Identification of plants natural dye by Meto tribe in South Central Timor

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Abstract. Information on plant species, natural dyes and the dying process of the yarn of ikat weaving in South Central Timor is still minimal and not well documented. Therefore, this study aimed to identify natural dye in South Central Timor. The samples were collected by exploration methods. Parts of plants, dyeing processes, and kinds of color were recorded based on observation, interviews with craftsmen and documentation. Our results showed that there are 7 plant species were successfully identified, Curcuma longa L., Indigofera tinctoria L., Morinda citrifolia L., Phyllanthus reticulatus Poir, Phaseolus lunatus L., and Tectona grandis. The plant organs used as a source of natural dye are leaves, barks, rhizome, and roots. The method of processing was to be pounded, squeezed, soaked in water and the color produced was red, dark blue, yellow, black, and green.

1. Introduction

Ikat weaving of East Nusa Tenggara has many varieties because each district has a characteristic. East Nusa Tenggara has 21 districts, and each district has multiple motifs. The district the ikat came from could be determined by the dominant color. One of the districts, South Central Timor, has its identity that can be seen from the bright colors of its ikat [1]. This colorful ikat weaving represents the motif of the Meto tribe communities that occupy almost all areas in Timor mainland.

Manufacture of woven fabrics is one of the traditional-home industries using plants’ natural dye used for generations. This woven fabric is traditionally made by rural communities and has to be a part of their daily activities. To create woven fabrics, people need dyes that can give patterns and motifs to the fabric [2]. The dye used to stain the fabrics is derived from nature, such as animals, minerals, and plants, either directly or indirectly. This natural dye is obtained by extraction or boiling traditionally. The parts of plants that can be used to dye are the bark, stems, leaves, roots, flowers, seeds and sap. Each plant can be a source of natural dyes because they contain natural pigment. This potential is determined by the intensity of the produced color and highly dependent on the type of dyeing matter. Dyeing matter is a substance that determines the direction of the color of natural dyes and organic compounds contained in sourced natural dyes. One type of plant contains more than one dyeing matter [3].

The advantage of using natural dyes is the color intensity is much lower than the synthetic colors, so that the effect creates an impression in the eyes always supple, soft, and will not produce the same
color tone even though using the same recipe. Of course, there are also disadvantages related to their natural properties that are easy to fading, the raw material is uncertain and standards are not guaranteed. However, these disadvantages can be anticipated with special care. The use of natural dyes is more associated with the elements of art, elegant, high taste and reduce environmental pollution so that the consumer target will be upper middle class and overseas. Therefore, the selling price is higher [3].

The use of natural dyes in some countries is still believed to be safer than synthetic dye because it is non-carcinogenic, degradable, manufacture, and relatively use simple technology. It is very suitable for small and medium industries that are currently encouraging the government to support exports. The development of natural dyes for Indonesia as a tropical area is rich in plants that can produce the dye. This situation is expected to revive the image of natural dyes. Therefore, a variety of plants that are capable of producing the dye will have good prospects.

Besides, a sustainable environment is a hot issue that preoccupies Indonesia nowadays; more specifically in South Central Timor, mining could have a negative impact on environmental damage. Indigenous people could lose their jobs from weaving and lost herbal medicine from plants because of forest damage.

Because of information on plant species, natural dyes and ways of processing is still minimal and not well documented, so our goal was to identify the plant species, plant organs, and way of processing organs as a natural dye for the Meto tribe in South Central Timor.

2. Methodology

2.1. Time and location of study
Data were collected from November – January 2015 in Pana Village, Boti Village, Ayotupas Village and Oenasi Village, South Central Timor district, East Nusa Tenggara Province, Indonesia. We chose those villages represented the characteristic of Meto Tribe that are Mollo, Amanatun, and Amanuban Tribe.

2.2. Technique for collecting data
The method used in this study was the interview with Meto tribe communities in South Central Timor Regency. Respondents were determined by using the combination of purposive sampling and snowball sampling techniques [4]. Respondents were elderly and craftsmen. The exploration method was used to observe the plants and which part of them used as a natural dye directly. Flora’s book was used to identify the plants [5] and documentation was made on the plant species that have been recognized.

2.3. Data analysis
Data were analyzed by using descriptive qualitative and presented in tabulation form.

3. Results and Discussion
Based on the results of interviews and observations in the field, it is known that the types of coloring plants used by craftsmen from the Meto tribe weaving can be seen in Table 1.
### Table 1. Plant species used as natural coloring agents by the Meto tribe in South Central Timor Regency

| No. | Local name / Indonesian name / Scientific name | Plant organs | Processing method | The color produced |
|-----|-----------------------------------------------|--------------|-------------------|--------------------|
| 1   | Huki/ Curcumin / Curcuma longa L. | Rhizome      | Pounded           | Yellow             |
| 2   | Ta’um/ Tarum/ Indigofera tinctoria L. | Leaf         | Soaked in water   | Dark blue/ Black   |
| 3   | Bauk ulu/ Starvation fruit/ Morinda citrofolia L. | Root         | Pounded           | Red                |
| 4   | Meko/ Buah tinta/ Phylantus reticulatus Poir. | Fruit        | Squeezed          | Dark blue          |
The coloring plants used by the weaving craftsmen of the Meto tribe in Timor Tengah Selatan District were 6 species. The species was identified to consist of 5 families, namely Zingiberaceae, Fabaceae, Rubiaceae, Euphorbiaceae, and Lamiaceae. Even in the coloring of threads, craftsmen still use the soil to produce black, mixed with tarum after that, so the black color becomes thick.

