

འབྲུག་གི་ནང་འཁོད་ལྷོ་ཆག་སྐྱད་པ་བཟོ་ནིའི་བྱ་རིམ་གནས་ཚད།

**BHUTAN STANDARD**

Contemporary Natural Dyeing Procedure



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# BTS XXX: 2023

## FOREWORD

This Bhutan Standard for Contemporary Natural Dyeing Procedure was drafted by Sub-Committee on Natural Dye SC 03 and adopted by Bhutan Standards Bureau after the draft finalized by the Textile and Handicraft Technical Committee TC 06 and approved by the **Bhutan Standards Bureau Board (BSB Board)** in July 2022.

This standard is subject to systematic review after five years to keep pace with the market trends, industrial and technological developments. Any suggestions and further information may be directed to the concerned Technical Committee.

# འབྲུག་གི་ནང་འཕེད་ལྗོངས་ཆགས་སྐྱེད་པ་བཟོ་ནིའི་བྱ་རིམ་གནས་ཚུལ།

## Contemporary Natural Dyeing Procedure

### 1 Introduction

In Bhutan, the art of weaving and natural dyeing are part of our culture and tradition. Natural dyeing dates back to ancient times when all dyes were extracted from natural sources such as plants, animals or minerals without any chemical treatment. They are mostly eco-friendly, biodegradable, less toxic, and less allergenic.

Contemporary natural dyeing refers to modern methods and techniques of dyeing yarns using natural ingredients with mineral salt mordant. Contemporary natural dyeing in Bhutan was officially introduced in 2008 by the Department of Trade under the Ministry of Economic Affairs, now known as the Ministry of Industry, Employment and Commerce (MoICE). Since then, the first batch of trained experts have been practicing and continuing this skill, modifying the steps in the process to yield better colorfast dye using the same local ingredients and age-old practices. Contemporary dyeing techniques have evolved over time as well, incorporating new technologies, sustainable practices, and innovative approaches.

Organizations such as Agency of Promotion of Indigenous Craft (APIC), Handicraft Association of Bhutan (HAB), Tarayana Foundation, SABAH Bhutan and Royal Textile Academy (RTA) are trying to revive and impart this art by providing free training, workshops and awareness programs in communities all across Bhutan. Private dye artists are equally involved and active in educating and encouraging locals while also promoting the art of natural dyeing in the country.

This document provides the procedure of contemporary natural dyeing methods practiced in Bhutan

### 2 Scope

This document prescribes the standard of contemporary natural dyeing procedure. It will also provide first-hand information and guidance for natural dye users to maintain the quality of dyed yarns and fabrics.

### 3 Normative References

No normative references are cited.

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## 4 Terms and Definition

For the purpose of this standard, the following definitions shall apply.

### 4.1. Naka pani (dz)/Kilung(sh)

Refers to soap berry used as a cleaning agent for washing the yarns

### 4.2. Zim (dz/sh)

Refers to Asiatic sweet leaf used in pre-mordanting the yarns/ fabrics.

### 4.3. Tsoe (dz)/Laniru(sh)

Refers to Madder used as a dye ingredient to extract red or orange color. The Madder plant contains a pigment called alizarin, which is responsible for its vibrant red color

### 4.4. Jatshoe(dz)/Tshos(sh)

Refers to Lac used as a dye ingredient to extract red/or pink/ or purple color.

### 4.5. Tsangja or Rum(dz)/Yangshaba(sh)

Refers to Indigo used as a dye ingredient to extract turquoise blue/ or green color.

### 4.6. Tago- poko (dz)/ Kheysi khoptang(sh)

Refers to Walnut hulls used as a dye ingredient to extract brown color.

### 4.7. Youngka(dz/sh)

Refers to Turmeric used as a dye ingredient to extract yellow color.

### 4.8. Khempa(dz)

Refers to Artemisia used as a dye ingredient to extract shades of gray/green.

### 4.9. Tshog-den(dz)

Refers to the base color which is achieved through pre-mordanting.

### 4.10. Gob-Poko(dz)

Refers to Onion skin used as a dye ingredient to extract shades of green/yellow color.

### 4.11. Shersho Meto(dz)

Refers to Marigold used as a dye ingredient to extract yellow/orange color.

### 4.12. Karma Choki(sh)

Refers to Mexican Devil used as dye ingredient to extract shades of yellow/green.

**4.13. Bangtsho (dz/sh)**

Refers to the dyeing method where the dye bath undergoes the controlled fermentation for a few days or a week to extract the desired color.

**4.14. Dyeing**

Refers to the process of imparting color to materials, typically by immersing them in a dye solution or applying dye directly to the surface.

