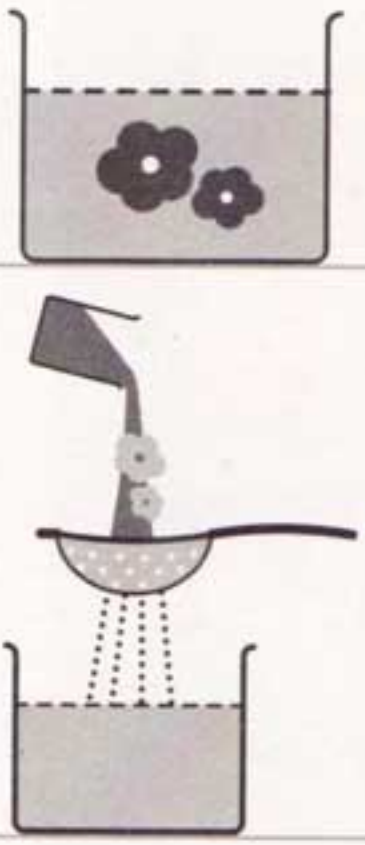
Flame Of The Forest Flowers	10
Water	400 ml
Bamboo Strips	5

GLASS BEAKER BOROSIL MAKE



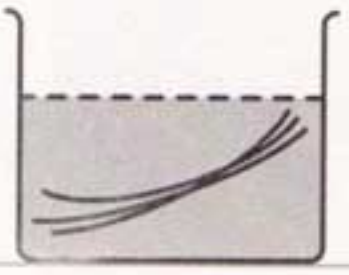
1. Collect the Flame of the forest flowers

2. Dry them well in the Sun and store



3. Soak the dry flowers over night in water

4. Next morning strain the solution and keep it aside

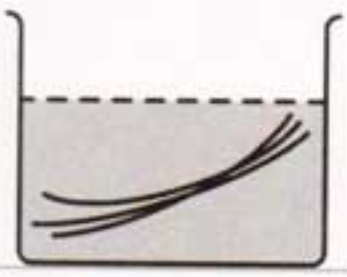


5. Take the liquid in a beaker. Add the strips to it

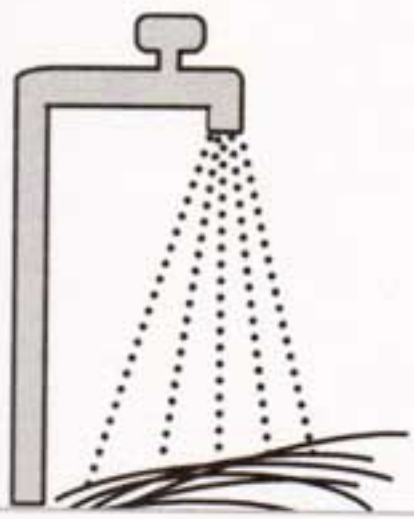
6. Soak for 2-3 hours

60 Minutes

7. Boil the solution for one hour (60 minutes)
Remove the beaker from the flame



8. Leave the strips in the solution to cool overnight



9. Next morning remove strips and wash in cold water

10. Dry in shade

Personal Notes----------

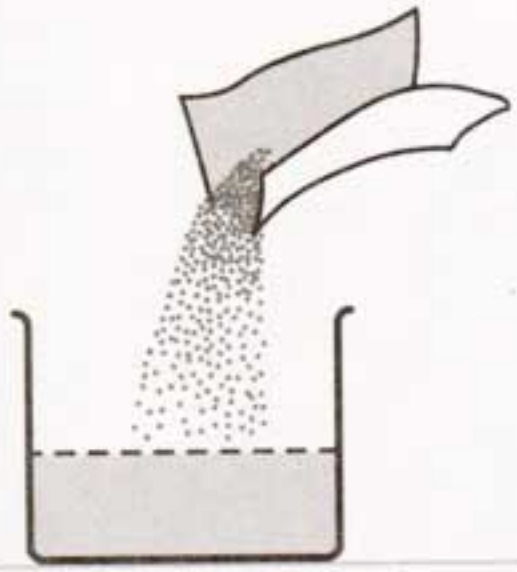
07

Dyeing With
Jungle Yellow

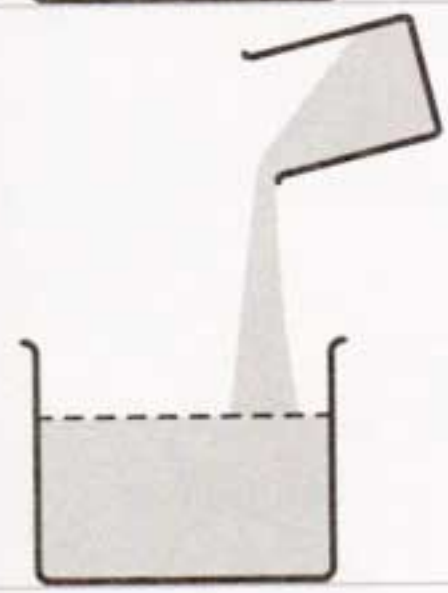
Jungle yellow is obtained from
Nova Transfers Pvt. Ltd.,
Shyam Nagar,
Jogeshwari East,
Mumbai 400060
Tel. 91-22-28326741/28322527
Fax 91-22-28350892
E-mail <nova@bom2.vsnl.net.in>

