

## Natural dye plants for buton woven fabric in Wabula Village, Buton District

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### ABSTRACT

This study aims to document the species and parts of plants, processing, and colours produced in the dyeing process of Buton woven fabrics. The research was conducted in July-October 2019. The method used was descriptive-qualitative through observation and interviews with 30 weaving crafters in Wabula Village, Buton Regency. Data were analysed by descriptive analysis. The results showed that the plants used were the leaves and stems of tarum (*Indigofera tinctoria* L.) to get blue colour, jackfruit stems (*Artocarpus heterophyllus* L.) to get brown colour, noni roots (*Morinda citrifolia* L.) to get light red colour, turmeric rhizome (*Curcuma longa* L.) to get light yellow and reddish brown, stems and roots of bitti (*Vitex cofassus* R.) to get yellow colour, and bark of mahogany (*Swietenia mahagoni* (L.) Jacq) to get reddish brown colour. The colours were obtained through the steps of dyeing woven fabrics consisting of extraction of materials by fermentation or boiling methods, mordanting, dyeing, and colour fixation. The four types of fixators used are acetic acid, iron (Fe), lime, and alum. The motifs formed on Buton fabrics have their own meanings and uses for the Wabula people.

**Keywords:** Buton weaving, natural dyes, Wabula village

### INTRODUCTION

Natural dyes are dyes that can be obtained from plants, animals, minerals, or microorganisms. However, most natural colourants are obtained from plants. Almost all plant parts such as bark, fruit, and leaves can produce colour when extracted (Ihsan et al., 2020). Natural dyes have many advantages over synthetic dyes. Natural dyes are biodegradable and do not harm health. (Jordeva et al., 2020). Fabrics with natural dyes are soft in colour, hypoallergenic, and potentially antibacterial (Failisnur et al., 2018).

Natural dyes have the potential to be used as a substitute for synthetic dyes (Rinawati et al., 2021). Natural dyes are widely used to dye textiles from natural fibres with the aim of improving their environmentally friendly quality (Febriana et al., 2017; Jordeva et al., 2020). Natural dyes from various plants have been reported, including purple-pink flower petals from

*Impatiens glandulifera* Royle (Klančnik, 2021), *Cinchona succirubra*, *Castanea argentea*, *Peltophorum pterocarpum*, *Schima noronhae*, *Albizia chinensis*, *Pithecolobium lobatum*, *Bischofia javanica*, *Samanea saman*, *Eugenia polyantha*, *Chromolaena odorata*, and *Terminalia bellirica* (Kaswinarni et al., 2019). Among Indonesians, the use of natural dyes derived from plants is already known and applied in small-scale textile production businesses (Darma, 2015) such as betel leaves (Afan et al., 2020), and suji leaves (Alamsjah et al., 2021) which are used as dyes for woven fabrics.

Indonesia's traditional woven fabrics are rich in a variety of colours, patterns and distinctiveness influenced by the culture and history of the region. One of the beautiful woven fabrics of the archipelago is the typical Buton woven fabric (Slamet, 2017) which is one of the cultural heritages with various symbolic meanings (Sabariah et al., 2021). The interesting thing about Buton woven fabrics,

especially from Wabula Village, Buton Regency, is the use of natural dyes from plants that are still maintained by some crafters as dyes for woven fabrics.

The purpose of this study was to document the types and parts of plants, processing, and colours produced in the process of dyeing Buton woven fabrics by the community in Wabula Village, Buton Regency. This is because most crafters who initially used natural dyes are now starting to switch to using synthetic dyes, so it is feared that knowledge about the use of natural dyes will be lost from the community.

## METHOD

This research was conducted from July to October 2019. Data were obtained through

observation and interviews with 30 Buton woven fabric crafters in Wabula Village, Buton Regency to observe and document the types and parts of plants, processing, and dyeing of Buton woven fabric. Data were analysed by descriptive analysis.

## RESULTS AND DISCUSSION

Based on the results of the research, information was obtained that there are 6 species of plants used as a source of natural dyes in Buton woven fabrics produced by weavers in Wabula Village. Data on plant parts, dyeing techniques, and colours produced in dyeing woven fabrics can be seen in Table 1.

Table 1. Plant parts, dyeing techniques, and colours produced in Buton woven fabric dyeing.

Local name	Common name	Scientific Name	Parts used	Extraction method	Fixator	Colour produced
Ngila	Tarum	<i>Indigofera tinctoria</i> L.	Leaves and stems	Fermentation	Acetic acid	Blue
Ndanga	Jackfruit	<i>Artocarpus heterophyllus</i> L.	Stems	Stewing	Iron	Brown
Bangkudu	Noni	<i>Morinda citrifolia</i> L.	Roots	Stewing	Lime Alum	Light red Light yellow
Suni	Turmeric	<i>Curcuma longa</i> L.	Rhizome	Stewing	Lime	Reddish brown
Wola/Kama	Bitti	<i>Vitex cofassus</i> R.	Stems and roots	Stewing	Lime	Yellow
Mahoni	Mahogany	<i>Swietenia mahagoni</i> (L.) Jacq	Bark	Stewing	Lime	Dark brown

### Extraction of dyes

Extraction is the rupture of plant cell walls to develop or obtain dye in the medium. Extraction includes immersion, stirring, and heating (Jordeva et al., 2020). The part of the plant that is extracted is the part that is estimated to contain the most colouring substances such as roots, stems, leaves, and rhizomes. There are two extraction methods used by weavers to obtain colour from plants, namely by fermentation (tarum) and redemption (jackfruit, noni, turmeric, bitti, mahogany).

