PLANT-BASED NATURAL DYES IN MONTASIK DISTRICT

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Abstract

Additive substances are materials deliberately added to food to influence its properties and characteristics. These additives include, among others, food colorings and flavor enhancers. Food coloring refers to substances used to impart or improve the color of food, whereby natural colorings are derived from plants that have the potential to produce various hues. This study aims to identify plant species used as natural dye materials by the community in Montasik. The research employs a qualitative descriptive approach using purposive sampling. Data were collected through interviews, observation, and documentation. The findings reveal 13 plant species used as natural dyes, belonging to 10 families. The results indicate that pandan (Pandanus amaryllifolius) was used by 70 respondents, suji (Dracaena angustifolia) by 67 respondents, Kunyit (Curcuma longa L.) by 65 respondents, Kembang telangflower (Clitoria ternatea) likewise by 65 respondents, and purple sweet potato (Ipomoea batatas L.) by 60 respondents.

Keywords: Montasik Community, Natural Colorants, Nutrition and Health, Plants as Food Additives..

INTRODUCTION

Additive substances are materials deliberately added to food in order to influence its properties and characteristics. According to the Indonesian Ministry of Education and Culture (Kemendikbud), based on their function, food additives can be classified into four categories: colorings, sweeteners, preservatives, and flavor enhancers. Food coloring refers to substances used to impart or improve the color of food, producing specific hues. Preservatives are materials added to extend the shelf life of food products by preventing or inhibiting microbial growth. Sweeteners are added to provide a sweet taste to food. Flavor enhancers, on the other hand, are used to intensify the taste and aroma of food. **(**Andriyani,P. dkk. 2019: 75)

According to the Regulation of the Minister of Health of the Republic of Indonesia Number 033 of 2012, food additives are substances intentionally added to food to affect its properties or form. The various purposes of food additive applications include maintaining and improving the nutritional value of food, inhibiting food spoilage caused by microorganisms, preserving the freshness, color, and aroma of food, as well as assisting in food processing and improving the overall appearance of food products (Kunarto, B, dkk, 2021: 259). Based on their origin, food additives are classified into two types, namely natural additives and synthetic additives. Natural additives are derived from plants, whereas synthetic additives are produced from chemical substances (Titin, T, 2020: 104). Natural colorants are pigments that can be obtained from various types of dye-producing plants. These natural pigments are extracted from different parts of the plant, including the leaves, bark, fruit peel, seeds, roots, and flowers, which are processed through several methods such as boiling, burning, bruising, pounding, or direct application. (Linda, R. 2017: 303).

Montasik is one of the sub-districts located in Aceh Besar Regency. It is an area that still retains its rural character, characterized by a pleasant atmosphere and fertile soil, giving rise to a rich diversity of plant life with minimal pollution from vehicle emissions. The Montasik area is home to extensive paddy fields as well as community gardens cultivated for vegetables and other food crops, including plants with the potential to produce natural colorants that can be utilized as food additive materials.

Based on direct observation conducted within the community of Montasik Sub-district, several plant species were found to be used by the local community as food and beverage additive materials. These plants are sourced from crops and trees growing naturally in the area, and some species are also cultivated by residents in their gardens or around their homes. The utilization of plants as food additives by the Montasik community includes their use as natural colorants and flavor enhancers. Among the plant species used as natural colorants are pandan leaves (Pandanus amaryllifolius), which are used to color cendol and sponge cake; Kunyit (Curcuma domestica Val.), used to color yellow rice; Kembang telangflower (Clitoria ternatea), used as a colorant for beverages and rice, producing a bluish-purple hue; and purple sweet potato (Ipomoea batatas L.), used to color stick cake and timphan cake. As for flavor-enhancing plants, the community makes use of lemongrass (Cymbopogon citratus), kaffir lime (Citrus hystrix DC.), black pepper (Piper nigrum), and many other species commonly employed in food preparation.

