International Journal of Home Science 2020; 6(1): 335-338

International Journal of Home Science

**ISSN:** 2395-7476
IJHS 2020; 6(1): 335-338

www.homesciencejournal.com
Received: 10-11-2019
Accepted: 14-12-2019

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# To study about the functional properties of *Tectona grandis*

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**Abstract**
Next to agriculture, the textile industry in India ranks. Continued growth to improve quality of life. A bamboo fiber has a good reputation in the clothing industry for the benefit of both humans and earth. Bamboo leaves have antioxidant properties, menstrual irregularities or conditions can be helpful by taking bamboo shoots to help regulate the process. Natural colors are colors that are produced from plants, invertebrates, or minerals. The teak leaf in Ayurdeva is known to be a laxative, uterine sedative, perfect for piles, dysentery, and leucoderma. Resent studies show the antibacterial properties of the teak plant. Teak leaf has been shown to have both dyeing and medicinal properties in this study.

**Keywords:** Teak leaf, finishing, antifungal, antibacterial

## 1. Introduction
Next to agriculture, the textile sector in India ranks. Textile is one of India's oldest industries and has a significant presence in the national economy, contributing to about 14% of the added value of manufacturing, accounting for about one-third of our gross export earnings and providing productive jobs for millions of people. In our country, the textile industry has a unique place. Natural fibers are derived from plants, animals and minerals. Because these are naturally available, they are called natural fibers. Consisting of cellulose, plant fibers are known as natural cellulosic fibers. fibers, especially cotton and silk, are the essential raw material for making fabrics. There are two types of fibers: organic fibers, consisting of animal and plant fibers, and man-made fibers, consisting of synthetic fibers and regenerated fibers.

### 1.1. Health benefits of teak leaf
Teak is a very good source of flavonoids, carbohydrates, alkaloids, saponins, tannins and proteins. Studies also reveal that the teak plant has anti-inflammatory, antipyretic, antidiabetic, anti-ulcerogenic, antibacterial, analgesic, antioxidant, anti-diuretic, hypoglycemic, anti-asthmatic, antimicrobial, anti-inflammatory properties. Colouring is made from root bark and young leaves and is used for paper, matting and textile items. The coluring may be red-brown or yellow-brown. Dye alone from the leaves is used for the dyeing of wool and cotton in particular. The sawdust is burned as an inciens in java, Indonesia.

## 2. Methodology
### 2.1. Selection of 100% bamboo knitted fabric
The bamboo Knitted fabric was environmentally friendly. The 100%bamboo knitted fabric was purchased in Tiruppur, Kothari Fabs. I KG of fabric was bought it of about 6 meters.

**Plate 1:** Bamboo fabric

**2.2. Desizing**

Desizing is the process of removing the starch from the fabric. here the 100%bamboo knitted fabric was processed to remove the starch as follows.

**2.2.1. Procedure**

**2.2.1.1 Materials required**

| | | |
|---|---|---|
| Fabric | : | 680gm (4 meters) |
| Water | : | 5 litters |
| Detergent | : | 25gm |
| Temperature | : | 60ºC |

First the 25gm of detergent was mixed with 5 liter of water. then the 100% of bamboo knitted fabric was immersed in the prepared solution for 30 mins with the temperature 60ºC.After the 30 mins the fabric was removed from the solution and it washed the tap water. then fabric was squeezed and dried.

**Plate 2:** Desizing

**2.3. Selection of mordant**

Myrobalan is a great dye to modify colours on Bamboo fabric. On its own it produces butter yellows. Myrobalan (Terminalia chebula) is a deciduous tree that grows in Asia, mainly in the foothills of the Himalayas. The dye comes from the dried fruits, which are ground into a powder. Myrobalan is rich in tannin and can be used both as a mordant and a dye for cotton and bamboo fabric. Mordent is nothing but an agent used to fixing the dye in the fabric. In this process myrobalan was used as a fixing agent.

**2.3.1. Materials required**

| | | |
|---|---|---|
| Fabric weight | : | 680gm (4 mtr) |
| Myrobalan mordant | : | 102 gm |
| Water | : | 6 litters |
| Temperature | : | 60ºC |
| Time duration | : | 1 hr |

The myrobalan powder was extracted of weighted according to the fabric weight. the amount of myrobalan powder is measured according to the weight of the fabric. For 1 gm of 100% bamboo knitted fabric 0.15gm myrobalan powder was adding for the preparation of the solution. There are 680gm 100%bamboo knitted fabric 102gm myrobalan powder was added.

