

**THE ETHNOBOTANICAL PERSPECTIVE OF INDIGENOUS HERBS
AND SPICES OF TABARU ETHNIC GROUP
IN HALMAHERA ISLAND, INDONESIA**

**Fatchur Rohman^{1*}, Mimien Henie Irawati Al Muhdhar¹,
M. Nasir Tamalene^{1,2}, Wawan S. Nadra² and Wira Eka Putra^{1,3}**



Fatchur Rohman

*Corresponding author email: fatchur.rohman.fmipa@um.ac.id

¹Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, Indonesia

²Department of Biology Education, Khairun University, Indonesia

³Department of Biotechnology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, Indonesia



ABSTRACT

Herbs and spices have been used for many years as an important source of food ingredients. Recently, herbs and spices have been used as the source of medicinal materials due to its rich-bioactive compounds content. However, the knowledge about the scientific background of these herbs and spices uses in the local community is based on limited data. This work aims to study the perspective of the Tabaru ethnic group toward the use of herbs and spices as an additional food source. This study was conducted between November and December, 2018 in Halmahera Island. The data and information about the use of herbs and spices were collected from 48 locals whose ages ranged between 40 and 89 years. The main occupation of respondents was farming of mainly nutmeg, clove, and coconut. The data were analyzed based on plant uses which included spices, food, and drug use. Data on plant species were analyzed using the Cultural Food Significance Index (CFSI) formula. The results showed that the Tabaru ethnic group used approximately 14 plant species as herbs and spices. According to the CFSI values, herbs and spices in very high significance group include *Curcuma longa* L. (value of CFSI, 460.8), *Cinnamomum burmanni* (Nees & T. Nees) Nees & Blume, *Myristica fragrans* Houtt., *Curcuma domestica* Valetton, and *Zingiber officinale* Roscoe (CFSI, 259.2). Moreover, in the high significance category, *Capsicum annuum* L. is listed with high CFSI score reaching 86.4. In the moderate significance category, we found about four species, namely *Ocimum americanum* L. and *Ocimum americanum* L. (CFSI, 48.6), *Etilingera heliconiifolia* (K. Schum.) AD Poulsen (CFSI, 24.3), *Alpinia galanga* (L.) Willd. (CFSI, 23,625). Finally, two species of *Etilingera elatior* (Jack) R.M.Sm. (CFSI, 17.82) and *Alpinia eremochlamys* K.Schum. (CFSI, 15.53) were in the low significance group. In conclusion, the value of CFSI has a positive correlation to the utilization and the conservation level of herbs and spices of Tabaru ethnic group in Halmahera Island.

Key words: Ethnobotany, Halmahera, Herbs and Spices, Tabaru Ethnic Group



INTRODUCTION

Herbs and spices have been used in foods and drinks to improve taste, and fragrances and as food preservatives [1-4]. Recently, they have been used as alternative source for medicine, cosmetics, and antimicrobials [5,6]. Many studies have shown that herbs and spices contain bioactive compounds such as essential oils, acetyl eugenol, eugenol, furfural, karyophilene, metal-amylketone, karyophilene, tannin, gasiat acid and other active ingredients. These active ingredients play a role in enhancing the flavor of various foods [7].

Many tribes in Indonesia utilize various types of herbs and spices as food ingredients. There is an increasing social trend in using herbs and spices in a variety of meals became a local culture and wisdom within the community [8]. The increasing human awareness of health and the important role of medicinal plants promote the need for herbs and spices in both dry and wet forms [9]. Herbs and spices cultivation techniques are carried out by local communities to preserve the indigenous species. The era of modernization affects the consumption patterns and decrease the basic knowledge of the younger generation about the herbs and spices. This unwanted condition that faces the current generation might become a threat to the sustainability and the existence of herbs and spices [10,11].

Herbs and spices have pivotal social and economic values in Tabaru ethnic group. Tabaru ethnic group is an indigenous community in the North Maluku area which has unique cultural richness. Maluku has been widely known as a spice-producing area because there are several types of herbs and spices found in this area. According to a study conducted by Rodianawati *et al.* [12] showed that there are two major dominant spices found in Maluku area, called nutmeg (*Myristica fragrans*) and cloves (*Syngium aromaticum*; *Eugenia romaticum*). Thus, in this present study, we aim to analyze the local knowledge of the Tabaru ethnic group in the use of herbs and spices, especially for an additional food source.