METHODS

This study employed a qualitative approach. The sampling method used was purposive sampling, in which samples were selected based on specific considerations. The respondents chosen were exclusively villagers from Montasik Sub-district who utilize plants as food additive materials, particularly as natural colorants and flavor enhancers. Data were collected through interviews, observation, and documentation.

This research was conducted across ten villages in Montasik Sub-district, namely Atong, Teubang Phui Masjid, Lamme Garot, Bira Cot, Bak Dilib, Dayah Daboh, Lampaseh Lhok, Mata Ie, Mon Ara, and Piyeung Mane. These villages were selected due to their considerable potential in terms of the number of residents who utilize plants as natural dye materials. The study was carried out in March 2025. The tools and materials used in this research are presented in Table 1 below.

Table 1. Tools and Materials

No	Tools and Materials |	Fungtion
1	Questionnaire / Interview	To collect information
2	Writing Instruments	To record the necessary information required in the research
3	Camera	As a documentation tool
4	Reference Book / Information Source	As a source of information

The population of this study consists of the residents of Montasik Sub-district, Aceh Besar Regency. Montasik Sub-district comprises three settlement areas, namely Mukim Bukit Baroe, Mukim Montasik, and Mukim Piyeung. In total, Montasik Sub-district encompasses 39 villages.

The sample in this study consisted of residents from the villages of Atong, Teubang Phui Masjid, Lamme Garot, Bira Cot, Bak Dilib, Dayah Daboh, Lampaseh Lhok, Mata Ie, Mon Ara, and Piyeung Mane. The selection of these villages was based on the following considerations: population size, village location, and the use of plants as natural colorants and flavor enhancers in food preparation. The respondents in this study consisted of housewives and home-based food business owners. Sampling was carried out using the purposive sampling technique, in which community members were selected based on the criterion of actively using and utilizing plants as natural dye materials.

The data collected in this study are qualitative in nature, consisting of non-numerical data such as words, images, text, and other forms of descriptive information. The instrument used in this study was an interview questionnaire. The data collection techniques employed in this study were interviews, observation, and documentation.

Data analysis in qualitative research begins with preparing and organizing the data, which includes textual data such as transcripts and visual data such as photographs, for further analysis. The data are then reduced into themes through a process of coding and code summarization, and finally presented in the form of charts, tables, or descriptive discussion. Data on the types of plants used as natural colorants and flavor enhancers were recorded in tabular form, accompanied by descriptions of their processing methods as natural dye materials. Each plant was described by presenting its photograph along with its identification details.

RESULTS AND DISCUSSION

The findings of the research conducted in Montasik Sub-district revealed that there are 13 plant species utilized as natural colorants and flavor enhancers in food. The plant species used as natural colorants and flavor enhancers by the community in Montasik Sub-district are presented in Table 2 below:

Table 2. Plant Species Utilized as Natural Dye Materials by the Community in Montasik Sub-district

No	Scientific Name	Local Name	Familia
1	*Daucus carota* L	Wortel	Apiaceae
2	*Centella Asiatica*	Pegagan	Apiaceae
3	*Clitoria turnatea*	Kembang telang	Fabaceae
4	*Dracaena angustifolia*	Suji	Asparagaceae
5	*Cucurbita moschata*	Labu	Cucurbitaceae
6	*Amaranthus* sp	Bayam	Amarantaceae
7	*Beta vulgaris*	Buah bit	Amarantaceae
8	*Theobroma cacao*	Kakao	Malvaceae
9	*Hibiscus Sabdariffa*	Rosella	Malvaceae
10	*Hylocereus polyrhizus*	Buah naga	Cactaceae
11	*Curcuma longa* L	Kunyit	Zingiberaceae
12	*Pandanus amaryllifolius*	Pandan	Pandanaceae
13	*Ipomea batatas L*	Ubi jalar/ubi ungu	convolvulaceae

Source: Research Findings

Based on Table 3 above, it is known that there are five dominant plant species most widely used, as indicated by the highest number of users according to the data obtained. These plant species are: pandan (Pandanus amaryllifolius), used by 70 respondents; suji (Dracaena angustifolia), used by 67 respondents; Kunyit (Curcuma longa L.), used by 65 respondents; Kembang telangflower (Clitoria ternatea), likewise used by 65 respondents; and purple sweet potato (Ipomoea batatas L.), used by 60 respondents. Kembang telang(Clitoria ternatea) recorded the highest number of users, with 91 respondents. These plants demonstrate a high level of utilization as both natural colorants and flavor enhancers in various food preparations.

