

## Ethnobotany of Traditional Food Ingredients in Tuban Regency, East Java

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### Abstract

*Traditional food is one of the cultural products that was created to meet primary human needs by involving local wisdom. Various types of traditional food are processed from plants taken from the surrounding environment and other places. Local communities have specific interactions and perceptions of plants as ingredients for their traditional foods. The aim of the research was to determine the diversity, the categories of utilization, the organs used, the preparation methods, and the Cultural Significance Index (ICS) of plants in traditional Tuban food ingredients. This research was conducted by surveying 117 respondents from 20 sub-districts in Tuban Regency, followed by in-depth interviews with 20 traditional food makers in Tuban. The data obtained is in the form of qualitative data in the form of local knowledge of the Tuban people regarding plants in their traditional food ingredients, while quantitative data is in the form of the Cultural Significance Index (ICS). The results showed that there were 15 families consisting of 10 species of plants in traditional Tuban food, all of which were cultivated plants, the most used category of plants as spices and the organs most used were seeds and the highest ICS value was *Oryza sativa* L.*

**Keywords:** Ethnobotany, Ingredients, Traditional Foods, Tuban.



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### INTRODUCTION

Traditional food is a processed food product that is known, made, and consumed for a long time generations, and generally uses local ingredients with preparation, presentation, and taste that are relatively adapted to the local community (Harsana & Triwidayati, 2020). Traditional food ingredients often consist of plants obtained from the surrounding environment or cultivated elsewhere which are obtained in the market (Nuraeni et al., 2022). Food plants have organs such as stems, leaves, and roots, are obtained from the surrounding environment, and can be eaten or consumed by humans. These plants are commonly used as grains, fruits, vegetables, and tubers (Satrima et al., 2015). Many local communities have local wisdom to process plants into traditional food (Silalahi et al., 2021).

The local community's perception and interaction of plants are studied in ethnobotanical research (Supiandi et al., 2019). Food plants are divided into six categories, namely staple food, secondary food, vegetables, spices, fruits, and ritual or spiritual food (Silalahi et al., 2021). The determination of this category is based on the type of plant utilization by the local community. In addition, based on the method of obtaining these plants, they are divided into cultivated and non-cultivated plants (Hendra & Oktaviani, 2020). Methods of preparing plants for food are different for each local community in Indonesia (Tambunan, 2021). The unique way of processing these plants makes food one of the cultural identities of a region. The utilization and use of plant preparation methods have been carried out for generations by the Tuban community. The community processes plants to meet nutritional needs and adapt them to the tastes of the local community.

Tuban, East Java, is crossed by the Pantura route from west to east of Java Island. Many cities are connected by this route, such as Bandung, Jakarta, Semarang, and Surabaya (Yudianti, 2021). Most of the population of Tuban are Javanese who have unique cuisine according to the resources available in Tuban. This uniqueness is due to the characteristics of the food resources of the Tuban, namely from the Laut Jawa and agricultural land with various kinds of soil textures to produce various types of unique foodstuffs.

Several traditional Tuban foods utilize plants that are well known to the wider community, while there are still many potentials that have not been explored. Besides that, some foods are starting to be rarely found and forgotten. This is due to the development of technology and information, as well as the increasing number of modern foods which are shift role the existence of traditional foods. Therefore, it is necessary to preserve traditional food, including traditional Tuban food to diversify food ingredients and conserve biological resources, culture, and local knowledge about traditional food. To support this, various studies have been carried out on the ethnobotany of traditional food, including the ethnobotany of traditional Sasak cuisine (Sukenti et al., 2016, 2019); the culinary wealth of Dayak (Septo et al., 2021); ethnobotany of food and health care for Malay mothers (Susandarini et al., 2021); inventory and mapping of traditional Tuban foods (Rahayu et al., 2022). However, there is not much information about the ethnobotany of traditional Tuban food. Therefore, this research was conducted to determine the types, organs, ways of utilization, and Index of Cultural Significance (ICS) of plants by the local community of Tuban.

