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Development of Ethnobotany Materials to Support Basic Concepts of Science Learning in Higher Education

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Abstract: The local knowledge of the Doridungga Donggo community in searching for medicinal and food ingredients is a form of wisdom because its use follows ecological rules. The use of these plants can be in the form of plants with medicinal properties that are used for treatment by communities around forest areas as traditional medicine. The research aims to investigate medicinal ingredients from conventional plants of the Doridungga Donggo community, which can be used to strengthen science learning concepts. Data sources and information on research data sources were determined using purposive sampling techniques. Data sources were selected based on primary data and secondary data. Preliminary data was obtained from the results of site surveys and supported by secondary data from various literature on ethnobotany. The research was conducted in Doridungga Village, Donggo District, Bima Regency, NTB. Data was analyzed based on characteristic values, theoretical plant benefits, and plant benefits based on community perception. The research results include Bidara, Guava, Golkar, Turmeric, Betel, Pule, Coriander, Kicibling, and Rida Fada. These plants are used as medicine for fever, stomach ache, diabetes, stomach ulcers, to remove body odor and bad breath, tuberculosis, wounds, tonsils, urinary syphilis, headaches, and lumbago. The research results can be input for university science learning curricula based on local wisdom.

Keywords: Bima; Doridungga Village; ethnobotany; science concept; West Nusa Tenggara

Introduction

The problem that often arises in the learning process at school is the minimal use of learning media, so students are less active and less interested in the material being taught (Putri et al., 2022). One science learning media that can be utilized is plants in the surrounding environment. Moreover, there are learning activities in areas that still use wild plants as medicine or daily necessities. Ethnobotany is the study of the use of plants in everyday life (Hamzah et al., 2023). Ethnobotany is synonymous with culture or a region. Therefore, ethnobotany studies in Indonesia are still a massive opportunity for researchers and academics in biology (Hidayat et al., 2018). Ethnobotanical studies are essential because the public consumes some of them because they have positive physiological effects (Mulu et al., 2020). It is necessary to explore the local knowledge of many communities, which need to be better documented and are widely known to be well-developed (Seuk et al., 2023). Information and local wisdom related to local community wisdom must be studied, written, and developed before it becomes extinct, along with the current progress of modernization (Sitanggang et al., 2022).

Ethnobotanical studies can be carried out from various sources of plant presence, such as wild plants or those deliberately created in the yard in the form of a garden (Supiandi et al., 2019). Gardens are places to relax and work and essential study areas for ethnobotanists (Sahusilawane et al., 2023). Much ethnobotanical research on gardens is still carried out by

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indigenous communities in tropical developing countries (Julung et al., 2023). The criteria for a garden as a source of ethnobotanical information is that it is located close to a residential house (Suwartapradja et al., 2023). A garden can be a yard (a private garden adjacent to a home in a small town or city) or a country yard (a garden adjacent to a house in a rural area).

Ethnobotanical discussions on local plants can use ethical classifications of existing garden types based on categories of plant use carried out by local communities (Susandarini et al., 2021). However, local classification systems for cultivated areas can make cross-cultural comparisons difficult because different criteria (such as function or geographic location) may underlie contrasting categories (Chikmawati et al., 2023). However, the local type ultimately proved more meaningful in explaining variations in flower diversity and gardening practices (Sujarwo et al., 2017). However, such traditional systems support an integrated healthcare approach. These conventional practices often also incorporate medicines from locally obtained plants by applying trial-and-error treatments over many years. In the end, many plants used in traditional medicine systems have produced new compounds for discovery in the pharmaceutical field (Fathir et al., 2021).

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Method

Location

The research was conducted in Doridungga Village, Donggo District, Bima Regency, NTB (Figure 1). The people of Doridungga Donggo village live in the hills of Bima Regency, West Southeast Nusa. They utilize the surrounding natural resources to meet their daily needs by harvesting forest products, farming on agricultural land, raising livestock, and agriculture in the mountains. In general, the people of Doridungga Donggo have good health and physical condition because of their habit of farming and farming in hilly areas.