The percentage of the most frequently and dominantly used plants can be seen in the figure below.

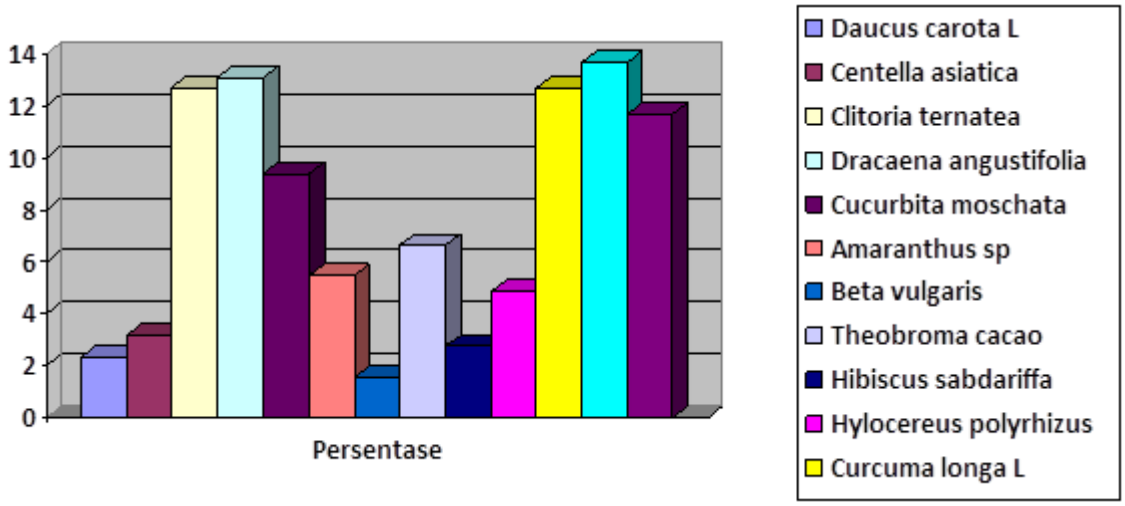

Figure 1. Percentage Graph of Dominant Plant Species
Source: Research Findings

Description and Classification of Plants Used as Natural Colorants by the Community of Montasik Sub-district

The following presents the description and classification of plants utilized as natural colorant materials by the community in Montasik Sub-district:

1. Familia Apiaceae
   a. Wortel (*Daucus carota* L)

Carrot is a root vegetable with an orange color that grows underground, possessing a taproot that enlarges into a tuber serving as a food reserve storage organ. Its leaves grow above the ground, are pinnately compound in form, and green in color. Carrots are rich in beta-carotene (vitamin A), vitamin C, vitamin K, fiber, and minerals such as potassium and calcium. These nutritional contents are beneficial for eye health, digestion, and immune function (Amiruddin, 2013:1). Carrots are utilized as a natural food coloring material due to their orange pigment derived from beta-carotene. The processing method involves grating or blending the carrot with a small amount of water, then straining it to extract the juice. The carrot juice can be directly incorporated into food batter to impart a natural orange color. Examples of food products that can make use of carrot-based coloring include traditional steamed cakes, steamed sponge cake, pudding, and noodles.