MATERIALS REQUIRED

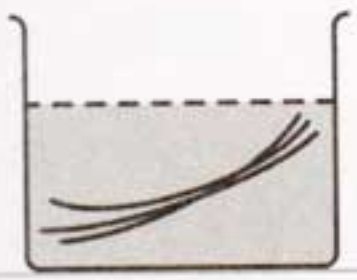
Jungle Yellow Powder	30 gms
Water	500 ml
Bamboo strips	5



1. Take 200 ML of water, dissolve jungle yellow powder and keep the solution overnight



2. Next day add 300 ML water to make the volume of solution to 500 ML

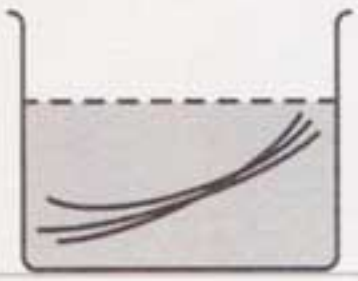


15 Minutes

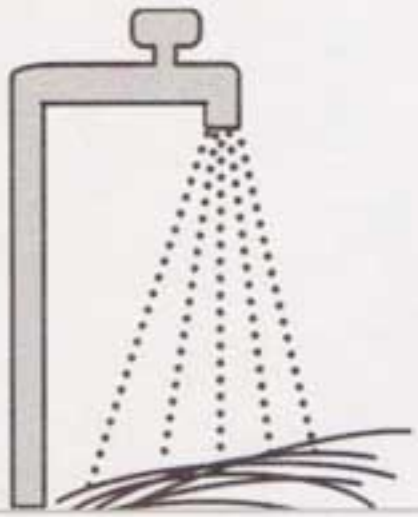
3. put the bamboo strips in it for 15 minutes

60 Minutes

4. Boil the bamboo strips in the solution for one hour (60 minutes)



5. Leave the strips in the solution overnight



6. Remove the strips from the solution and wash with cold water

7. dry in shade

Personal Notes----------

08

Dyeing With
Manjishta Powder

Botanical name : Rubia cordifolia Linn
Sanskrit : Manjistha
Hindi : Manjit
English : Indian Madder / Bengal Madder

Part used : Root & Stem

Colour obtained : Red / scarlet

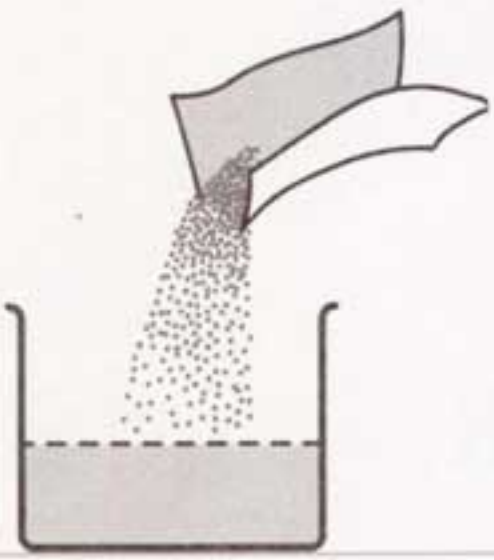
Manjishta powder is available in purified form from Dr Jain's herbal or as locally powdered root.
Root powder is also available in Chemical Bazaar near Crawford Market in Mumbai.

Precaution -
Maintain the temperature of the dye solution at 60 - 70 ° C. Do not allow the solution to boil.
If it boils then the strips will not get coloured red.

MATERIALS REQUIRED

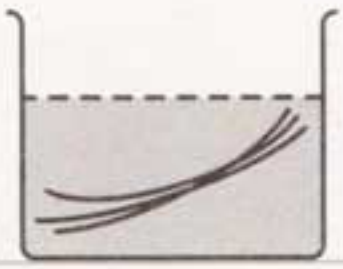
Manjishta Powder	20 GMS
Tartaric Acid	5 GMS
Potassium Hydrogen Tartarate	5 GMS
Alum	10 GMS
Water	750 ML
Bamboo Strips	200
Thermometer	

