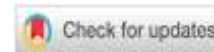




## Diversity of plant as a complementary to the staple food of dawanese east nusa tenggara



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### ABSTRACT

The Dawanese have a staple food which is also a typical food, namely bouse and katemak, the manufacture of which utilizes a variety of cereal plant resources and is generally served with a complement in the form of local vegetables or typical chili sauce of the Dawan people. This study aims to determine the types of plants used by the Dawan community as a complement to staple food. Exploration methods and interviews were conducted to obtain information on the names of species and plant parts used. The plant data obtained were identified and then analyzed descriptively. The results showed that there were 12 types of plants from the *Solanaceae*, *Rutaceae*, *Apiaceae*, *Lamiaceae*, *Amaryllidaceae*, and *Alliaceae* families which were generally used in the manufacture of chili sauce typical of the Dawan community. The plant parts used are leaves, fruit, and tubers. Knowledge about plant utilization needs to be accompanied by knowledge about plant preservation and conservation efforts.

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### INTRODUCTION

Indonesia is known as a nation with a high level of diversity. This can be seen in the existence of natural resources and existing human resources. Apart from being known as an archipelagic country consisting of thousands of large and small islands and having a high wealth of biodiversity, Indonesia is also known to have a diversity of customs and cultures that are different with their uniqueness and peculiarities found in every community group. The existence of biodiversity and the diversity of customs and cultures has a relationship and its relation to one another. The diversity of customs and culture of each community group is supported by the existence of biological resources in terms of the use and utilization of the biodiversity that exists around that group of people, and vice versa, the condition and sustainability of biological diversity



are influenced by the habits of the community in terms of utilization and preservation (Setyowati *et al.*, 2005; Kuni, 2015).

The use of biological diversity in people's living habits is reflected in the form of activities using various types of plants as a source of fulfilling their daily needs. For the need for boards, certain parts of various types of plants have been utilized as building materials and household furniture. In terms of clothing, plants are also known as the basic ingredients for making clothes and dyes. In addition to these two needs, meeting food needs is also included in the form of community needs which in their use and utilization depend a lot on the diversity of plant resources (Ariyanti, 2010). As a food source, it is also known that various types of plants are widely used by various community groups as a source of staple food and complementary food.

The Dawan tribe is one of the many tribes in East Nusa Tenggara, which is the original inhabitants of the island of Timor, especially the western part of Timor. The Dawan tribe is spread over three districts namely Kupang, South Central Timor, and North Central Timor. Like Indigenous peoples in general, the Dawan people have various forms of traditions, customs, and local wisdom, such as farming habits on dry land ecosystems, traditional ceremonies, making traditional clothes, making traditional houses, and traditional food (Bria & Binsasi, 2020; Naisumu *et al.*, 2022; Nitti *et al.*, 2022). In carrying out the customs and culture of the Dawan people, of course, this cannot be separated from the availability of natural resources, especially the diversity of plant species on the island of Timor.

The Dawan tribe community utilizes the potential of plant resources in various traditions and habits to fulfill their daily needs. The Dawan tribe utilizes the potential of plants, especially the cereal group, as a traditional staple food consisting of corn and various types of legumes and legumes. In the tradition of the people, this local processed food is usually served with a complement consisting of various local vegetables and *lu'at* which is also made from a mixture of herbs and spices. Serving *lu'at* as a complementary food is an inseparable custom in the traditions of the Dawan people (Naisali & Bria, 2022).

The food needs of the people on the island of Timor, both food groups as a staple food and food as a complement, cannot be denied that it is greatly supported by the diversity of plants that grow in ecological conditions which are dominated by dryland ecosystems and also the local wisdom of the community in agricultural systems and farming techniques. Research on the diversity of types of herbs and spices as a complement to the staple food of the Dawan tribe is urgently needed as a form of documentation and information regarding one form of utilization of plant biodiversity in the diversity of customs and culture of the community. This research aims to determine the kind of herbs and spices used to make traditional chili sauce by Dawanese in North Central Timor.