Figure 2. Wortel (*Daucus carota* L)

Classification wortel
Classis: Plantae
Divisio: Magnoliophyta

Classis: Magnoliopsida
Ordo: Apiales
Familia: Apiaceae
Genus: *Daucus*
Species: *Daucus carota* L

b. Pegagan (*Centella asiatica* L)

Pegagan (Centella asiatica) is a creeping plant with small stems that spread along the soil surface. Its leaves are round and fan-shaped, green in color, with long petioles. The leaf surface is smooth with serrated edges. Its roots are fibrous and grow from the nodes of stems that come into contact with the ground. Gotu kola contains saponins, flavonoids, vitamin C, and minerals such as calcium and magnesium, which are beneficial for memory, blood circulation, and skin health (Ernawati H.R., et al., 2023:10).

Pegagan is utilized as a natural food coloring material due to the green pigment (chlorophyll) found in its leaves. The processing method involves thoroughly washing the gotu kola leaves, then blending them with a small amount of water until smooth. The mixture is then strained to obtain a green extract that can be used as a colorant. This extract can be incorporated into food batters such as layered cake, sponge cake, pudding, or agar jelly to impart a natural green color. The gotu kola plant is shown in Figure 3.

Figure 3. Pegagan (*Centella asiatica* L)

Classification pegagan
Classis: Plantae
Divisio: Magnoliophyta
Classis: Magnoliopsida
Ordo: Apiales
Familia: Apiaceae
Genus: *Centella*
Species: *Centella asiatica* L

2. Familia Fabaceae

Kembang telang (*Clitoria ternatea* L)

Kembang telang (*Clitoria ternatea*) grows to a height of 2 to 3 meters. This plant has compound leaves consisting of 3 to 7 small leaflets with an oval or egg-shaped form. Kembang telangalso produces beautiful flowers with funnel-shaped petals that are blue or bluish-purple in color. The fruit of the Kembang telangis pod-shaped and contains soft, round, black seeds. Kembang telangcontains anthocyanins, flavonoids, vitamin A, vitamin C, and minerals such as iron and calcium, which function as antioxidants and help maintain eye and skin health (Saras.T, 2023:6).

Kembang telang is utilized as a natural food colorant due to its natural blue pigment known as anthocyanin. The processing method involves boiling fresh or dried Kembang telangpetals in hot water for several minutes until the water turns blue. The resulting liquid is then strained and used as a colorant in various food products. Examples of food preparations that make use of Kembang telangcoloring include blue-colored coconut rice, klepon cake, agar jelly, and cold beverages such as Kembang telangiced drink. The Kembang telangplant is shown in Figure 4.

Figure 4. Kembang telang (*Clitoria ternatea* L)

Classification Kembang telang
Classis: Plantae
Divisio: Magnoliophyta
Classis: Magnoliopsida
Ordo: Fabales
Familia: Fabaceae
Genus: *Clitoria*
Species: *Clitoria ternatea* L

3. Asparagaceae
Suji (*Dracaena angustifolia*)

Suji plant (Dracaena angustifolia) has ribbon-shaped leaves with slightly pointed tips. The leaf arrangement of suji is a simple leaf system. The leaves are positioned in a slightly alternating pattern with even margins along the edges. The base of each leaf clasps the stem. Suji leaves measure approximately 20 cm in length and up to 4 cm in width. The leaves have parallel veins with a slightly green coloration. Suji leaves contain saponin, a compound that can be used to treat dysentery (Gunarti. S.N, 2023:103).

Suji leaves are utilized as a natural food colorant due to their high concentration of green pigment (chlorophyll). The processing method involves thoroughly washing the suji leaves, then pounding or blending them with a small amount of water until smooth. The mixture is subsequently strained to extract the juice for use as a colorant. The green liquid extracted from suji leaves is used to impart a natural green color to various food and beverage products, such as layered cake, klepon, dadar gulung, agar jelly, and cendol. The suji plant is shown in Figure 5.