ALUMINIUM OR STAINLESS STEEL VESSEL

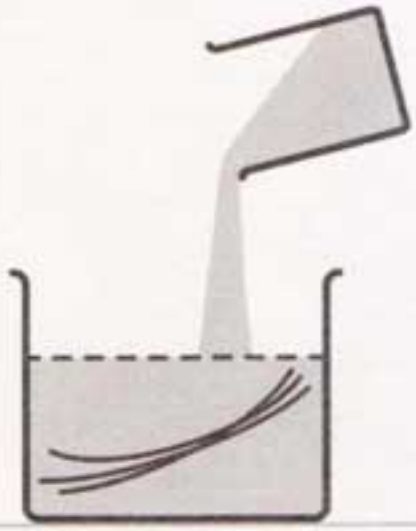


1. Take 750 ML of water in a vessel and add Manjistha powder to it

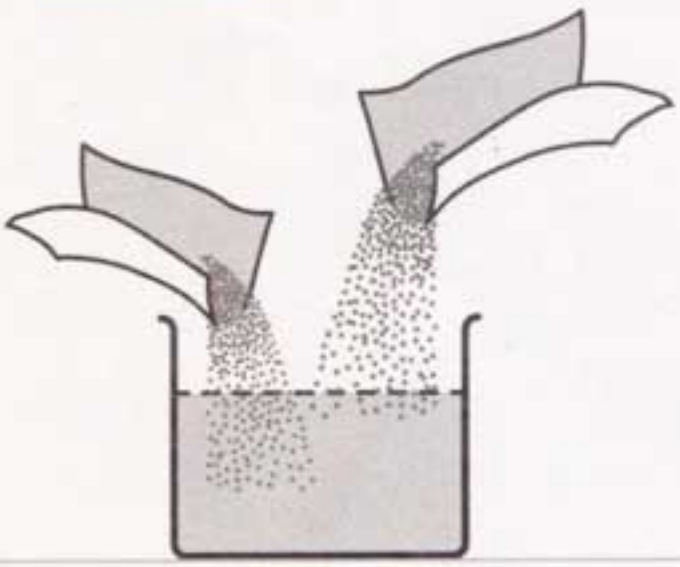
2. Allow the powder to soak in the water overnight



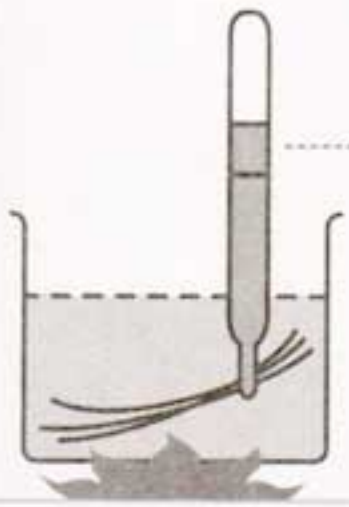
3. Next morning, add the bamboo strips to the vessel with the Manjistha soaked in it

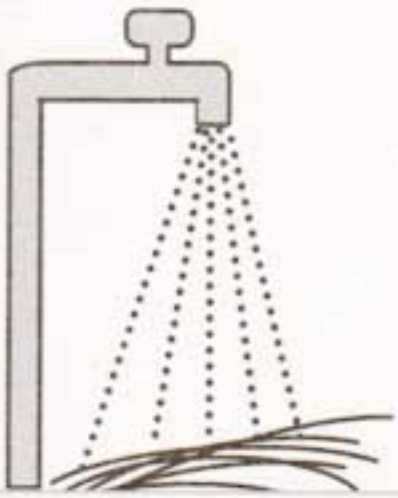


4. Add more water till the strips are completely immersed in the solution



5. To this solution add tartaric acid
Then add Potassium Hydrogen Tartarate





6. Place a thermometer in the solution and heat the solution for 3 ½ hours maintaining the temperature at 60-70° C

-If a thermometer is not available, feel the water on your skin, it should feel hot. The temperature can be maintained by putting the flame of the stove on and off.

7. Remove the strips from the dye solution and wash with cold water

-If the colour is light then put the strips back in the same solution and heat for another 2 hours. It has been observed that Manjishta powder obtained from Dr Jain's herbal gives a deep shade of orange, while that obtained from the roots or root powder is a shade duller.

Personal Notes----------

09

Dyeing With Manjishta Roots

Botanical name : Rubia cordifolia Linn
Sanskrit : Manjistha
Hindi : Manjit
English : Indian Madder / Bengal Madder

Part used : Root & Stem

Colour obtained : Red / scarlet
This is colour fast to light

Manjishta roots have therapeutic value and are used in various ayurvedic preparations because of its known property as powerful blood purifier.