The fermentation method is used only for the processing of tarum. The washed tarum

stems and leaves are soaked with clean water in a closed container for 12-24 hours. After 12 hours of immersion, the fermentation process will be marked by the appearance of gas bubbles and blue colour. The process is considered completed when the gas bubble does not appear again and the immersion water is greenish-yellow. The solution was then filtered to separate it from the extracted material. The solution was then mixed with 30 g of lime powder and stirred for 1-2 hours. During stirring, blue-coloured frothing will occur. Stirring is stopped once no more foam is formed and the solution is blue in colour (fading) indicating that the tarum has started

to precipitate. Settling can be maximized for 12-24 hours until tarum paste is formed. Before use, the paste is mixed with coconut sugar solution in a 1:1 ratio. [Arta et al. \(2019\)](#) mentioned that the addition of palm sugar aims to convert indigo dye (tarum) into a water-soluble alkaline leuco form.

Extraction by boiling method was carried out on the processing of ingredients from jackfruit, noni, turmeric, bitti, mahogany. Boiling begins with cutting and washing the parts to be used. The time needed in the boiling process of jackfruit stems, noni roots, bitti roots and stems, and mahogany bark was carried out for  $\pm 2$  hours of boiling, while the turmeric rhizome was boiled for  $\pm 1$  hour. Boiling is done so that the colours (pigments) in the plant organs are easily removed. The boiled water is filtered to get a completely clean solution. The resulting solution is then used as a fabric dye.

### Staining

One of the steps in the dyeing process is mordanting. Mordants are chemicals that aid the absorption and fixation of natural colours. [\(Atika et al., 2022\)](#). Mordants can be applied before, after, or simultaneously with dyeing, known as pre-mordanting, post-mordanting, and simultaneous mordanting methods. The weavers in Wabula Village use the pre-mordanting method. Mordanting is done by boiling a mixture of 12 L of water and 250 gr of alum until it boils. Next, the yarn is put into the boiling water and boiled for  $\pm 2$  hours. The yarn was then washed and air-dried to a semi-dry condition.

The next step is colouring. There is a difference between the dyeing process of materials extracted by the fermentation method and those extracted by boiling. In fermentation, the yarn in semi-dry condition is dipped in cold temperature dye. Dyeing is repeated until the desired colour is obtained (at least 5 times). The yarn is then aerated in the shade to dry and then fixed. Meanwhile, in the boiling method, dyeing is done by

immersing the yarn in a container containing dye solution for +6 hours. Next, the yarn is dipped in a detergent solution, rinsed thoroughly and then dried in the sun.

### Fixation

The final step of yarn dyeing is fixation or colour binding. Fixation aims to sharpen the colour and prevent the colour from fading easily ([Paryanto et al., 2018](#)) due to sweat, washing, sunlight, and rubbing ([Saefudin & Basri, 2022](#)). There are four types of fixators used in Buton weaving dyeing in Wabula Village, namely acetic acid, iron (Fe), alum, or lime. The fixation solution is made by dissolving 50-70 gr of the fixator in 1 L of water or as needed (in that ratio). The colours produced on the yarn with the various fixators are shown in Table 2.

Fixation of tarum-dyed yarn is done by soaking the yarn in acetic acid solution and then drying it by aerating (not exposed to direct sunlight). The fixation results in blue-coloured yarn. [Ariyanti & Asbur \(2018\)](#) explained that the blue colour produced by tarum comes from the indigo compounds it contains. *Indigofera tinctoria* contains a secondary metabolite, indican, which is a precursor to natural blue dye ([Budiastuti et al., 2022](#); [Setyaningrum et al., 2023](#)) and is not carcinogenic ([Erdawati et al., 2023](#)). Fixation with acetic acid will maintain the blue colour of the yarn.

Yarn dyed with jackfruit stem extract and fixed with iron will produce brown yarn. This is in accordance with the explanation ([Widiana & Sugiyem, 2021](#)) that the addition of iron which is a metal causes the resulting colour to be darker than the original colour. Natural dyes from jackfruit wood as textile dyes are not easily faded ([Qadariyah et al., 2017](#)).