Figure 5. Suji (*Dracaena angustifolia*)

Classification Suji
Classis: Plantae
Divisio: Magnoliophyta
Classis: Liliopsida
Ordo: Asparagales
Familia: Asparagaceae
Genus: *Dracaena*
Species: *Dracaena angustifolia*

4. Familia Cucurbitaceae

Labu kuning (*Cucurbita moschata*)

Labu kuning (*Cucurbita moschata*) is a creeping plant with long, hairy stems that spread along the soil surface. Its leaves are broad, heart-shaped with serrated edges and a rough, hairy surface. The flowers are bright yellow, trumpet-shaped, and separated into male and female flowers. The fruit is round or elongated, with a hard and thick outer skin that is green when young and turns yellow-orange upon ripening. The flesh is thick, bright yellow in color, and soft in texture. The seeds are flat, white, and found in abundance at the center of the fruit. Labu kuning contains beta-carotene (provitamin A), vitamin C, fiber, and minerals such as potassium and magnesium, which are beneficial for eye health, digestion, and immune function (Tarigan. E. et al., 2018).

Labu kuning can be utilized as a natural food colorant due to its bright yellow flesh. The processing method involves steaming or boiling the Labu kuning until soft, then mashing it into a paste. This paste is subsequently mixed into food batter to impart a natural yellow color along with a mild sweet flavor. Examples of food products that use Labu kuning as a natural colorant include timphan, sponge cake, pudding, and onde-onde. Labu kuning as a natural colorant is shown in Figure 6.

Figure 6. Labu (*Cucurbita moschata*)

Classification Labu
Classis: Plantae
Divisio: Magnoliophyta

Classis: Magnoliopsida
Ordo: Cucurbitales
Familia: Cucurbitaceae
Genus: *Cucurbita*
Species: *Cucurbita moschata*

5.Familia Amarantaceae

a. Bayam (*Amaranthus caudatus L*)

Spinach (Amaranthus sp.) is an annual or perennial plant that grows in a shrub-like form, capable of reaching a height of 1.5 meters. Its root system spreads shallowly at a depth of approximately 20 to 40 cm and possesses a taproot. Spinach leaves are generally oval-shaped with slightly pointed tips and clearly visible leaf veins. The flowers are arranged in erect panicles that emerge from the tips of the plant or from the leaf axils. Spinach contains iron, vitamin A, vitamin C, folate, calcium, and fiber, which are essential for maintaining blood health, eye health, and immune function (Handayani. RD, 2022:13).

Spinach can be utilized as a natural food colorant due to its fresh green leaves. The processing method involves washing the spinach leaves thoroughly, then blending them with a small amount of water until smooth. The resulting liquid or paste is then strained and used as a colorant in food batter. Natural coloring derived from spinach is commonly used to impart a green color to food products such as green noodles and sticks or crackers made from flour-based dough. The spinach plant is shown in Figure 7.

Classification Bayam
Regnum: Plantae
Divisio: Magnoliophyta
Classis: Magnoliopsida
Ordo: Caryophyllales
Familia: Amarantaceae
Genus: *Amaranthus*
Species: *Amaranthus caudatus* L

Figure 7. Bayam (*Amaranthus caudatus* L)

b. Buah Bit (*Beta vulgaris* L)

Bit (Beta vulgaris) is an annual plant that grows in a grass-like form with an extremely short stem that is barely visible. Its taproot develops into a tuber, while its leaves grow clustered at the neck of the taproot (base of the tuber) and are reddish in color. The Bit tuber is round or top-shaped in form, although some tubers may be elongated. A root is found at the tip of the tuber. The flowers are arranged in long-stalked racemes. Bit contains folate, iron, potassium, vitamin C, fiber, and natural nitrate compounds, which are beneficial for blood cell formation, lowering blood pressure, and improving stamina.

Bit is utilized as a natural food colorant due to its strong and attractive reddish-purple flesh. The processing method involves washing and peeling the Bit, then grating or blending it and straining the mixture to extract the juice. The resulting juice or paste can be directly incorporated into food batter. Bit is commonly used as a natural colorant in the preparation of cakes, pudding, bread, ice cream, and juice. Bit is shown in Figure 8.