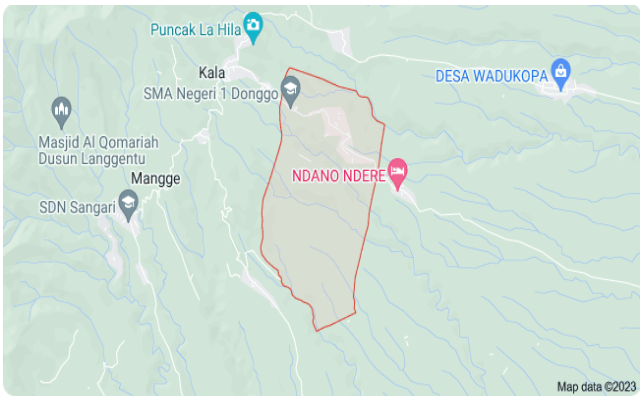


Figure 1. Location Map of Doridungga Village, Donggo District, Bima Regency, NTB (source https://www.google.com/maps/place/Doridungga)

The local knowledge of the Doridungga Donggo community in searching for medicinal and food ingredients is a form of wisdom because its use follows ecological rules (Sukenti et al., 2021; Susandarini et al., 2021). In Doridungga Village, residents have used various potential plants as medicine, both from the yards around their houses and from wild plants originating from the forest.

Data Collection

Data sources and information on research data sources were determined using purposive sampling techniques. Data sources were selected based on primary data and secondary data. Preliminary data was obtained from the results of site surveys and supported by secondary data from various literature on ethnobotany (Afentina et al., 2020; Sari et al., 2020). A literature review was conducted to determine the research location's general conditions, the people's shape of Doridungga Village, and the introduction of medicinal plant species in Doridungga Village. On the ethnobotany theme, people have yet to specifically discuss the various local plants in Donggo District, especially in Doridungga Village. Primary data was collected using observation and limited resident interviews (Nurhidayah et al., 2023). Field observations aim to obtain the actual situation in the field, including introducing plant types and the conditions of the community in Doridungga Village. The data was collected by interviewing the local community using structured interview techniques. The respondents selected were a combination of purposive sampling techniques and snowball data collection.

Data Analysis

Research data was analyzed based on characteristic values, theoretical plant benefits, and plant benefits based on community perception. The plants used are from the habitus aspect. Habitus is the external appearance and characteristics of a plant. According to Hayati and Irianti (2022), the habitus of various types of plants are trees, herbs, lianas, epiphytic shrubs, and shrubs. The use of plants for people's lives can be seen from the tri-stimulus, including natural, beneficial, and religious (AMAR) (Istikomayanti & Mitasari, 2021). Furthermore, the medicinal plant species, which have been grouped according to their use, are then examined through the AMAR (Natural, Beneficial, and Religious) trilogy stimulus so that information can be obtained on conversational actions that can be carried out by local communities who use the plants.

a. Analysis based on Plant Characteristics.

Data obtained from medicinal plants is then grouped and arranged based on use, number of species for each benefit, family, classification based on the type of disease (based on medicinal plants), classification also based on the part of the plant used, based on habitus, habitat type, and cultivated/wild medicinal plants.

b. Analysis based on Plant use

Determination of species based on disease groups/use is classified into several disease groups, namely: fever or fever, stomach ache, diabetes, stomach ulcers, body and mouth odor, tuberculosis, wound disease, tonsillitis, urinary syphilis, disease headaches, and back pain.

c. Analysis based on public perception.

Data from interviews with the community regarding medicinal plants were processed and grouped into (1) characteristics of the community, (2) types of diseases that the community has suffered from, (3) species of medicinal plants that are known and used to treat diseases, (4) parts of the plant which are used to treat diseases, (5) how to use medicinal plants. The data was then analyzed cumulatively and qualitatively descriptively.

Result and Discussion

As a first approach to ethnobotanical research, researchers seek consent, build rapport, and ethical considerations. Following the research permit requirements, we asked permission from the village head (Kepala Desa or Kades) and sub-district director (Camat). For individual verbal consent, researchers always ask permission before interviewing respondents and in-depth interviews with informants. Researchers used questionnaires for interviews with respondents and interview guides for informants (Madiyawati et al., 2023). Researchers also conduct field observations to understand local environmental conditions, such as village conditions. Various medicinal plants are cultivated in the community gardens of Doridungga Village, Donggo District, including yard, grassland, and forest ecosystems. Semi-structured interview techniques were carried out with purposively selected informants who included formal village figures, informal figures, members of village farmer groups, members of women's farmer groups, and housewives. The following is a recap of the research findings while the researchers were in Doridungga Village, Donggo District.

Table 1. List of plant species used as medicine by the Doridungga people.