## RESEARCH METHODS

### Research Design

This research was conducted in July-August 2023 in five subdistricts of North Central Timor: Noemuti, West Miomaffo, East Miomaffo, Insana, South Bikomi, and Kota Kefamenanu. Methods of data collection are done by the method of explorations and interviews (Figure I).

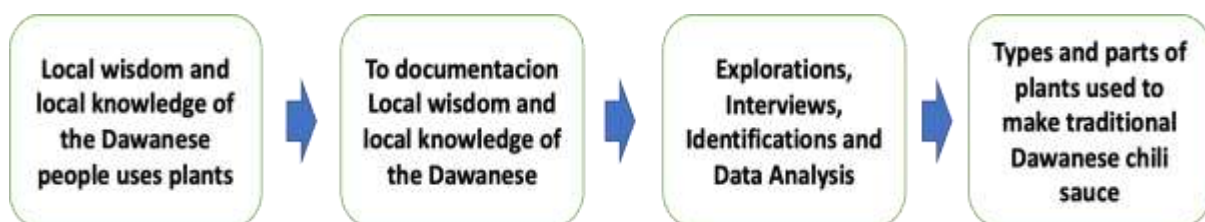


Figure I. Flow chart of research

### Population and Sample

The Dawan community in North Central Timor Regency is the population in this research. Respondents who became the samples of this research were 20 housewives from the Dawan community who were selected randomly (purposive random sampling) over 40 years old, to find out the names of plants and parts used in making local chili sauce to complement the staple food of the Dawan people.

### Instruments

Equipment to support this research includes a list of questions in a questionnaire, writing tools, samples of plant types obtained during interviews, a plant identification guidebook, and the PlantNet application.

### Procedures

This research was carried out by interviewing housewives with questions related to knowledge, habits, ingredients, and types and parts of plants used in making traditional chili sauce. Data interview from each respondent was tabulated based on the type and part of the plant used. For local plant species whose scientific names are not yet known, identification is carried out using plant identification guides such as determination keys, websites, and plant identification applications. Results of the analysis obtained data on the number of types and parts of plants used to make traditional chili sauce by the Dawanese community.

### Data Analysis

The observed data were then analyzed descriptively using qualitative and quantitative approaches as well as literature studies to assist in describing the data observed.

## RESULTS

The Dawan tribe is an indigenous people who inhabit the island of Timor, especially the western part of Timor. The Dawan people have various unique and interesting cultural forms which are reflected in traditional ceremonies and rituals as well as in daily life. Traditional houses, woven cloth, and special food as well as some local wisdom such as food processing techniques and agricultural systems are cultural products of the Dawan people which are cultural assets and at the same time an attraction in cultural tourism. The cultural products found in the Dawan people are inseparable from the use of the rich local biodiversity on the island of Timor.

The uses of plant biodiversity by the Dawan community can be seen in local food preparations that use various types of cereal plant groups. Corn and local beans are the main ingredients in the typical Dawan food preparations, known as *bose* and *katemak*. *Bose* is a processed product using corn kernels that have had their husks removed and cooked by boiling together with various nuts and a mixture of certain parts of several plant species, while processed *katemak* uses whole corn kernels without removing the husks with various nuts. and a mixture of certain parts of several plant species.

*Bose* and *katemak* as staple foods in the preparation and presentation are also added with complementary foods consisting of various local vegetables and spices. the local vegetables used in the presentation are cooked together with corn while local spices are processed into the special chili sauce of the Dawan people. As part of a staple food complement, local vegetables and chili sauce provide a distinctive taste in the presentation of *bose* and *katemak*. Types of local vegetables that are commonly used in the manufacture and serving of *katemak* include kelor (*Moringaceae*), papaya (*Caricaceae*), pumpkin (*Cucurbitaceae*), and also several plants from the families