Classification Buah bit
Regnum: Plantae
Divisio: Magnoliophyta

Classis: Magnoliopsida
Ordo: Caryophyllales
Familia: Amarantaceae
Genus: *Beta*
Species: *Beta vulgaris* L

Figure 8. Buah Bit (*Beta vulgaris* L)

6. Familia Malvaceae
   a. Kakao (*Theobroma cacao* L)

Cacao plant (Theobroma cacao L.) is a group of seed-bearing plants consisting of trees with hard, woody trunks. As a dicotyledonous plant, the cacao plant has a taproot system. Ripe cacao fruits are characterized by very soft pulp. The fruit ripens 5–6 months after pollination. Cocoa contains flavonoids, iron, magnesium, calcium, and vitamins B and E, which act as antioxidants, improve mood, and support heart health (Ministry of Health of the Republic of Indonesia: 2017).

Cocoa fruits are used as a natural food coloring through their seeds, which are processed into cocoa powder or chocolate. The processing begins by fermenting and drying the cocoa beans, then roasting and grinding them into a fine powder. This cocoa powder is used to impart a dark brown color to various foods and beverages. Examples of products that use cocoa powder as both a colorant and a flavor enhancer include chocolate cakes, brownies, ice cream, pudding, and chocolate drinks. Cocoa beans, as shown in Figure 9.

Classification Coklat
Regnum: Plantae
Divisio: Tracheophyta
Classis: Magnoliopsida
Ordo: Malvales
Familia: Malvaceae
Genus: Theobroma
Species: *Theobroma cacao* L.

Fugure 9. Kakao (*Theobroma cacao* L)

   b. Rosela (*Hibiscus sabdariffa* L)

Hibiscus sabdariffa L It has the morphological characteristics of an upright stem with rounded, woody branches. The morphology of the rosella leaf includes simple, palmate leaves with an ovate shape; the leaves are arranged alternately and have serrated margins. Each leaf stalk bears only one rosella flower, which consists of 8–11 sepals per flower. Rosella flower sepals are bright red and have fine hairs about 1 cm long, with a fused base. Rosella flowers have a funnel-shaped corolla with five petals, each measuring about 3–5 cm. Additionally, rosella flowers have thick, short stamens, and the pistil appears tubular, sometimes yellow or red (Susanti. L et al., 2019:135).

Rosella is used as a natural food coloring because its petals produce a strong, attractive purplish-red hue. The processing method is quite simple: the rosella petals are first dried or directly boiled in hot water until the water changes color. This boiled water is then used as a coloring agent in food or beverages. Rosella is frequently used in the production of syrups, tea, jellies, ice cream, and puddings. In addition to providing a beautiful color, rosella is rich in vitamin C and antioxidants, thereby enhancing the nutritional value of the food or beverage. The rosella plant is shown in Figure 10.

Classification Rosela
Regnum: Plantae
Divisio: Tracheophyta
Classis: Magnoliopsida

Ordo: Malvales
Familia: Malvaceae
Genus: *Hibiscus*
Species: *Hibiscus sabdariffa* L

Fugure 10. Rosela (*Hibiscus sabdariffa* L)

7. Familia Cactaceae

The red dragon fruit plant (Hylocereus undatus) has fleshy, thick stems that are triangular or pentagonal in shape, green in color, and grow as trailing or climbing vines. The stems resemble cacti, lacking true leaves, but their surfaces are smooth and covered with small spines. This plant has aerial roots that grow from the stem to attach to supports or nearby objects. Its flowers are large, white, and bloom at night. Red dragon fruit has a thick, scaly skin of bright red color with pink or purple flesh, as well as small black seeds scattered throughout the flesh. Dragon fruit contains vitamin C, fiber, antioxidants (such as betalains and flavonoids), and minerals like calcium, iron, and magnesium, which are beneficial for immune function, digestion, and skin health (Ministry of Health of the Republic of Indonesia: 2017).

Dragon fruit is used as a natural food coloring due to its bright red or purple flesh, particularly the red dragon fruit variety. The preparation process is quite simple: the dragon fruit flesh is blended or pounded and then strained (though straining is optional). The result is a juice or paste that can be directly mixed into food batter. Dragon fruit is frequently used as a natural colorant in the preparation of beverages, fruit ice, pudding, ice cream, cakes, and jelly. Dragon fruit, as shown in Figure 11.