MATERIALS AND METHODS

The location of the study

The research was carried out in 13 villages in the western part of Halmahera Island on the coordinates N 1°31'26.912" E 127°33'43.420" (Figure 1). Almost all villages in this study were located near the coastal area in which farmers and fishermen dominate the population. Commonly, plantation management is based on the traditional custom of the Tabaru ethnic group. Interestingly, more than two-thirds of the people in the villages rely on livelihoods such as livestock and agriculture. Further, the local society also still relies on traditional wisdom to ameliorate several types of diseases by using indigenous medicinal plants around their habitation. On the other hand, the local staple foods are sago (*Metroxylon sagu*) and cassava (*Manihot esculenta*).



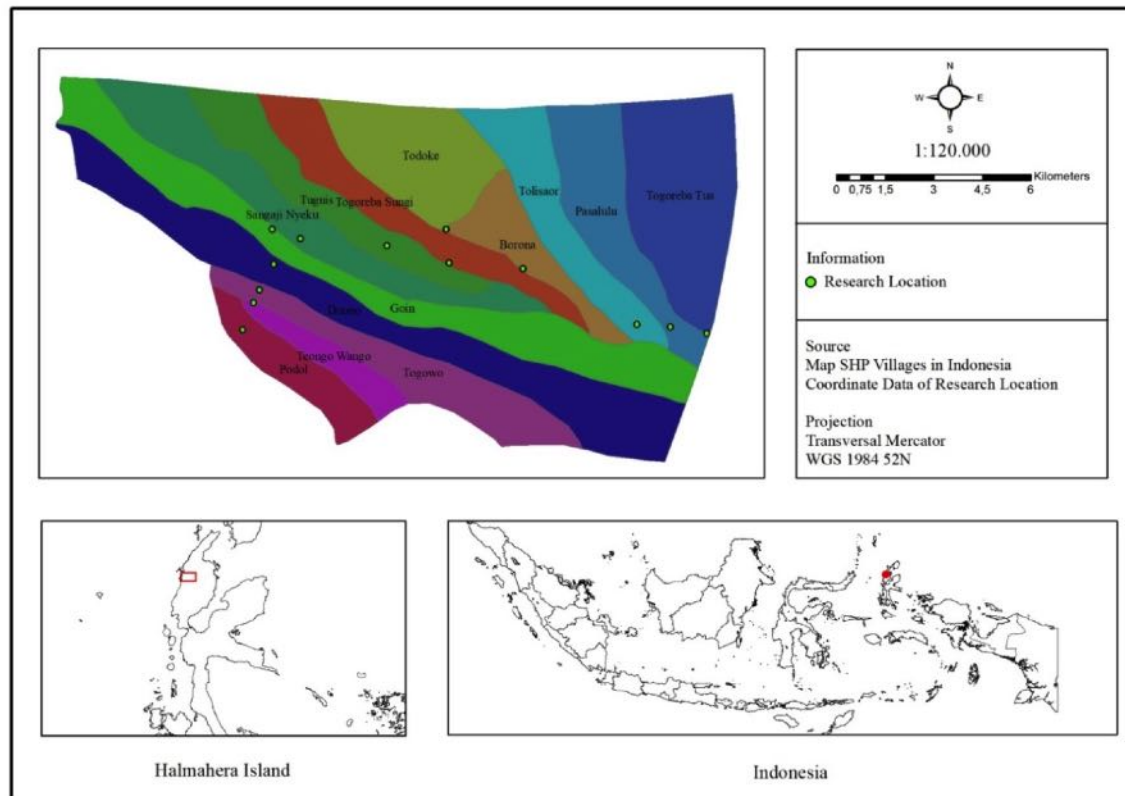


Figure 1: Map of the study areas

Data and information source

The source of research data was determined using a purposive sampling technique. The data source was chosen based on information from the tribal chief and village head. Consent letter was given to about 52 informants prior to research interview; however, only 48 among them agreed to sign the consent letter to support this study. The number of informants was determined according to age (Table 1) with a minimum education classification (Table 2).