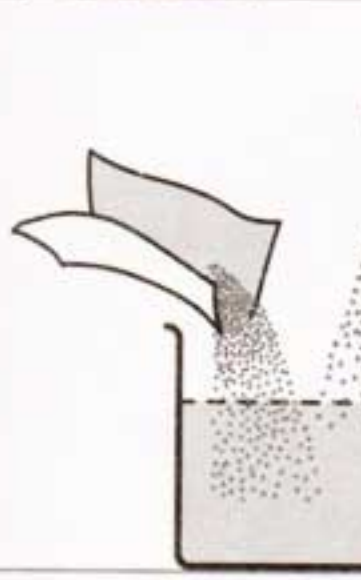
Potash alum and Tartaric acid are available in chemical stores.

Precaution -
Maintain the temperature of the dye solution at 60 - 70 ° C.
Do not allow the solution to boil.

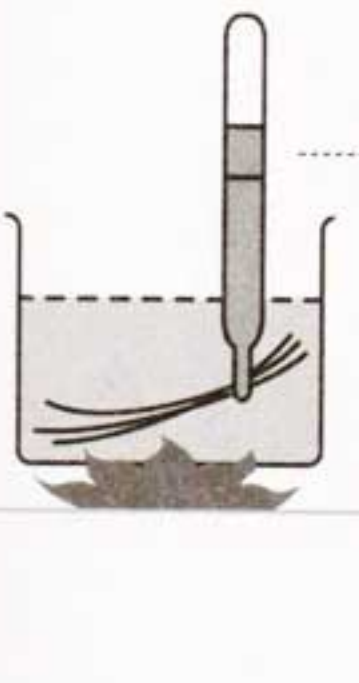
MATERIALS REQUIRED

Manjishta Roots	250 GMS
Potash Alum	5 GMS
Tartaric Acid	2.5 GMS
Bamboo Strips	100
Water	just enough to immerse the strips
Thermometer	

1. Soak the manjistha roots in water overnight



2. Strain the solution and Keep the dye liquid aside



3. To the dye liquid add Potash Alum (5 grams) Then add Tartaric acid (2.5 grams)

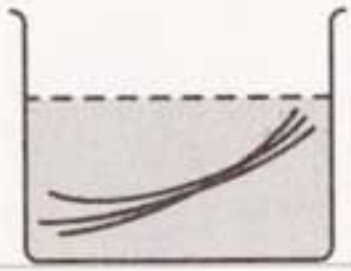
4. Dip the strips in the liquid

5. Dip a thermometer in it

6. Warm the solution

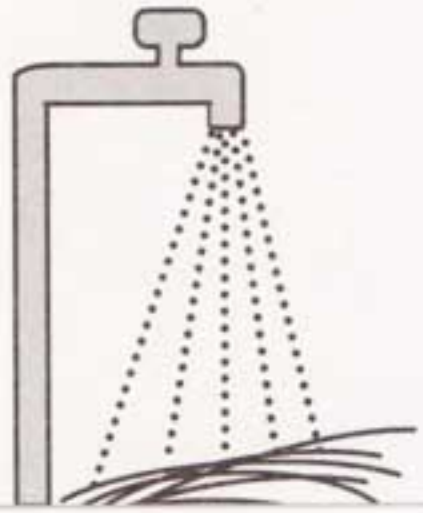
. Maintain the temperature at 60-70° C

. Warm the solution for 1-½ hours



7. Remove the vessel from the flame

8. Leave the strips soaked in the dye solution overnight (24 hours)



9. Next day remove strips from the solution and wash

10. Dry in Shade

Personal Notes----------

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Dyeing With
Manjishta
Obtained from Alp's Laboratory

Botanical name : Rubia cordifolia Linn
Sanskrit : Manjistha
Hindi : Manjit
English : Indian Madder / Bengal Madder

Parts used : Root & Stem

Colour obtained : Red / scarlet
This is colour fast to light

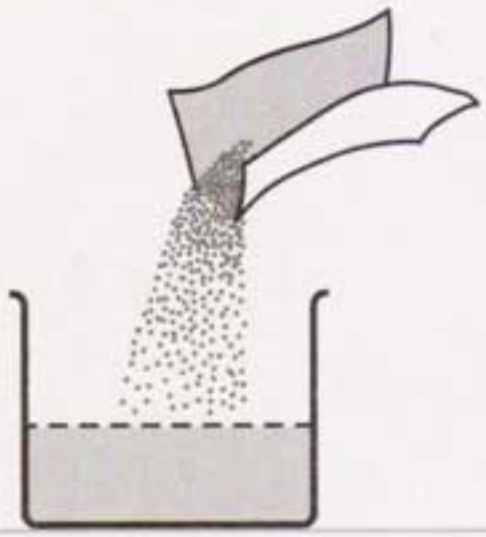
Manjishta Powder can be obtained from,
ALPS Industries Limited
57/2, Site IV, Industrial Area,
Sahibabad, Ghaziabad (U.P.) 201010,India
Tel. 91-0120-4896022 /23 /24
E mail : <naturaldyes@alpsindustries.com>

Precaution-
Maintain the temperature of the dye solution at 60 - 70 ° C.
Do not allow the solution to boil.