Classification Buah Naga
Regnum: Plantae
Divisio: Tracheophyta
Classis: Magnoliopsida
Ordo: Caryophyllales
Familia: Cactaceae
Genus: *Hylocereus*
Species: *Hylocereus polyrhizus*

Fugure 11. Buah Naga (*Hylocereus polyrhizus*)

8. Familia Zingiberaceae

a. Kunyit (*Curcuma domestica*)

Kunyit (Curcuma longa L.) has a pseudo-stem composed of overlapping leaf sheaths that enclose one another. The Kunyit leaf consists of a leaf sheath, leaf stalk, and leaf blade. The Kunyit rhizome has branches that form clumps beneath the soil surface. The rhizome consists of a primary rhizome (Kunyit tuber) and shoots (rhizome branches). The Kunyit rhizome grows from a main tuber that is elongated, short, thick, straight, or curved in form. The outer skin of the rhizome is brownish-orange or bright yellowish to blackish-yellow in color. Kunyit contains the active compound curcumin, as well as vitamin C, vitamin B6, iron, potassium, and manganese, which function as antioxidants and anti-inflammatory agents, and help strengthen the immune system (Ministry of Health of the Republic of Indonesia, 2017).

Kunyit is utilized as both a natural food colorant and flavor enhancer due to its bright yellow color and distinctive taste. The processing method involves grating or pounding fresh Kunyit rhizomes, then squeezing them to extract the juice, which is added directly to dishes. Kunyit is commonly used in various culinary preparations such as chicken soup (soto ayam), yellow rice, curry, sie ruboh, chicken or meat gulai, and various stir-fried dishes. Kunyit is shown in Figure 12.

Classification kunyit
Regnum: Plantae

Divisio: Magnoliophyta
Classis: Liliopsida
Ordo: Zingiberales
Familia: Zingiberaceae
Genus: *Curcuma*
Species: *Curcuma domestica* Val.
atau *Curcuma longa*

Fugure 12. Kunyit (*Curcuma domestica*)

9. Familia Pandanaceae
Pandan (*Pandanus amaryllifolius*)

Pandan (Pandanus amaryllifolius) belongs to the family Pandanaceae, genus Pandanus. Pandan grows in tropical regions and is a perennial shrub reaching a height of 1 to 2 meters. The plant is valued for its uses as a spice, flavoring agent, fragrance, and natural green colorant in cooking, as well as a raw material in perfume production. Pandan leaves contain various chemical compounds including alkaloids, saponins, flavonoids, tannins, polyphenols, and pigments. Pandan is widely used as a flavoring agent and natural colorant in traditional food and beverages. The aromatic compounds of pandan produce a yellow color as a result of the oxidation of carotenoid pigments.

The processing method involves blending fresh pandan leaves and straining the mixture to obtain the extract. This pandan extract can be used as a natural green colorant in various dishes and cakes. Pandan is commonly used in cendol, sponge cake, onde-onde, layered cake, and pandan pudding. Pandan leaves are also used as a flavor enhancer in savory dishes such as coconut rice, rendang, and gulai, whereby whole pandan leaves are added during the cooking process to impart a fragrant aroma that enhances the overall flavor of the dish. The pandan plant is shown in Figure 13.

Classification Pandan
Regnum: Plantae
Divisio: Magnoliophyta
Classis: Liliopsida
Ordo: Pandanales
Familia: Pandanaceae
Genus: *Pandanus*
Species: *Pandanus amaryllifolius* L.