**5 Raw materials**

**5.1 Types of yarn and fabrics**

Cellulose based: Cotton and nettle

Protein based: Wool and silk

**5.2 Dye materials from plants and animals**

Sl. No	Local Term /Common Name	English Name	Scientific Name
1.	<i>Naka pani/Kilung</i>	Soap Berries	<i>Sapindus mukorossi</i>
2.	<i>Zim</i>	Asiatic sweet leaf	<i>Symplocos paniculata</i>
3.	<i>Laniru/Tsoe</i>	Madder	<i>Rubia cordifolia</i>
4.	<i>Jatshoe</i>	Lac	<i>Laccifer lacca</i>
5.	<i>Yangshaba/TsangJa/Rum</i>	Indigo	<i>Strobilanthes cusia</i>
6.	<i>Tago</i>	Walnut	<i>Juglans regia</i>
7.	<i>Youngka</i>	Turmeric	<i>Curcuma longa</i>
8.	<i>Khempa</i>	Mugwort	<i>Artemisia vulgaris</i>
9.	<i>Gob Poko</i>	Onion Skin	<i>Allium cepa</i>
10.	<i>Shersho Meto</i>	Marigold flowers	<i>Tagetes erecta</i>
11.	<i>Karma Choki</i>	Mexican Devil	<i>Ageratina adenophora</i>

### 5.3 Mordant

Mordant helps to fix the dye to the fiber and improve colour fastness. In contemporary natural dyeing, four types of minerals salt are used as mordant;

- a) Alum
- b) Ferrous
- c) Copper and
- d) Lime

The recommended amount of mordant is mentioned below in percentage:

- a. Alum 20% of Weight of the Fiber (WOF)
- b. Copper 5% of WOF
- c. Ferrous 2% of WOF
- d. Lime enough to soak the yarn/fibers

SI.No	Local Term /Common Name	English Name	Scientific Name
1.	<i>Dochur</i>	Alum	<i>Potassium aluminum sulfate</i>
2.	<i>Chagtshoen</i>	Ferrous	<i>Ferrous sulfate</i>
3.	<i>Zangtshoen</i>	Copper	<i>Copper sulfate</i>
4.	<i>Tshuni</i>	Lime	<i>Calcium carbonate</i>

## **6 Dyeing procedure**

### **6.1 Scouring**

The yarn/fabric has to be washed thoroughly to remove natural and artificial impurities. This process makes the yarn clean, and helps in absorbing the dye evenly. Yarns are washed using a mild detergent or *nakapani*. *Nakapani* (or mild detergent) is added to hot water, and the yarn/fabric is boiled in this solution for 10-15 minutes, followed by washing and rinsing of the yarn/fabric in cold water.

### **6.2 Pre-mordanting**

The materials are treated with mordant before dyeing.

In Bhutan, *zim* extract is used for pre-mordanting in every dye material except for indigo. It is used as the base color "*tshog-dhen*" that helps in fixing the color and fastness. *Zim* leaves have to be boiled for more than an hour, and then strained. The washed yarns are then boiled in the *zim* extract for 15- 20 minutes.

### **6.3 Ingredients**

Yarn:1kg  
Dye Material ( any dye producing plant) : 3 kg  
DriedZim:1kg  
Water: 20 L

### **6.4 Process**

- i. Chop or smash the dye materials into pieces or powder form depending on the dye materials.
- ii. Boil the chopped dye material in water for an hour.
- iii. After cooking for an hour, strain the liquid (dye solution) in a different pot.
- iv. Dip the *zim* treated yarns in the dye solution and simmer for up to 1 hour.
- v. Prepare hot water in 4 separate stainless steel containers for post mordanting.
- vi. Add the 4 different mordant (depending on the amount of the yarn) in hot water in each designated container except for lime in cold water.
- vii. Stir the solution of mordant water until it is dissolved.

- viii. Separate the dyed yarns into 4 equal parts (250 grams) and dip the yarns in the 4 different mordant solutions.
- ix. Gently stir and spread the yarns occasionally, ensuring it is fully submerged in the solution. Soak it for 15 minutes or until the bath is cold.
- x. Wash the yarns gently in cold water using mild detergent to remove any residual dye and mordant, and rinse it until the water runs clear.
- xi. Dry in the shade for better results.

*Note 1: Above dyeing procedure can be applied for any dye producing materials.*

*Note 2: There might be variation in shades depending on the types of yarns, dye materials source, water types, cooking time and mordants.*

*Note 3: Yarns are pre-mordanted and post-mordant for better results.*

*Note 4: Stainless steel pots and utensils are recommended as it is non-reactive and won't have any effect on the fibers.*

*Note 5: In case of flawed shade or dissatisfaction with the dyed shade, one can treat it again by following the same procedure.*

*Note 6: The dyed yarns/fabrics should be washed in cold water with mild PH neutral detergent to retain the dye for a longer period of time.*

## **7 Test**

Testing for color fastness and overall dye quality are carried out physically in the following ways:

### **i. Wash fastness test**

The dyed yarns are washed with cold water for 30 minutes. After 30 minutes, excess water is removed and air dried at room temperature. Compare the result with the unwashed fabrics and see the differences in shades.

### **ii. Light fastness test**

The dyed yarns are washed in normal cold water for 30 minutes. After 30 minutes, excess water is removed and dried in direct sunlight for 2 hours. Compare the result with the unexposed fabrics and see the differences in shades.

### **iii. Visual test**

Visual inspection of evenness of shade in the dyed yarns or fabric.

## **8 Tools and Equipment**

- a) Stainless steel pots
- b) Stainer
- c) Spatula
- d) Rubber Gloves
- e) Apron
- f) Mask
- g) Buckets
- h) Jugs/ Containers
- i) Muslin cloth
- j) Weighing scale
- k) Measuring scale
- l) Stove
- m) Thermometer
- n) Stirring rods

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