## **METHOD**

This research was conducted in Tuban, East Java, which consisted of 20 sub-districts for 4 months from June to October 2020. This research began by making a list of questions arranged in a questionnaire which was then validated by a gastronomy expert and continued with a survey of 117 respondents. This is done to find out about the traditional Tuban food. After getting the lists of traditional Tuban food, 20 informants of traditional Tuban food makers. The selection of informants was carried out using the purposive sampling method, which was selected based on the consideration that these informants had the competence to be able to provide

information relevant to this study, while the following informants were determined using the snowball sampling method (based on recommendations from previous informants). Semi-structured interviews were conducted to collect data from informants. The data obtained from informant information are qualitative and quantitative. Qualitative data is local wisdom owned by the local Tuban community regarding plant resources used in their traditional food. While the quantitative data is the Index of Cultural Significance (ICS) which is then analyzed using the formula (Wirabumi et al., 2022) :

$$ICS = \sum_{i=1}^n (q \times i \times e)$$

Information: ICS = Index of Cultural Significance  
q = quality value  
i = intensity value  
e = exclusivity value  
n = usability (1 to n)

## RESULTS AND DISCUSSION

Based on the results of a survey of 117 respondents spread over 20 sub-districts in Tuban, 16 traditional Tuban food menus were found. Based on the results of a survey, traditional Tuban food has spicy, savory, salty, and slightly sour characteristics. Furthermore, the information obtained from these respondents was used as a basis for obtaining further data which was carried out by interviewing the informants. The results of the interviews indicated that there were 28 species of plants used by the local community of Tuban in their traditional food. The uniqueness of traditional Tuban food is not only due to the composition of the food ingredients but also due to the unique processing methods that have been passed down from generation to generation (Table 1).

The local community of Tuban knows the plants in the traditional Tuban food ingredients from generation to generation and each plant species has its local name (Table 1). According to Hendra & Oktaviani (2020) stated that traditional food contains various local wisdom which is an expression of the close relationship between humans and their environment. In traditional food, the local community makes a combination of foodstuffs and processing techniques for food plants to produce a certain taste, shape, color, or smell that characterizes food in a region.

Identification of 28 species of plants used as traditional Tuban food ingredients can be found in 15 families (Table 1). The family Poaceae are 5 species; the family Zingiberaceae are 4 species; the families Amaryllidaceae, Euphorbiaceae, Solanaceae, Apiaceae, Arecaceae, Rutaceae, and Fabaceae are 2 species each; families Lauraceae, Myrtaceae, Moringaceae, Leguminosae, Musaceae is 1 species each. The Poaceae family in traditional Tuban food is used as a carbohydrate resource (rice, corn, and wheat) and spices (sugar cane and lemongrass). Refer to Sarwar et al. (2013) stated that the Poaceae family is the fifth largest plant family and has important economic value because some of its members are cereal crops such as rice, corn, wheat, barley, and millet which can be used as a source of human food. In addition, some members of this family, such as lemongrass, also have essential oils that can be used as spices (Li'aini & Kuswantoro, 2023). While the Zingiberaceae family (turmeric, aromatic

ginger, galangal, and ginger) are used as spices. The Zingiberaceae family can be used as a spice because it has a distinctive taste and aroma (Wendimu & Tekalign, 2022).

The category of using food plants as traditional Tuban food ingredients as spices are 21 species, carbohydrate resources are 4 species, vegetables, fruit, food wraps, and secondary foods are 1 species each. Refer to Robi & Kartikawati (2019) stated that spices come from aromatic plants and can be used as seasonings, flavor enhancers, and preservatives in traditional foods. Based on the results of a survey conducted on 117 respondents, it was found that traditional Tuban food has a characteristic combination of spicy, salty, savory, and slightly sour flavors. The spicy taste is obtained from the use of cayenne pepper as a seasoning. According to Rahmawati et al. (2020), the spicy taste of cayenne pepper is due to the presence of capsaicin in the fruit placenta. While the use of shallot, garlic, and the addition of various kinds of spices such as candlenut, coriander, galangal, lemongrass, and bay leaf in traditional Tuban food made a savory taste. The sour taste comes from the spices come from tamarind plants, tomatoes, and lime. Refer to Hendra & Oktaviani (2020) stated that the distinctive taste of food comes from spices which consist of a single spice component or a mixture of various spices which are specially processed. Every tribe has differences in utilizing plants for their traditional food. Some traditional Tuban foods also have a slightly sweet taste, although not too strong. This sweet taste is obtained from soy sauce and sugar. Soy sauce are processed from soybean, and sugar are processed sugarcane.