Local name	Latin name	Efficiacy	Part Used
Bidara / ro'o rangga	Ziziphus mauritian	Fever medicine	Leaves
Jambu batu / jambu wadu	Psidium guajava	Medication for stomach ache	Leaves
Golkar / golka	Chromolaena odorata L.	Medicine for leaf sugar disease	Leaves
Kunyit / huni	Curcuma longa Linn. syn. Curcuma domestica Val	Stomach Ache	Tuber
Sirih / nahi	Piper Betle Linn,	medicine for eliminating body odor and bad breath	Leaves
Golkar / golka	Chromolaena odorata L.	TB Medicine	Leaves
Golkar / golka	Chromolaena odorata L.	Wound medicine	Leaves and stem
Pule / rida	Alstonia scholaris	Sap medicine	Tonsil
Ketumbar / ketumba	Coriandrum sativum L	Medicine for urinary syphilis	Leaves
Kicibling /tobe nggiri	Strobilanthes crispu	Headache medicine	Leaves and stem
Rida fada	Alstonia scholaris	Medication for back pain	Leaves

The various plants that have been obtained are then grouped based on their benefits (Kulsum & Susandarini, 2023). The following are the results of the analysis and grouping of medicinal plants in Dorungga Village as a result of interviews and observations at the research location based on how they are used:

1. Heat medicine (ro'o rangga).

The use is by stacking bidarka leaves and mixing them with rice soaked in plain water and a little red shallot, then pile it up until smooth. After the ingredients are mixed evenly and smooth, apply all over the body, from the face to the toes.

2. Medicine for stomach ache (ro'o guava wadu).

The use is by stacking guava leaves; the pile should not be smooth or rough. After stacking them, put them in a container and pour enough hot water, then add a little salt and stir until evenly mixed. After that, strain it so that the dregs don't mix with the water, then drink it.

3. Diabetes medicine (ro'o golka).

The use is by stacking Golkar leaves; after stacking them, knead them with enough plain water and strain so that the dregs don't mix and then drink it.

4. Ulcer medicine (huni).

The use is by grating the turmeric tuber. After grating it, squeeze the grated turmeric so that the water comes out and strain it. Mix the filtered results with honey. Drink it at 7 pm, ½ (half) tablespoon of turmeric water and three tablespoons of honey, stir and drink. At 01 pm, stir ½ (half) tablespoon of turmeric water and two tablespoons of honey. After prayer, stir ½ (half) tablespoon of turmeric water and one tablespoon of honey and drink. Do it every day until the stomach ulcer heals.

5. Medicine to eliminate body odor and bad breath (ro'o nahi).

The use is by cooking betel leaves until they boil, then drinking one glass and bathing with the betel leaf water so that body odor and bad breath disappear. The way to bathe is to bathe with betel leaf water first, and secondly, bathe with normal water or bathe as usual. Do it every day or regularly, guaranteed to eliminate body odor and bad breath.

6. Medicine for tuberculosis (ro'o golka).

The use is by stacking Golkar leaves. After stacking them, knead them with enough plain water and strain so that the dregs don't mix and then drink.

7. Wound medicine (ro'o golka).

The use is to pile up the leaves or stems of Golkar and then apply them to the injured area so that the blood does not come out and can tighten the injured skin.

8. Tonsil medicine (nana rida).

The use is by taking half a glass of tea or about 3 (three) tablespoons of sap from the pule or pulai tree. After that, mix it with a little salt, stir until evenly mixed, then drink.

9. Urinary syphilis medication (ro'o katumba).

The use is by washing the coriander leaves first. After washing the coriander leaves, squeeze them until the water comes out of the coriander leaves themselves without any mixture of ordinary water. After the water comes out, strain it so the dregs don't mix. Then add a little brown sugar, then drink.

10. Headache medicine (to be nigiri).

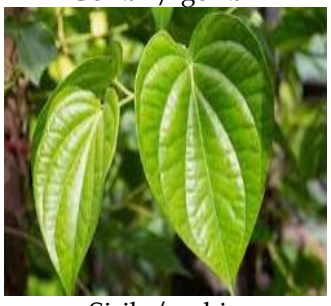
The use is stacking cabling leaves and stems, then grating half a coconut on the head. Then, the grated coconut is mixed with the killing piled up earlier, adding a little water. After that, knead or stir using your hands