Data collection

Data collection was conducted between November and December 2018. The collection of spice plant samples was based on information provided by the tribal chief and village head. The information given was about the indigenous herbs and spices plantation area followed with its restrictions on entering indigenous territories. Before data collection, the conduct of interview activities had already received approval from informants, as suggested in the Ethnobiology Code of Ethics International guidelines. The plants mentioned in the interviews were collected in a participatory manner and identified using ethnographic information and verified by using secondary literature. The plant data were then identified and stored in the Laboratory of Biology, Khairun University, Ternate.

Data analysis

The research data were analyzed based on use-value, which was based on the number of uses and the number of informants who used the types of spices as additional food. Data on plant species were analyzed using formal guidelines [13] regarding calculations and

the Cultural Food Significance Index (CFSI) category (table 3). The CFSI formula has a predetermined category index value. The CSFI formula is given as follows:

$$\text{CFSI} = \text{QI} \times \text{AI} \times \text{FUI} \times \text{PUI} \times \text{MFFI} \times \text{TSAI} \times \text{FMRI} \times 10^{-2}$$

Remarks: The index value of the quotation index (QI), availability index (AI), frequency of utilization index (FUI), the used index (PUI) parts plant, the multifunctional food use index (MFFI), the taste appreciation index (TSAI), and the food medicinal role index (FMRI).

The results of this study were then analyzed based on a descriptive and quantitative approach. The results of the analysis data were then categorized based on ICS values (cultural importance values).

RESULTS AND DISCUSSION

The herbs and spices as the featured product of Tabaru ethnic group

Generally, the communities of Tabaru ethnic group use the herbs and spices as a food ingredient. The interview with 48 informants subsequently identified that Tabaru ethnic groups commonly utilize 14 types of herbs and spices. These consist of seven species of Zingiberaceae family, two species of Solanaceae family, and a species of Lauraceae, Lamiaceae, Myristicaceae, Myrtaceae, and Poaceae (Table 4).

According to the results, herbs and spices cultivated by the Tabaru ethnic group include 11 domestic species and three wild species. Furthermore, the wild species include *Alpinia eremochlamys* (K.Schum), *Etilingera heliconiifolia* (K.Schum.) AD Poulsen, and *Etilingera elatior* (Jack) RMSm, which are easily found in forests. Besides being useful as a spice, these plants also have a pivotal function as a traditional medicine source. Herbs and spices of the Zingiberaceae family have crucial secondary metabolites such as flavonoids, phenols, terpenoids, and essential oils that can inhibit the growth of pathogenic bacteria [14]. Plants belonging to the Zingiberaceae family provide many benefits as food, spices, medicines, coloring, and perfumes. For instance, *Zingiber officinale*, has been used for many years as a spice and in the form of traditional medicine to treat various diseases such as thrombosis, nausea, migraine, rheumatism, and bleeding [15,16]. The herbs and spices from the Myrtaceae family commonly contain anthocyanin and antioxidants, which have a critical role as anti-inflammatory, anti-mutagenic, and anti-cancer [17,18]. The Solanaceae family also contains polyphenols and vitamins, which are essential to maintain the immune system and prevent blood clots [19,20].

The use-value of herbs and spices of Tabaru ethnic group

In this present study, seven of the fourteen species have very high usage values in the results of the CFSI analysis, so that they are classified as Very High Significance. The group of species in this category includes *Curcuma longa* L., (CFSI, 460.8), *Cinnamomum burmanni* (Nees & T. Nees) Nees & Blume, *Myristica fragrans* Houtt., *Curcuma domestica* Valetton, *Zingiber officinale* Roscoe (CFSI, 259.2). Further, only *Capsicum annum* L. is found in High Significance category with CFSI score reaching 86.4. About four species categorized as Moderate Significance Category include *Ocimum americanum* L., *Ocimum americanum* L. (CFSI, 48.6), *Etilingera heliconiifolia* (K.Schum.) AD Poulsen (CFSI, 24.3), and *Alpinia galanga* (L.) Willd. (CFSI, 23,625). Lastly, about two species are in Low Significance category, namely *Etilingera elatior*



(Jack) R.M.Sm. (CFSI, 17.82) and *Alpinia eremochlamys* K.Schum. (CFSI, 15.53). The value of CFSI has a positive correlation to the utilization and the conservation level of herbs and spices of Tabaru ethnic group in Halmahera Island (Figure 2).