In this study, it was found that the plant sources of carbohydrates for the people of Tuban were divided into two categories: staple foods and secondary carbohydrate sources. Staple foods are foodstuffs that are consumed in large quantities, provide a filling sensation, and serve as the main energy source in the form of carbohydrates. On the other hand, secondary foods are alternative options that can substitute for staple foods (Susandarini et al., 2021). Rice (*nasi*) is the staple food for most Indonesians, including those in Tuban, East Java. However, under certain conditions, they utilize secondary carbohydrate sources as a substitute for rice (*nasi*) (Rusdi, 2023; Sumarwati, 2022). The species of secondary carbohydrate source plants vary depending on the region (Rusdi, 2023). The people of Tuban commonly use local plants such as corn and cassava, and in addition, they also utilize wheat as a source of secondary carbohydrates.

Moringa is a plant that is cultivated locally and used by the people of Tuban as a vegetable. There are not many types of vegetables in the traditional food of the Tuban people because most of them live in coastal areas and prefer to consume animal-based food sources. Vegetables in food components are needed to meet the needs for fiber, vitamins, and minerals (Buturi et al., 2021). Vegetables are plant food ingredients that contain high water content and can be consumed directly or processed using certain techniques (Jayaraman & Gupta, 2020).

In this study, it is known that there is only one type of plant that is used as fruit in typical dishes of the Tuban community, namely the banana plant. Tuban people consume bananas directly or have them processed first by steaming, frying, or making banana chips. Fruits are aromatic plant products that are naturally sweet or typically have been sweetened before consumption (Jayaraman & Gupta, 2020). Fruit also contains water, fiber, vitamins, and minerals. (Elfariyanti et al., 2022). Bananas are

high in carbohydrates, vitamin A, and minerals such as magnesium and potassium. In addition, banana fruits also contain active compounds, such as flavonoids, phenols, tannins, glycosides, proanthocyanidins, sesquiterpenoids, and monoterpenoids, terpenoids, quinones, alkaloids and saponins. Natural antioxidants, antineoplastic activity, antibacterial activity, vermifugal activity, and a rich supply of potassium are just a few of the advantages of bananas (Susanti, 2013).

The use of banana leaf food wrappers has been practiced for generations when there were no modern food wrappers such as plastic. Banana leaves are used as wrappers for various types of traditional Tuban food, such as *pepes*, *bothok*, and *lontong*. Leaves are an organ of the banana plant that is utilized as a traditional food wrap by the local community of Tuban. According to Sari et al., (2019) banana leaves are one type of leaf that is commonly used as a food wrapper, which aims to extend the shelf life of food, enhancing the appearance of food, and add aroma and delicacy to food.

A secondary food ingredient utilized by the Tuban community in traditional foods is palm oil. Palm oil processed into cooking oil is used to help the preparation process of other food ingredients into ready-to-eat traditional foods by frying. Tuban's traditional food that is prepared by frying is *pelas*. According to Pawitrasari et al., (2022) secondary food ingredients are additional food ingredients outside the staple food category. Cooking oil is usually processed from cultivated oil palm plants and further processed in cooking oil factories (Husain & Marzuki, 2021).

**Table 1.** Ethnobotany of Traditional Tuban Food Ingredients

No	Local/ Indonesian Name	Common Name	Family	Species	Uses	Part of Used	Processing Method	ICS	Information
1	Jagung /Jagung	corn	Poaceae	<i>Zea mays</i>	secondary foods (carbohydrate resources)	seeds	old corn seeds are mashed and steamed as a substitute for rice, young corn seeds are crushed, mixed with spices, and fried as a side dish	20	Local cultivated
2	Gandum/ Gandum	wheat	Poaceae	<i>Triticum sp.</i>	secondary foods (carbohydrate resources)	seeds	wheat flour is made for the cooking mixture	12	Cultivated*
3	Tebu/Tebu	sugarcane	Poaceae	<i>Saccharum sp.</i>	spices	stems	granulated sugar for cooking seasoning	25	Cultivated*
4	Pari/Padi	rice	Poaceae	<i>Oryza sativa L.</i>	staple food (carbohydrate resources)	seeds	the seeds are dried and steamed	58	Local cultivated
5	Sereh/Serai	lemongrass	Poaceae	<i>Cymbopogon citratius</i>	spices	stems	the stem is crushed	9	Local cultivated