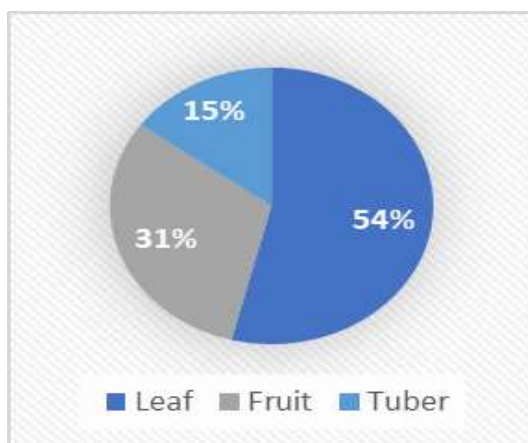
*Euphorbiaceae* and *Moraceae*. Parts of the plant used as vegetables include leaves, flowers, and young fruit.

The Dawan people also have the habit of serving sambal as a complement to enjoying *bose* and *katemak*. *Lu'at* is a traditional chili sauce of the Dawan people which has a distinctive taste because it uses a blend of spices from local plants. Knowledge about making *lu'at* is included in local community knowledge that has been passed down from generation to generation. The types of herbs and spices used to make the traditional sambal of the Dawan people are presented in Table I.

**Table I.** The type of plant used to make the typical Dawan chili sauce

Family	Species	General Name	Local Name	Part used
Solanaceae	<i>Capsicum frutescens</i>	Cabai rawit	Unus	Fruit
	<i>Solanum lycopersicum</i>	Tomat	Kauliman	Fruit
Rutaceae	<i>Citrus hystrix</i>	Jeruk purut	Leol mina	Fruit
	<i>Citrus aurantifolia</i>	Jeruk nipis	Muik masi	Fruit
Apiaceae	<i>Pimpinella sp</i>	Adas manis	Sipa	Leaf
	<i>Coriandrum sativum</i>	Ketumbar	Kuenter	Leaf
	<i>Cuminum sp</i>	Jintan putih	Ut kapas	Leaf
Lamiaceae	<i>Ocimum africanum</i>	Kemangi	He'lo	Leaf
	<i>Menta sp.</i>	Mint	Onatlo	Leaf
	<i>Plectranthus amboinicus</i>	Sukan	Luwek mafauban	Leaf
Amaryllidaceae	<i>Allium cepa</i>	Bawang merah	Pio mtasa	Tubers and leaf
Alliaceae	<i>Allium sativum</i>	Bawang putih	Pio muti	Tubers

The use of plants by the Dawan tribe as a staple food or as a complement to staple food uses certain parts of a plant. From the exploration results, it is known that the parts of the plant used in making traditional chili sauce are leaves, fruits, and tubers. The most widely used part of the plant is the leaves. The percentage of plant parts used in making traditional Dawan chili sauce is presented in Figure 2.



**Figure 2.** Percentage diagram of the use of plant parts in making Dawan's typical chili sauce

## DISCUSSION

*Lu'at* is a traditional sambal of the Dawan people which is made using a mixture of several herbs and spices and is consumed without going through the cooking process first. The traditional chili sauce of the Dawan people can be in the form of fresh chili sauce or chili sauce that has been stored for some time. The term *lu'at* is more used for sambal which is made and stored for some

time before being consumed. In the culture of the Dawan people, serving lu'at is an integral part of serving staple food both in daily life and in certain traditional events.

The exploration and identification results in Table I show that 12 types of spice plants are used as ingredients for making chili sauce to complement the staple food of the Dawan people. The twelve plant species systematically belong to 6 different plant family groups, namely *Solanaceae*, *Rutaceae*, *Apiaceae*, *Lamiaceae*, *Amaryllidaceae*, and *Alliaceae*.