Fugure 13. Pandan (*Pandanus amaryllifolius*)

10. Familia Convolvulaceae
Ubi jalar/ubi ungu (*Ipomoea batatas* L.)

Sweet potato (Ipomoea batatas L.) is a perennial herbaceous food crop that creeps along the ground, reaching a length of up to 5 meters. This plant thrives in tropical regions. Its leaves are oval-shaped with a heart-like base, pointed tip, and green to purple in color, measuring 5 to 15 cm in width with petioles ranging from 5 to 30 cm in length, arranged in a spiral pattern. The flowers are light purple and funnel-shaped. The fruit is smooth and contains 4 seeds per fruit, which are black, angular, and approximately 3 mm in length. The tubers are white or purple in color. The plant is propagated through stem cuttings, tubers, and seeds. Purple sweet potato contains complex carbohydrates, fiber, vitamin C, vitamin A (from beta-carotene), and anthocyanin antioxidants, which are beneficial for energy, eye health, and neutralizing free radicals (Tomi Zapindo. T, et al., 2022: 832).

Purple sweet potato is utilized as a natural food colorant due to its striking color and safe consumption properties. The processing method involves steaming or boiling the purple sweet potato, then mashing or blending it until smooth. The resulting paste can be directly incorporated into food batter to impart an attractive purple color. This

tuber is commonly used in various food preparations such as cookies, crackers, timphan, porridge, sponge cake, doughnuts, pudding, onde-onde, and purple sweet potato spring rolls. Purple sweet potato is shown in Figure 14.

Classification Ubi jalar
Classis: Plantae
Divisio: Magnoliophyta
Classis: Magnoliopsida
Ordo: Solanales
Familia: Convolvulaceae
Genus: *Ipomea*
Species: *Ipomoea batatas* (L.)

Fugure 14. Ubi jalar (*Ipomoea batatas* L.)

Based on the findings of the research conducted in Montasik Sub-district, it was found that 13 plant species are utilized in food processing as natural colorants. The data distribution reveals a clear hierarchy of preference, with the dominant group being led by species that offer direct applicative and multifunctional roles. Pandanus amaryllifolius (pandan, 70 users) and Dracaena angustifolia (suji, 67 users) occupy the top positions, strongly reflecting their crucial role as primary natural colorants in traditional cuisine and the local food industry. These high usage figures are supported by studies confirming the color stability and antioxidant activity of extracts from both plants (Wongpramud & Rachtanapun, 2021). Similarly, Clitoria ternatea (butterfly pea, 65) and Curcuma longa (turmeric, 65) reinforce the same pattern, whereby a single species serves not only as a colorant (blue and yellow respectively) but also holds the status of a medicinally validated plant (Nithianantham et al., 2019; Hewlings & Kalman, 2017). This pattern indicates that within the local knowledge system, concrete utility value integrated into everyday practice constitutes the primary determinant of species adoption.

Based on the dominance data by number of users, Pandanus amaryllifolius exhibited the highest dominance rate, used by 13.67% of respondents. It was followed by Dracaena angustifolia at 13.09%, while Clitoria ternatea and Curcuma longa L. were each utilized by 12.70% of respondents. Another plant with a high usage rate was Ipomoea batatas L., accounting for 11.72%. In contrast, a notable disparity was observed in species such as Beta vulgaris (beetroot, 8 users) and Centella asiatica (gotu kola, 16 users). This is particularly noteworthy given that C. asiatica is globally recognized for its remarkable pharmacological profile, especially in wound healing and cognitive health (Mishra et al., 2021). The low utilization rate of these two species identifies them as underutilized resources within the observed community. This phenomenon may be attributed to a knowledge gap regarding processing methods and specific benefits, limited availability, or insufficient integration into local culinary traditions. These findings present a strategic opportunity for evidence-based interventions, such as nutrition and health education and the development of easily adoptable processed products, to unlock the economic and health potential that has thus far remained untapped.

CONCLUSION

Based on the findings of the research on the utilization of plants as natural dye materials by the community in Montasik Sub-district as a reference for the Nutrition and Health course, it can be concluded that there are 13 plant species utilized by the Montasik community as natural colorants. The processing and utilization of these plants as natural colorants are carried out through various methods, namely extraction, steeping in hot water, cutting, mashing or pounding, steaming, boiling, and drying. The processing method applied is adjusted according to the type of plant used and its intended application.

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