No	Local/ Indonesian Name	Common Name	Family	Species	Uses	Part of Used	Processing Method	ICS	Information
6	Kunir/Kunyit	turmeric	Zingiberaceae	<i>Curcuma longa</i>	spices	rhizome	the rhizomes are mashed	34	Cultivated*
7	Kencur/ Kencur	aromatic ginger	Zingiberaceae	<i>Kaempferia galanga</i>	spices	rhizome	the rhizomes are mashed	17	Cultivated*
8	Laos/Lengkuas	galangal	Zingiberaceae	<i>Alpinia galanga</i>	spices	rhizome	the rhizomes are crushed	12	Local cultivated
9	Jahe/Jahe	ginger	Zingiberaceae	<i>Zingiber officinale</i>	spices	rhizome	the rhizomes are crushed	22	Cultivated*
10	Brambang/ Bawang Merah	shallot	Amaryllidaceae	<i>Allium cepa</i> L. <i>var. ascalonicum</i>	spices	bulb, leaves	the bulbs are mashed and the leaves are chopped	15	Cultivated*
11	Bawang/ Bawang Putih	garlic	Amaryllidaceae	<i>Allium sativum</i>	spices	bulb	the bulbs are mashed and the leaves are chopped	12	Cultivated*
12	Miri/Kemiri	candlenut	Euphorbiaceae	<i>Aleurites moluccana</i>	spices	seeds	the seeds are mashed	9	Cultivated*
13	Menyok/ Singkong	cassava	Euphorbiaceae	<i>Manihot esculenta</i>	secondary foods (carbohydrate resources)	tubers, leaves	the tubers are steamed and pounded, the leaves are boiled as a vegetable	20	Cultivated*
14	Lombok/ Rawit	Cabai cayenne pepper	Solanaceae	<i>Capsicum frutescens</i> L.	spices	fruits	the fruits are mashed or chopped	12	Local cultivated

No	Local/ Indonesian Name	Common Name	Family	Species	Uses	Part of Used	Processing Method	ICS	Information
15	Tomat/Tomat	tomato	Solanaceae	<i>Solanum lycopersicum</i> L.	spices	fruits	the fruits are mashed or chopped	20	Cultivated*
16	Jinten/Jinten	cumin	Apiaceae	<i>Trachyspermum roxburghianum</i>	spices	seeds	the seeds are mashed	12	Cultivated*
17	Tumbar/ Ketumbar	coriander	Apiaceae	<i>Coriandrum sativum</i> L.	spices	seeds	the seeds are mashed	12	Cultivated*
18	Klopo/Kelapa	coconut	Arecaceae	<i>Cocos nucifera</i>	spices	seeds	the seeds are grated and squeezed to take the coconut milk	44	Local cultivated
19	Sawit/Kelapa Sawit	palm oil	Arecaceae	<i>Elaeis</i> sp.	secondary foods	seeds	the oil from the seeds is processed for frying	16	Cultivated*
20	Jeruk Purut/Jeruk Purut	lime	Rutaceae	<i>Citrus hystrix</i>	spices	leaves	leaves are used for seasoning	9	Cultivated*
21	Jeruk Nipis/ Jeruk Nipis	lime	Rutaceae	<i>Citrus aurantifolia</i>	spices	fruits	the fruit is squeezed for seasoning	16	Cultivated*
22	Asem Jowo/Asam Jawa	tamarind	Fabaceae	<i>Tamarindus indica</i>	spices	fruits	the fruits are crushed for seasoning	17	Local cultivated
23	Kacang Tanah/Kacang Tanah	peanut	Fabaceae	<i>Arachis hypogaea</i> L.	spices	seeds	the seeds are mashed	12	Local cultivated



No	Local/ Indonesian Name	Common Name	Family	Species	Uses	Part of Used	Processing Method	ICS	Information
24	Misoi/Mesoyi	massoi	Lauraceae	<i>Cryptocarya massoia</i>	spices	bark	the bark is dried for seasoning	6	Cultivated*
25	Salam/Salam	bay leaf	Myrtaceae	<i>Syzygium polyanthum</i>	spices	leaves	leaves are used for cooking	21	Cultivated*
26	Kelor/Kelor	moringa	Moringaceae	<i>Moringa oleifera</i> Lam.	vegetables	leaves, fruits	the leaves and fruits are boiled as a vegetable	16	Local cultivated
27	Dele/Kedelai	soybean	Leguminoseae	<i>Glycine max</i>	spices	seeds	the seeds are fermented for soy sauces	12	Cultivated*
28	Gedhang/Pisang	banana	Musaceae	<i>Musa sp.</i>	fruits, food wraps	fruits, leaves	the fruits are eaten and the leaves are used for food wraps	21	Local cultivated