Plants from the *Solanaceae* family are used in making the special chili sauce of the Dawan people, namely cayenne pepper and tomatoes. Cayenne pepper is a spice whose composition is dominant and is also the main ingredient in making chili sauce because it gives a spicy taste. The spicy taste produced by cayenne pepper can increase appetite so that sambal lu'at has its taste as part of the complement to the staple food of the Dawan people. The spicy taste of cayenne pepper is due to the content of capsiacinoid compounds. Cayenne pepper is known to contain higher capsiacinoid compounds than other chili groups (Barbero et al., 2008) so it gives a strong spicy taste sensation when compared to other chili groups. Cayenne pepper and tomatoes are known to contain chemical compounds such as flavonoids, alkaloids, phenolic saponins, vitamin A, and vitamin C which function as antioxidants and antimicrobials against pathogenic bacteria (Kalogeropoulos et al., 2012; Chaudary et al., 2018; Izah et al., 2019; Kusnadi et al., 2019; Isaac and Oluyomi, 2020). The use of tomatoes in making Dawan's special chili sauce is not a must, meaning that tomatoes are not a mandatory spice ingredient in making lu'at. Because of its nature and its sour taste when stored, tomatoes are used to make fresh chili sauce which is eaten immediately, not stored.

Kaffir lime or lime is a plant belonging to the *Rutaceae* family which is also used as a mixed ingredient for making chili sauce typical of the Dawan people. The addition of orange juice and/or slices of citrus fruit along with the peel of the fruit makes this traditional sambal of the Dawan people sour in taste with a fresh citrus aroma. Making sambal lu'at can use a mixture of the two existing types of oranges or can use one type of orange. Lime and kaffir lime fruit contain flavonoids, alkaloids, phenols, saponins, tannins, and steroids which have pharmacological activities as antibacterial, antifungal, antihelminthic antioxidants, anticancer as well as anticholesterol (Okwu et al., 2008; Sitinjak, 2017; Permata et al., 2018; Oikeh et al., 2016).

Plants of the *Lamiaceae* family that are used in making sambal lu'at are basil, mint, and sport. These three types of plants have a distinctive taste and aroma, the selection of the addition of these three types of plants also depends on people's tastes. In its manufacture, you can use these three types of plants at once or only add one type. Plants of the *Lamiaceae* family are known to contain essential oils so they are widely used as medicinal ingredients and also as cooking spices (Handayani, 2015). The phytochemical content of *Lamiaceae* plants is known to have potential as antioxidants, antidiuretics, antibacterials, antifungals, and anti-inflammatories (Cocan et al., 2018; Sulaiman et al., 2020).

The *Apiaceae* family, anise, cumin, and coriander are plant species that are used as additives in making the typical chili sauce of the Dawan people. Just like the plants of the *Lamiaceae* family, these three plants also have a distinctive taste and aroma. Sipa or anise is usually used in making fresh chili sauce or stored for some time, while the addition of cumin and coriander is only for making fresh chili sauce. The addition of these three types of plants in making the typical Dawan chili sauce depends on the tastes of the people, usually only using one of these three types of plants. Sipa is the most identical type of plant in the mixture for making lu'at. Coriander, anise, and cumin are herbaceous plants in the *Apiacea* family that can be used as cooking spices and which are known to contain chemical compounds that have the potential as antimicrobials and antioxidants (Wei et al., 2019; Zengin et al., 2019).

Shallots, which are plants from the Amaryllidaceae family, and garlic from the Alliaceae family, are included in herbs and spices which are also used as additional ingredients in making the special chili sauce typical of the Dawan people. These two types of plants have a distinctive taste and aroma, so they are widely used as spices and herbs in Indonesian cooking. In making Dawan's signature chili sauce, the use of shallots and garlic also depends on taste. Usually people add these two plants at once, but there are also those who only add one of these two types of plants. Shallots and garlic are reported to contain chemical compounds such as alkaloids, flavonoids, tannins, saponins (Laia, 2019).

During the harvest season, if there is an excess of spice plants, the Dawan people will process them into *lu'at* to be stored as supplies for some time, even up to several months. This is included in one of the local wisdom knowledge of the Dawan community in processing and preserving food ingredients, especially in terms of food spices as a complement to serving staple food.