Table 2. Additional ingredients used in the coloring process of the Meto Tribal woven fabric

| No. | Local name / Indonesian name / Scientific name | Part used | Function                   |
|-----|-----------------------------------------------|-----------|----------------------------|
| 1   | Lime betel/Lime powder                        | Lime powder | Color amplifier          |
| 2   | Noa/Coconut/Cocos nucifera                    | Flesh of fruit | Color amplifier          |
| 3   | Pena/Corn/Zeae mays                           | Cooking water | Fastening woven threads |
| 4   | Fenu/Candlenut/Aleurites moluccanus           | Seed      | Initial immersion         |
| 5   | Loba/Noba/Symplocos sp.                      | Bark      | Color binder              |

In addition to the 6 types of coloring plants above, craftsmen also use additional ingredients. Whiting (Ao) and coconut meat (Noa) are used to strengthen the color of the yarn so that it does not easily wear off, and also boiled water from cornflour (pen) to strengthen the white thread. The plants used in the initial immersion process are candlenut (Fenu) and also boiled water from cornflour (pen).

Table 3. Processing of natural coloring plants to produce colors

| No. | Color | Processing method |
|-----|-------|-------------------|
| 1   | Red   | - Starvation fruit bark is pounded until smooth and soaked in the water together with yarn and noba. After that, the thread is then squeezed and dried in the sun to dry. |
|     |       | - Starvation fruit bark is grounded until smooth and then cooked for 1 hour, along with threads and additional lime. |
| 2   | Yellow| - Turmeric rhizome is crushed to pieces, put the thread and pound together again, removed and then squeezed, add water and soak for 3-4 hours, then lifted and |
3 Green Arbila bean leaves are taken one basket, pounded until smooth, put the yarn and pounded together, and then the thread is removed, squeezed so that the color of the yarn is evenly distributed, then soaked with 1 cup of water for 3-4 hours, lifted and dried in the sun.

4 Dark blue The fruit of the inked tree is taken as much as 1 winnowing pan then squeezed and then added cornflour and added water soaked for 3 days, then put the thread and soaked for 3-4 hours just removed and dried

5 Black Tarum leaves are soaked for 4-5 days. Tarum leaves are soaked in the knees to get the marinade. Soaking water is added coconut fruit and lime then the yarn is dipped 3 times

Based on the results of the study, the Meto tribe in the Timor Tengah Selatan district used 6 types of natural coloring plants to be used to dye the weaving yarn. Seran and Hana [6] researched the community of Kaliuda Village, Pahunga Lodu Sub-District, East Sumba Regency, found that there were 9 species of plants. In contrast, Berlin et al. [7] have found 5 types of coloring plants. From the types of plants found, it can be said that the plants used are different because the flora available in the surrounding environment is different. While the same types of plants used are tarum, starvation fruit, and areca nut specifically in NTT, but when compared to the same in Borneo (Kalimantan), starvation fruit and areca nut are used.

The parts of plants used by the Meto Tribe in Timor Tengah Selatan Regency are leaves, roots, fruit, rhizomes, leaves, and bark (Table 1). According to Winarno [8] each part of the plant has its color pigment characteristics depending on the method of processing. Based on Table 1, the Meto tribe uses more leaves than other parts. This is because the leaves are easier to obtain and easier when processed to become natural coloring agents.

Based on Table 3, several methods for processing natural dyes that have been done by the Meto are obtained by boiling, pounding, kneading and soaking. Kumalasari [9] states that traditional processing is one of the processes carried out by still maintaining its authenticity inherited from generation to generation by elders.

The Meto tribe in Timor Tengah Selatan District mainly processes natural dyes by pounding them compared to other processing methods, and this serves to produce more concentrated colors. Usually, to get a more concentrated color, the Meto add additional ingredients (mordant) in the form of betel lime, loba, corn water, candlenut seeds, and coconut to the thread. For the Meto, adding betel lime, the material to be colored will produce a lighter color and can last longer (Table 2). According to Prabhu and Bhute [10], besides being able to strengthen colors, mordants function to enhance the fixation of the natural color on the fiber by the formation of a complex with the dye.

4. Conclusion
Based on the results and discussion, it was concluded that natural coloring plants used by the people of the Meto tribe in Timor Tengah Selatan regency are *Curcuma longa* L., *Indigofera tinctoria* L., *Morinda citrifolia* L., *Phylantus reticulates* Poir, *Phaseolus lunatus* L., and *Tectona grandis*. The plant organs used as a source of natural dye are leaves, barks, rhizome, and roots. The method of processing was to be crushed, boiled and soaked and the color produced was red, dark blue, yellow, black, and green.

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