\*cultivated outside Tuban

Plant organs used as traditional Tuban food ingredients are seeds (11 species); leaf, and fruit (6 species); rhizomes (4 species); stems and tubers (2 species); tubers and barks (1 species). Seeds are the most widely used organ plant by the local community of Tuban as their traditional food ingredients, this is because the seeds contain carbohydrates which can be used as a staple food or a secondary food. In addition, several types of seeds also contain phytochemical compounds that have a distinctive taste, color, and aroma so that they can be used as spices. According to [Shofiyah & Hakim \(2020\)](#) stated that several types of plants such as rice, corn, and wheat store food reserves in the form of carbohydrates in their seeds. In addition, several types of seeds such as pepper, nutmeg, cumin, and coriander also contain aromatic phytochemical compounds that can be used as spices ([Robi & Kartikawati, 2019](#)). Fruits and leaves are also used by the local community of Tuban as vegetables and seasonings (Table 1). The fruit has a high nutritional content including vitamins and minerals, while the leaves contain fiber which is good for digestion ([Silalahi et al., 2021](#)). Tubbers are also used as an alternative source of carbohydrates for the local community of Tuban. Tubbers are organs that contain carbohydrates and have been used as a non-seed staple food ([Poernomo & Winarto, 2020](#)).

The processing of plants by the local community of Tuban generally consists of 2 ways, namely eating them directly and processing them first. There are only bananas which are usually eaten directly, while the others are processed before consumption. Some plant processing is carried out in a modern way with machines, for example, processing sugarcane into granulated sugar and processing soybeans into soy sauce. However, most of the plants are processed traditionally, for example, processing spices by mashing or crushing and then cooking with the foodstuffs in the form of vegetables or animals. Refer to [Satrima et al. \(2015\)](#) stated that some plants that are used as fruit can be eaten directly without processing, while several other types of plants must be cooked before consumption.

The Index of Cultural Significance (ICS) in Table 1 shows that the rice plant (*Oryza sativa* L.) is the species with the highest ICS value of 58 followed by the coconut plant (*Cocos nucifera*) which is 44 and turmeric (*Curcuma longa*) which is 34. Rice plants have an important meaning in the life of the local community of Tuban, apart from being a staple food that is used daily, rice seeds are also used as one of the main food ingredients for rituals, while the stems and leaves of rice are used for ruminant livestock feed by the local community. The Tuban community also uses the seeds and water of young coconuts for drinks and the old seeds for seasoning by taking the coconut milk, while the coir and coconut shells are used as fuel for making smoked fish, the stems are used as building materials and the bones of the leaves are used for broomsticks. While turmeric is used by the local community as a spice, as drinks ingredients such as *kunyit asam*, and as herbal medicine ingredients. Coconut and turmeric plants are used almost every day by the local community. According to [Ismail \(2023\)](#) stated that the ICS value is used to measure the level of importance of each plant species needed in a community, the ICS value is obtained from the results of quantitative ethnobotanical analysis. Local knowledge about the uses of various plant species is influenced by the environment, cultural level, technological advances, and interactions between communities.

All plants in the foodstuffs for traditional Tuban food are cultivated plants. There are 11 species of plants that are cultivated locally while 17 species are purchased at the market or cultivated elsewhere. Traditional cuisine consumed for generations by the people in an area is food or drink made from foodstuffs that can be easily found in that area (Tribudiarti et al., 2018).

## CONCLUSION

The conclusions of this study are:

1. There are 28 species of 15 families of plants, both cultivated locally and elsewhere, which are used for traditional Tuban food ingredients.
2. The categories of plant utilization in Tuban's traditional food as spices, carbohydrate resources, vegetables, fruits, food wraps, and secondary foods.
3. The plant organ utilized in Tuban's traditional food are seeds, rhizomes, leaves, fruits, stems, tubers, and barks.
4. There are two processing food plants in Tuban's traditional food namely eating them directly and cooking them first.
5. The highest ICS value of plants was rice (*Oryza sativa* L.), followed by coconut (*Cocos nucifera*), and turmeric (*Curcuma longa*), and the lowest was massoi (*Cryptocarya massoia*).

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