Plants have complete organs which generally consist of vegetative organs, namely roots, stems, and leaves; vegetative organs namely flowers, fruits, and seeds and in some plants have additional modified organs such as rhizomes, roots, or tubers (Tjitrosoepomo, 2016). Use of herbs and spices in the manufacture of special chili sauce by the Dawan people uses a combination or combination of certain parts of plants, namely leaves, fruit, and tubers. Of the twelve types of plants, the leaves are the part of the plant that is most dominantly used in making the typical Dawan chili sauce (Figure 2). The fruit organ is the part that uses the percentage more after the leaves compared to the tuber which uses the percentage less when compared to the other two plant organs. In making and presenting it, the composition of the amount of each type of plant depends on taste or habit.

The plants used in the manufacture of the typical Dawan chili sauce are known to contain certain phytochemicals of each type used and are known to be useful in supporting and supporting metabolism and biological activity. Serving the typical food of the Dawan people, namely *bose* and *katemak* with a complement in the form of *lu'at* chili sauce, can increase appetite and also increase nutritional value because it uses a variety of natural plant ingredients with good ingredients for health.

The diversity of plant species used by the Dawan community is inseparable from the availability of biological resources on the island of Timor and their farming habits. The people of Timor Island have a habit of farming dry land with a multicultural cropping pattern or what is known as intercropping. This is done in order to obtain various types of crops in one growing season due to the shorter duration of the rainy season. In planting areas or gardens planted with staple crops such as corn, they are intercropped with legumes or spices.

Knowledge about the use of spices in making chili sauce as a complement to the staple food by the Dawan people is a tradition inherited and passed down by their ancestors for generations. The Dawan people consider that understanding and knowledge about the use of plants in various cultural customs, especially as food, is part of the ancestral heritage that needs to be preserved and passed on to the next generation.

In addition to knowledge about the use of plants as a food ingredient, several previous studies have also reported on people's habits in using plants in making woven fabric dyes, making traditional houses and in traditional ceremonies. Nitti et al., (2022), reported that there were 4 types of plants used as natural dyes for woven fabrics of the Dawan community in Tunbaun Village, Kupang Regency; Naisumu et al., (2022), reported that there were 8 types of plants used as natural dyes for woven fabrics of the Dawan community in Fafinesu Village, North Central Timor District; Bria and Binsasi (2020), reported that there were 15 types of plants used in making traditional houses for the Dawan community in North Central Timor District.

Preservation of local community knowledge about the use of plants in fulfilling the necessities of life which in practice is carried out daily or continuously, needs to be accompanied by knowledge about plant preservation and conservation. This is necessary in relation to the availability of plant species needed in customary activities or community habits. Utilization without being followed by conservation activities can have an impact on the rare or difficult to find plant species and can even result in the threat of extinction of certain plant biodiversity in their natural habitat. The loss of biodiversity of plant species needed at an event or community's customary habits can also have an impact on the non-functioning of the program or customary habits and even the loss of customary habits or traditions in the use of plants.

The knowledge of the Dawan people in the use of plants as staple food, staple food supplements, natural dyes, or in making traditional houses needs to be preserved and passed on to the next generation given the modernization developments that introduce the use and utilization of ready-to-eat packaged foods or chili sauce and dyes. synthetic which can threaten the knowledge of future generations regarding the use of plants in the customary habits of the Dawan people.

## CONCLUSION

The Dawan people on Timor Island are known to utilize a variety of plant diversity to meet their need for food. *Bose* or *katemak* which are processed local foods are usually served with complementary foods in the form of *lu'at*. The results of the identification show that 12 types of herbs and spices are usually used in making the typical chili sauce of the Dawan people. The twelve plants belong to 6 families, namely *Solanaceae*, *Rutaceae*, *Apiaceae*, *Lamiaceae*, *Amaryllidaceae*, and *Alliaceae*. Leaf, fruit, and tuber are the parts used in making the typical chili sauce of the Dawan people. The results of this research will become a part of the documentation of plant biodiversity in local wisdom and reference in local plant conservation.

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