Yarn dyed with noni root extract and fixed with lime will give the yarn a light red colour. Extraction from turmeric will produce different colours depending on the type of fixator used. If fixed with alum, the yarn is light yellow in colour. According to [Rosyida](#)








et al. (2014), the alum fixation process will not change the colour of the fabric as alum is a colourless chemical. Alum will only strengthen the dyeing result, while the lime-fixed yarn will give a reddish-brown colour.

Another colour was obtained from the fixation of bitti stems and roots using alum. The colour obtained is yellow. Meanwhile, the dark brown colour is obtained from yarn dyed with the extraction of mahogany bark and fixed using lime. This is explained by Lestari et al. (2020) that the addition of lime to the solution in the extraction process is proven to

increase the amount of tannins and flavonoids, resulting in a reddish-brown colour. Similar results were also reported by Novita et al. (2021) that *Swietenia mahagoni* (L.) Jacq produces grey and brown colours depending on the type of colour fixation used.

The results of dyeing and fixation are shown in Table 2, while Figure 1 shows the appearance of a Buton sarong after it has been woven from yarn dyed with natural dyes. The fabric colours obtained from dyeing are used to depict motifs in accordance with the philosophies of the Wabula people.

Table 2. Colours produced in yarns with various fixators.

Plant name	Fixation result			
	Alum	Iron (Fe)	Lime	Acetic acid
<i>Indigofera tinctoria</i> L.				
<i>Artocarpus heterophyllus</i> L.				
<i>Morinda citrifolia</i> L.				
<i>Curcuma longa</i> L.				
<i>Vitex cofassus</i> R.				
<i>Swietenia mahagoni</i> (L.) Jacq				

The motifs formed on Buton fabrics have their own meanings and uses. The plaid or *kaplengan* motif (in the Wabula Kadiye language) is specifically used for men (pictures a and b). This motif is based on the life of ancient farming communities who always moved from one place to another. Line motifs

such as those in images c and d are exclusively used by women. Figure c with 1 line motif means close to the partner, used by women who are engaged. Fabric with motif d (called Kasopa) is used by unmarried women, meaning closeness to God, parents, and people around them.



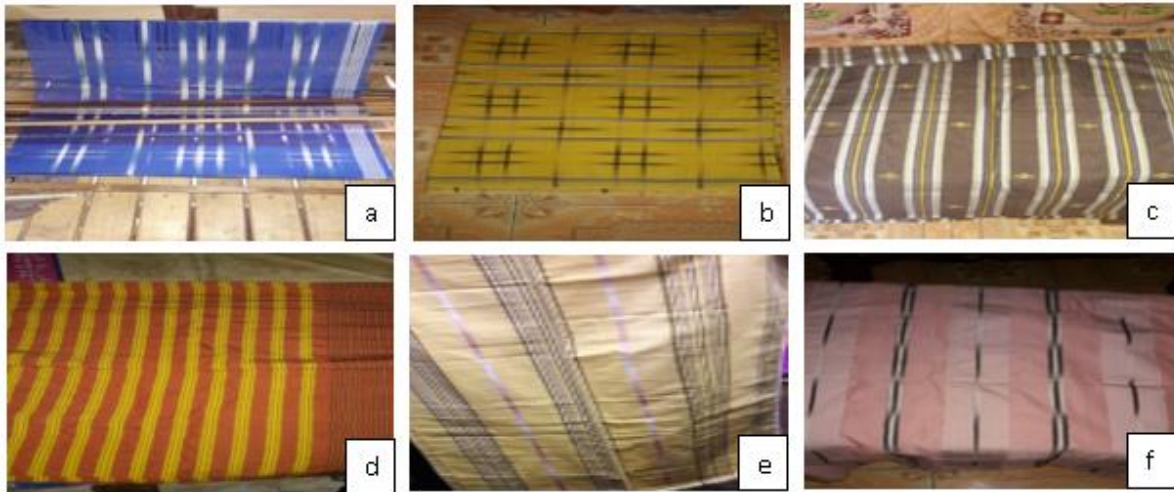


Figure 1. Woven fabric with various dyes: (a) tarum dye, (b) turmeric rhizome and mahogany bark, (c) jackfruit stems, turmeric rhizome, mahogany bark, (d) turmeric rhizome, (e) bitti root/stem, noni root and mahogany bark, and (f) noni root and mahogany bark.

The fabrics with motifs e and f can be used by both men and women. Motif e implies the state of the ancient people who always moved around in farming with broken lines that illustrate the time lag in farming, while the chain motif in Figure 1.f illustrates the Wabula people who maintain an attitude of mutual cooperation from the past until now.

## CONCLUSION

There are 6 species used as a source of natural dyes in Buton woven fabrics in Wabula Village, Buton Regency, namely tarum (leaves and stems), jackfruit (stems), noni (roots), turmeric (rhizomes), bitti (stems and roots), and mahogany (bark). The colour produced depends on the combination of the plant extract with the fixator or colour binder used. The fixators used are acetic acid, iron (Fe), lime, and alum. The motifs formed on Buton cloth have their own meaning and use for the people of Wabula Village.

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