As a custom that is inherited from generation to generation, the herbs and spices were used as an additional ingredient. In Tabaru ethnic group, the nutmeg and cloves have a critical role not only as food source, but also in economics, culture, and health (Figure 3). In medical perspective, high consumption of nutmeg and cloves can ameliorate various internal diseases and obesity. Other studies also show that herbs and spices have essential benefits as industrial oil source, coloring, medicine, and pesticides. Spice plants have important advantages as industrial oil source, coloring, drugs and pesticides [21-23].

In addition, the data showed that all informants from various age and education level groups demonstrated that herbs and spices are used as a food source, traditional medicine, and serve commercial, and cultural purposes. The Tabaru ethnic group has used the importance of spices as an aromatic ingredient for a long time. Scientifically, they do not know what kind of active compounds that alter the taste of food. They only believe that the aroma and taste that are altered by herbs and spices are coming from God. Interestingly, numerous scientific works have been demonstrated that herbs and spices contain a lot of bioactive compounds such as carotenoids, phytosterols, saponins, glycosinolates, polyphenols, protease inhibitors, monoterpenes, and phytoestrogens [24-26].

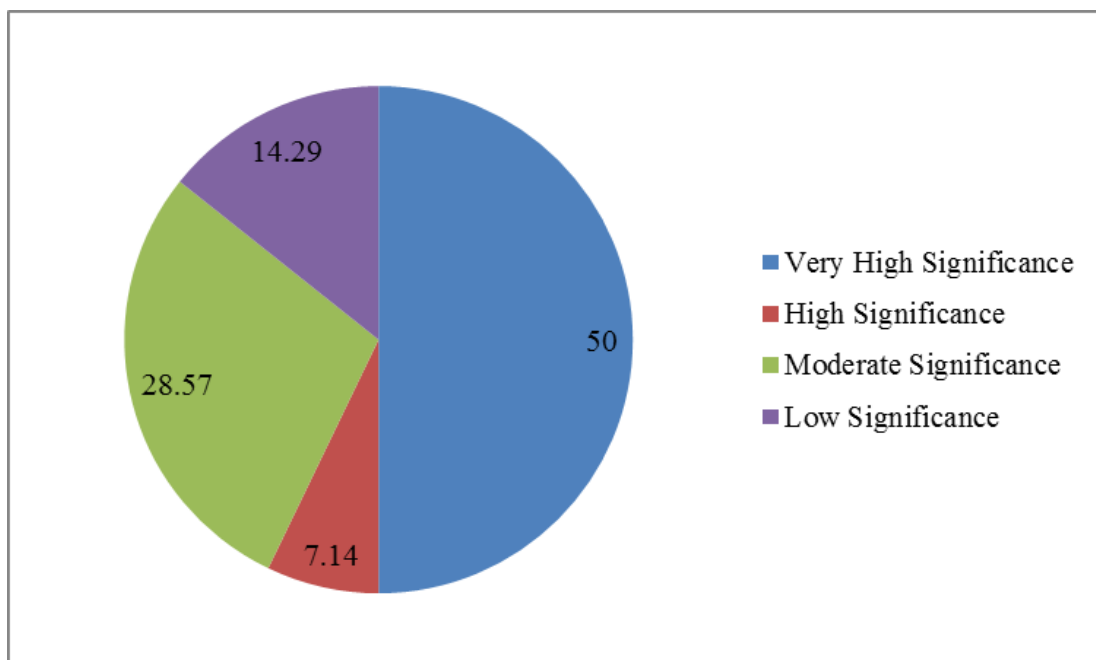


Figure 2: The use-value of herbs and spices in Tabaru ethnic group according to the Cultural Food Significance Index (CFSI) measurement. There are four classifications, including Very High Significance, High Significance, Moderate Significance, and Low Significance

In Tabaru ethnic group, clove and nutmeg are a welfare symbol for indigenous groups in cultural activities such as weddings and traditional parties in the village. Herbs and spices that are used by communities become a source of income that can reduce poverty, help cure diseases and reduce macronutrient deficiency [27]. Consuming spice plants as flavorant in food makes the food more tasty and enjoyable [2]. Bioactive substances in spice plants can also be curative agents to fight several types of disease-causing bacteria [28]. Herbs and spices are also a source of culinary tourism for local people [29]. Generally, locals cultivate spices as part of their concern in maintaining indigenous food resources. Simple consumption patterns cause them not to depend on other imported food sources. Inside the Tabaru ethnic group, the barter exchange system is still found, especially in local food crops.