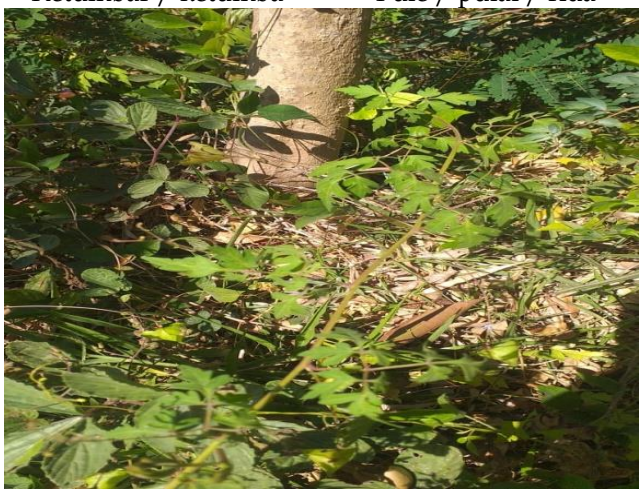
to mix evenly. Make this medicine around 04 or 05 in the afternoon. Once made, store it in a cool place; do not store it in the refrigerator. Storage starts in the afternoon until 6 am. After washing his hair with this medicine at 6 am, after washing his hair, wrap his head in a cloth to let the heat out. Wrap it for approximately 10-15 minutes, then open the lid. Then, he took a shower and rinsed his head at 9 a.m.

11. Medicine for back pain (ro'o rida fada).

The use is by stacking the rida fada leaves until smooth, adding male and female candlenuts, adding a little turmeric, and then stacking it to be evenly mixed. After it has been mixed until smooth, apply it to the waist.

Table 2. Pictures of medicinal plants in Dorungga Village

	
Golkar / golka	Bidara / ro'o rangga
	
Sirih / nahi	Kunyit / huni
	
Rida fada	Jambu batu / jambu wadu
	

Ketumbar / ketumba	Pule / pulai / rida
	
Kicibling /tobe nggiri	

Various medicinal plants from Doridungga Donggo Village have been studied in this research, both from wild plants and those deliberately planted by the community around their homes (Andila et al., 2023; Sujarwo et al., 2016). A yard is a plot around a house with various annual plants. Several types of vegetable plants are usually planted in home gardens. Gardens are agricultural land outside residential areas, and yards are mostly planted with commercial vegetable crops, including cabbage, beans, and others (Nomleni et al., 2021; Panjaitan et al., 2021). Mixed gardens are located outside residential areas and are usually planted with various seasonal and annual plants, such as wood, fruit, bamboo, and vegetables.

The research results show that various plants can benefit the daily needs of the Doridungga Donggo community, which is also an effort to achieve food independence (Waryanta, 2016). The research results can be input for university science learning curricula based on local wisdom (Fathir et al., 2021; Helmina et al., 2021; Wahdina et al., 2021). The study can also motivate researchers in the biological field, especially in the field of ethnobotany, to be able to inventory biodiversity in Indonesia as evidence of abundant natural wealth. This research also adds insight and motivation for the community to use their yards as a source of local plants that can be used for daily needs and even for medicinal plants, which can be used quickly at any time.

Conclusion

Ethnobotanical discussions on local plants can use ethical classifications of existing garden types based on categories of plant use that local communities have carried out. The local knowledge of the Doridungga Donggo community in searching for medicinal and food ingredients is a form of wisdom because its use follows

ecological rules. In this research, an investigation was carried out regarding medicinal ingredients from traditional plants and how they are used as cultural characteristics in a particular community. In this research, an ethnobotanical study was carried out to find out what plants have the potential to be used as traditional medicine for the Doridungga Donggo community. The results of the research show that various medicinal plants have been used for a long time by the people of Doridungga Village, including Bidara, Jambu batu, Golkar/Golka, Turmeric, Betel, Pule, Coriander, Kicibling, Rida fada. These plants are used as medicine for fever, stomach ache, diabetes, stomach ulcers, to remove body odor and bad breath, tuberculosis, wounds, tonsils, urinary syphilis, headaches, and lumbago. The research results can be input for university science learning curricula based on local wisdom.

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Author Contributions
Conceptualization, Zulharman and Mochamad Noeryoko; methodology, Zulharman and Mochamad Noeryoko; validation, Zulharman and Mochamad Noeryoko; formal analysis, Zulharman and Mochamad Noeryoko; investigation, Zulharman; resources, Mochamad Noeryoko; data curation, Zulharman and Mochamad Noeryoko; writing—original draft preparation, Zulharman; writing—review and editing, Mochamad Noeryoko; visualization, Zulharman and Mochamad Noeryoko; supervision, Zulharman and Mochamad Noeryoko; project administration, Zulharman and Mochamad Noeryoko; funding acquisition, Zulharman and Mochamad Noeryoko. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest
The authors declare no conflict of interest

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