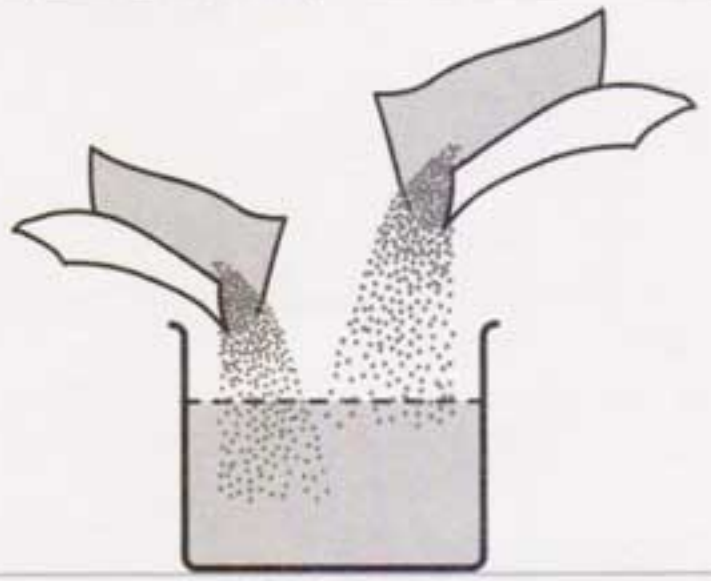
MATERIALS REQUIRED

Manjishta Powder (Alp's Lab]	5 gms
Potash Allum	5 gms
Tartaric Acid	2.5 gms
Bamboo Strips	25
Water	
Thermometer	