**2.3.2. Procedure**

First the 102 gm of myrobalan powder was mixed with 6 liter of cold water. The 100%knitted bamboo fabric was immersed in to the prepared solution. The fabric was immersed in 30 mins with 60ºC temperature. Then the fabric was squeezed and dried.

**Plate 3:** Myrobalan powder

**2.4. Selection of herbs for dyeing**

For the dyeing process Tectona grandis was selected. the leaf of tectona grandis was collected from the trees. And it was grown in tropical areas. Only young leaf was chosen for the extraction of dyes. Only in young leaf the dyeing property was found greater. where as no dyeing property was found in matured leaf.

**2.4.1. Drying of herbs**

Provided they are dried appropriately, herbs are able to preserve a significant quantity of their unique hue, aroma as well as healing properties. In fact, it is not all difficult to dry herbs property nevertheless, it requires you to be cautious while drying them as well as be aware of the particular attributes of each plant. Initially, you need to remove the plants away from direct sunlight immediately after you have completed collecting or harvesting them. You always need to following a common rule of thumb while drying herbs. As per this rule, you should always dry up all warming herbs in sunlight, while the cooling herbs should always be desiccated in the shade.

**Plate 4:** Dry Herbs

It was ensure that are removed all the soil from the leaf herbs you have cultivated soon after harvesting the plants.

**2.4.2. Grinded**

Dry grinded powder of the selected herbal portion was done in grinded mixers. After that, the powder was sieved with seiver to remove the dirt and unkind particles. The fine powder obtained was used for extractions.

**2.5. The extraction of dye solution from the selected herbs was done in three different Methods**

1. Aqueous dye extraction method
2. Ethanol dye extraction method
3. Methanol dye extraction method

**2.5.1. Ethanol dye extraction method**

**Material required**

| | | |
|---|---|---|
| Dye powder | : | 50gm |
| Water | : | 1 liter |
| Time | : | 35 - 45 |
| Temperature | : | 60 – 70ºC |
| Ph value | : | 6.7 |

**Plate 5:** Ethanol Dye Extraction Solution

The dry grained powder 50gm was taken and mixted with 1 liter of deionized water and about 30 mins at the temperature of 60 - 70ºC.After 30 mins the extraction was filtering using the filter sheet.

**2.5.2 Ultrasonic machine**

Ultrasonic cleaner stainless steel (6 liters) (LMUC - 6) the ultrasonic energy is produced by converting electrical energy in to mechanical vibrations by using generator and piezo electric transducers. Due to mechanical vibrations in cleaning liquid this phenomenon is called cavitations. In a very short time it removes all dirt's and foreign bodies from components which are immersed in the cleaning liquid features continuous self-tuning circuitry for any change in workload, liquid level and bath temp. uniform cavitations throughout the tank with special transducers separate oscillator eliminates damages to generator in case of failure of transducers using 40Khz frequency for effective cleaning with low noise designed for completed cleaning of small and large components without dismantling inner tank and outer body made of stainless steel model**.**

**Plate 6:** Ultrasonic machine

**2.5.3 Dyeing process**

The 100% bamboo knitted fabric was dyed using padding mangle method. The fabric was dyed separately in Aqueous, Methanol and Ethanol.

**2.5.4 Padding mangles**

**Material required**

| | | |
|---|---|---|
| Solution | : | 200ml |
| Time | : | 20-30mins |

The padding mangle and two-bowl padding mangle. The cloth is passed in full width the liquor in the through and the excess solution is removed by passing it through the squeezing bowls thus the mangle effects impregnation of the liquor and squeezes out excess liquor. The padding mangle is continuous process of the fabric in concerned liquor, such as pretreatment dyeing or finishing.

**Plate 7:** Padding mangle

**3.1 Analysis of functional properties of dyed sample**

The natural dyed100% bamboo knitted fabric was finished by using Tectona grandis and was analyses for the presence of functional properties. They were evaluated for the standard testing of antibacterial activity.