Figure 3: The use of herbs and spices in Tabaru ethnic group. There are four main functions of herbs and spices that integrated each other such as traditional medicine, economic value, culture, and food flavor

CONCLUSION

Tabaru ethnic group uses herbs and spices as an additional food source. In this present study, about 14 species with various CFSI values were found as common herbs and spices that are used as aromatic and food sources. The investigation demonstrated that Tabaru ethnic group places a high level of importance on the utilization and conservation of herbs and spices.

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Table 1: The number of informants based on age group

Age group	Gender	Percentage
	Female	(%)
40-49	15	31.25
50-59	23	47.92
60-69	6	12.50
70-79	2	4.17
80-89+	2	4.17
Total	48	100

Table 2: The number of informants based on the education level

Education level	Number of informant	Percentage
		(%)
Illiterate	1	2.08
Primary	2	4.17
Secondary	19	39.58
High	24	50.00
University	2	4.17
	48	100

Table 3: Number of Species (with CFSI Values)

CFSI Values	Category
(ICS 100 and over)	Very High Significance
(ICS 50-99)	High Significance
(ICS 20-49)	Moderate Significance
(ICS 5-19)	Low Significance
(ICS 1-4)	Very Low Significance
(ICS 0)	Negligible Significance

Table 4: CFSI value of herbs and spices found in Tabaru ethnic group

No	Botanical Family	Scientific Names	Voucher Code	Local Names	Detail of calculation of the CFSI							CFSI
					QI	AI	UFI	PUI	MFFI	TSAI	FMRI	
1	Lauraceae	<i>Cinnamomum burmanni</i> (Nees & T. Nees) Nees & Blume	KM-043	Kayu Manis*	48	4.0	5.0	1.5	1.0	9	2.0	259.2
2	Lamiaceae	<i>Ocimum americanum</i> L.	MNT- 067	Balakama*	48	3.0	3.0	1.5	0.5	7.5	2.0	48.6
3	Myristicaceae	<i>Myristica fragrans</i> Houtt.	MNT - 054	Pala*	48	4.0	5.0	1.5	1.0	9	2.0	259.2
4	Myrtaceae	<i>Syzygium aromaticum</i> (L.) Merr. & L. M. Perry	MNT - 053	Cengke*	48	4.0	2.0	1.5	1.0	10	2.0	115.2
5	Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	MNT - 064	Bundi*	48	3.0	5.0	1.5	0.75	9	2.0	145.8
6	Solanaceae	<i>Capsicum annum</i> L.	MNT - 040	Rica*	48	3.0	2.0	1.5	1.0	10	2.0	86.4
		<i>Solanum lycopersicum</i> L.	MNT - 049	Tomat*	48	3.0	3.0	1.5	0.5	7.5	2.0	48.6
7	Zingiberaceae	<i>Curcuma domestica</i> Valetton	MNT - 055	Kuning*	48	4.0	5.0	1.5	1.0	9	2.0	259.2
		<i>Etilingera elatior</i> (Jack) R.M.Sm.	MNT - 052	Ogolobata**	22	3.0	2.0	1.5	0.5	9	2.0	17.82
		<i>Alpinia galanga</i> (L.) Willd.	MNT - 045	Liri*	35	3.0	2.0	1.0	0.75	7.5	2.0	23.625
		<i>Curcuma longa</i> L.	MNT - 059	Gurati*	48	4.0	4.0	1.5	1.0	10	4.0	460.8
		<i>Zingiber officinale</i> Roscoe	MNT- 060	Gihoro*	36	4.0	3.0	1.5	1.0	10	4.0	259.2
		<i>Etilingera heliconiifolia</i> (K.Schum.) A.D.Poulsen	MNT- 066	Goobe**	30	3.0	2.0	1.5	0.5	9	2.0	24.3
		<i>Alpinia eremochlamys</i> K.Schum.	MNT- 051	Goobe utan**	23	3.0	2.0	1.5	0.5	7.5	2.0	15.53



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