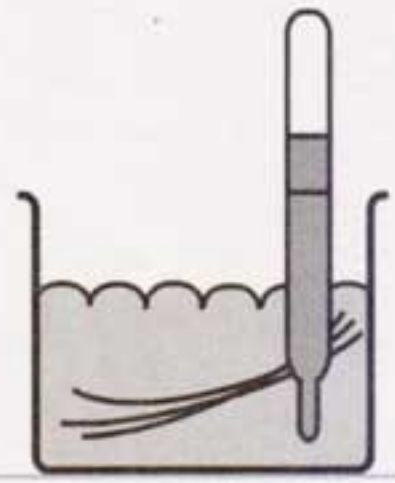
STAINLESS STEEL OR ALUMINIUM CONTAINER



1. Soak 5 gms of Manjishta in water for 2 days

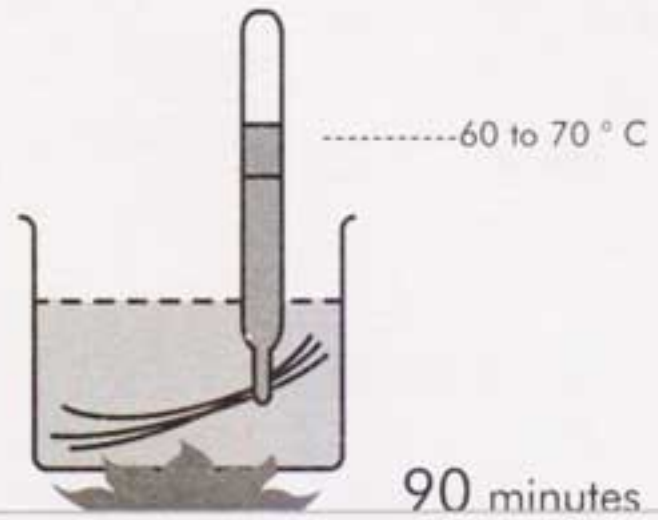


2. To this solution add 5 gms of potash Alum and 2.5 gms of Tartaric Acid

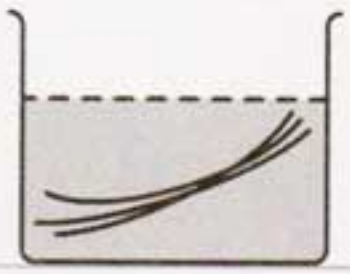


3. Put the bamboo strips in the solution

4. Dip a thermometer in the solution

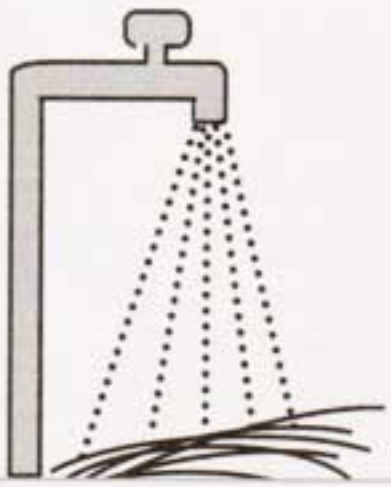


5. Warm the solution with the strips maintaining the temperature at 60-70 °C for 1 and 1/2 hours (90 minutes)

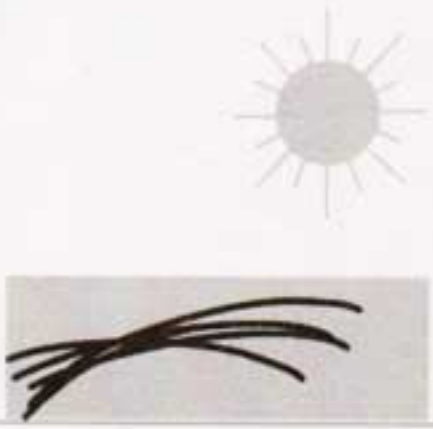


6. Remove the vessel from the flame
Leave the strips in the solution overnight

-If the colour of the strips is dull Warm the strips in the same solution for 2 1/2 hours maintaining the temperature between 60-70 ° C



7. Remove the strips from the vessel and wash with cold water



9. Dry in shade

Personal Notes----------

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Dyeing With Indigo

Indigo is available at :
Day Glo Colour Corporation,18/109,
Jogani Industrial Complex, V N Purav
Marg, Chunabhatti, Mumbai,
Maharashtra, India
Tel. 524 58 01 FAX 524 58 03
contact Mr Premal Kacharia
E mail : <dayglo@bom7.vsnl.net.in>

Precaution -

· Wear a mask while measuring powder chemicals to avoid inhalation

· Wear rubber gloves while measuring chemicals as some of them are corrosive

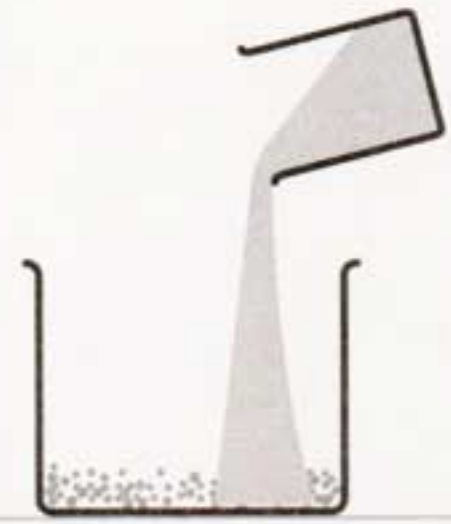
· Use only enamel or plastic buckets / trays for dyeing with indigo. Do not use steel or aluminium vessel.

MATERIALS REQUIRED

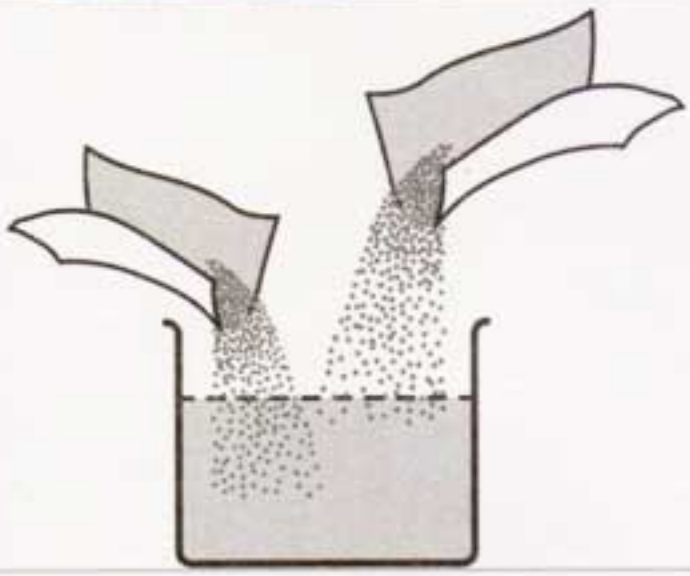
Indigo	One large spoon
Sodium Hydroxide	1.5 times indigo
Sodium Dithionate	5 times indigo
Water	enough to soak the strips