**3.1.1 Antibacterial activity**

The sland culture of Pathogenic bacteria such as Bacillus subtilis, E. coli, and Staphylococcus spp., were procured from Barathiar university, Coimbatore. These cultures were subjected to sub-culture with nutrient broth in a shaking incubator at 37 °C overnight. For antibacterial activity nutrient agar medium was prepared and poured into petri plate and allow for 10 min for solidify purpose. Then these culture were swabbed (Sterile cotton swabs) with E. coli and Staphylococcus spp., then Sample were cut into small pieces and placed over swabbed plate. Then the plates were incubated for 24 hrs at 37ºC. After the incubation the diameters of the inhibition zone of each sample was measured.

**Plates**

**Antibacterial activity in dyed bamboo fabric**

**1. Staphylococcus**

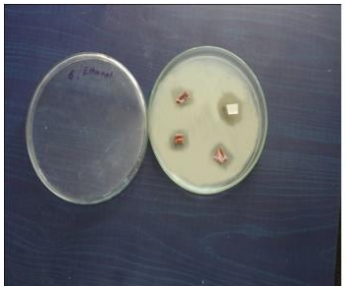


**Plate: 1**

**II. E. Coli**

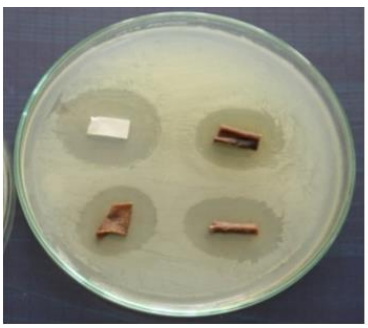


**Plate: 2**

### 4.1 Antibacterial activity test-(staphylococcus SPP.,)

**Table - 1**

| S. No. | Positive control | Zone of inhibition |
|---|---|---|
| Ethanol | 10 | 5.33 |

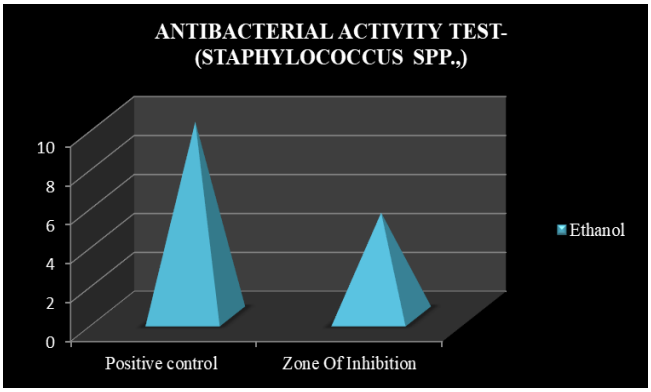


**Fig -1**

From the above Table -1 and Figure -1 it was found that antibacterial activity was found greater in Ethanol dyed 100% bamboo knitted fabric.

### 4.1.2 Antibacterial activity test: (E. coli)

**Table - 2**

| S. No. | Positive control | Zone of inhibition |
|---|---|---|
| Ethanol | 13 | 9.33 |

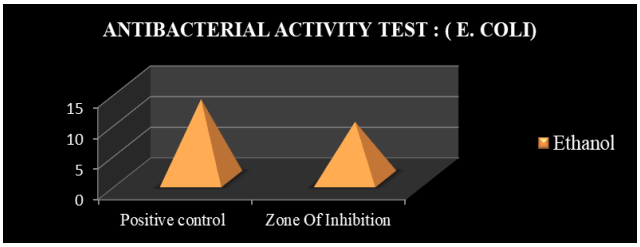


**Fig -2**

From the above Table -2 and Figure -2, it was found that antibacterial activity was found greater in Ethanol dyed 100% bamboo knitted fabric

### Conclusion

The bamboo fabric was Soft and comfortable, Eco friendly, Anti-bacterial, Anti-fungal, Ultraviolet protection factor is very good. Bamboo juice is particularly helpful for ulcers. Tectona grandis, is a plant that is useful to our lives. Teak leaf tea has a major ability to increase fat metabolism in the body. This teak leaf was making the natural slimming that can help you lose weight. Not only lose weight, as a healthy beverage teak leaf tea also contains antioxidants that can help prevent diabetes, high blood pressure, heart disease and other diseases. The teak leaf will be having naturally antibacterial and anti-fungal activity. From the above study it was found that aqueous extracted solution treaded result than control sample.

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