Rubber Gloves, Plastic Tub, Plastic spoon

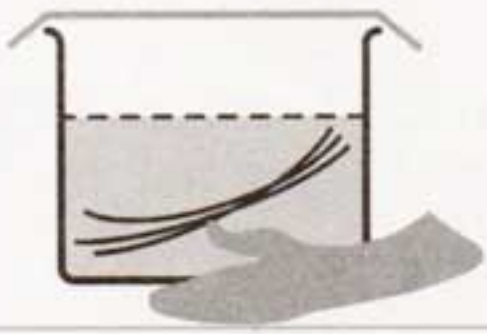
Personal Notes----------



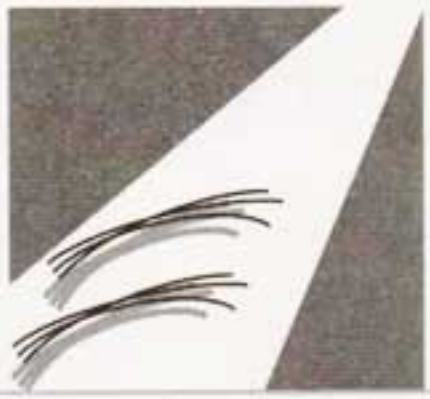
1. Take required quantity of indigo and add enough water to soak it



2. Add sodium hydroxide to it. Then add Sodium Dithionate.
Stir till the solution is clear



3. Put bamboo strips in the solution and keep the tub covered. Shake the tub occasionally.



4. Remove the strips and expose them to air for the colour to develop

After constant experimentation we have observed that dyeing with Indigo depends upon the time the strips are allowed to soak in it. To get various shades one has to just vary the dipping time.
By dipping a strip and taking it out immediately, light shade of blue is obtained.

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Dyeing to get
Olive Green Colour

1. Make dye solution as mentioned in Indigo dyeing

2. Put the strips pre-dyed in Katha in the dye solution and expose to light to get Olive Green colour

The spent solution can be repeatedly used to obtain lighter shades of Green colour

Personal Notes----------

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Dyeing With Alta

Alta is a dye used by Indian women to colour their hands during festivals.

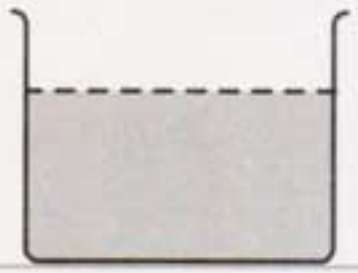
Colour obtained : Dark pink to light pink depending on the quantity of alta used.
It is colour fast to light.

Alta can be obtained from local general store.

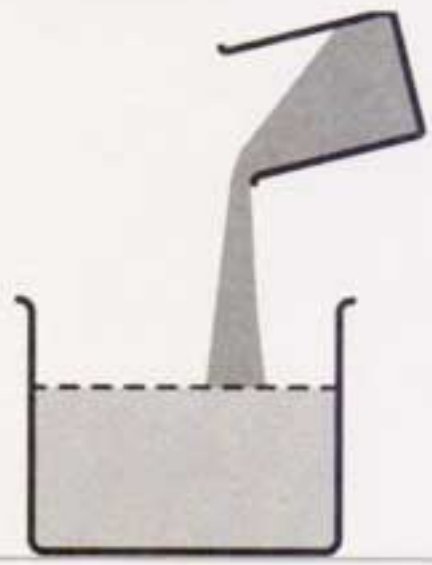
MATERIALS REQUIRED

Alta	125 gms
Water	5 litres
Bamboo Strips	100

STAINLESS STEEL VESSEL



1. Take 5 litres of water in a vessel



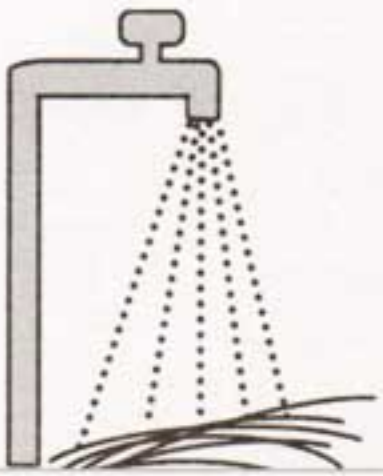
2. Weigh 125 grams of Alta and add it to the water in the vessel

3. Bring this solution to boil

4. Put the bamboo strips in the solution

5. Continue to boil for 30 minutes

30 minutes



6. Remove the strips from the solution and wash

7. Continue washing till no colour runs

8. Dry the strips in shade

Personal Notes----------

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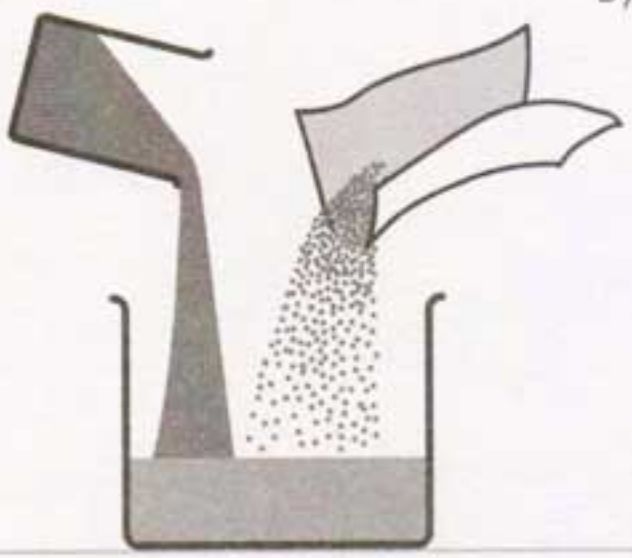
Dyeing to get
Orange Colour

Haldi powder is available in any local grocery shop.
Alta can be obtained from local general store .

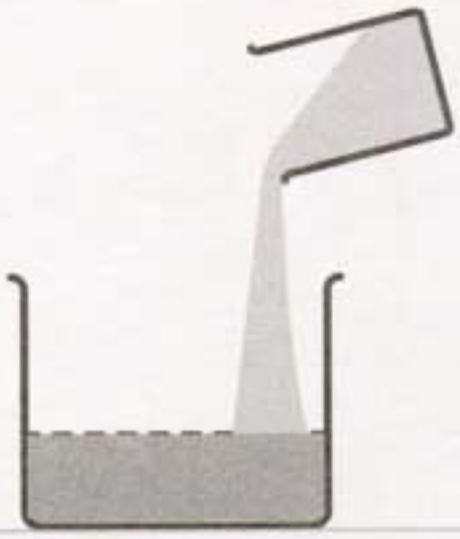
MATERIALS REQUIRED

Haldi Powder	50 gms.
Alta liquid	2 tsp
Water	6 litres
Bamboo Strips	130

STAINLESS STEEL VESSEL



1. Mix haldi powder and alta in a stainless steel vessel (till the desired orange colour is obtained)

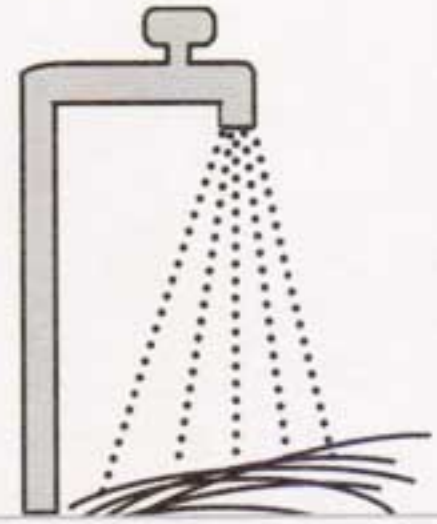


2. Pour 6 litres of water in the vessel

3. Stir well and bring to boil

30 minutes

4. Put the bamboo strips in the solution and continue boiling for 30 minutes



5. Remove the strips and wash them in cold water.

6. Dry strips in shade

Personal Notes----------

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Dyeing to get
Purple Colour

1. Make dye solution mentioned in Indigo dyeing

2. Put strips pre-dyed with Alta in the solution and then expose to light to give purple colour

Personal Notes----------

Creating Colours
Can be Fun!

Colouring with Natural Dyes can be fun.
This manual gives methods for creating a few colours. But one need not be restricted. One can get many colours by mixing two colours or just by boiling coloured strips in different mordants

· After dyeing bamboo strips in haldi, boiling it in a solution of Iron salts gives various shades of light, golden to dark brown

· Yellow strips (dyed with haldi) and boiling in copper sulphate solution gives a pale yellow or brightens the colour.

. Mixture of yellow and blue can give pure green. One can get various shades of green by dyeing strips dyed in tea or Katha with Indigo.

· Dyeing yellow strips in indigo can give different shades of green.

. Mixture of red and blue can give Violet. Strips dyed in Alta with Indigo gives various shades of Purple.

. Orange to pink shades can be obtained by dyeing strips with varying proportions of Haldi and Alta.

Personal Notes----------

Indigo

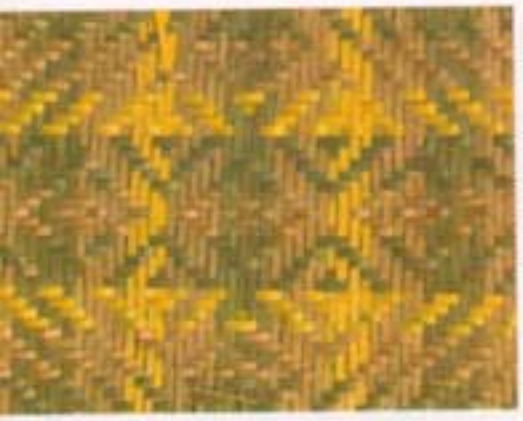
Turmeric

Katha

Indigo

Turmeric + Alta

Alta



A mat weaved with bamboo strips
dyed in Katha, Turmeric and Tea leaves

Harda

Alta + Indigo

Manjishta

Tea Leaves

Cow urine

BambU Studio, Industrial Design Centre,
IIT Bombay