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Traditional knowledge on the use of local food crops by Togutil Ethnic in Halmahera Island, Indonesia

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Abstract. *Tamalene MN. 2017. Traditional knowledge on the use of local food crops by Togutil Ethnic in Halmahera Island, Indonesia. Asian J Agric 1: 66-72.* Food crop is an important component in the life system of the Togutil ethnic group in Halmahera Island. The main characteristic of the group is their nomadic life, despite the existence of some sedentary groups. Generally, the group consumes wild food plants growing in their natural ecosystem. This paper presents a selected result of food crop studies conducted in Halmahera Island, Indonesia. The botanical supply of food crops of the Togutil has high usefulness in their social and cultural activities. Data was collected through in-depth interview method with key informants chosen based on purposive sampling. Plant species were identified in the Laboratory of Herbarium Botany Bogoriense of the Biological Research Center of Indonesian Institute of Science (LIPI). 48 species of 23 families of food crops are used by the Togutil tribe of Halmahera Island, Indonesia. The food crops identified were wild plants with 45.83% growing in bushes habitat and primary forest, with 56.25% being cultivated crops planted in the garden and yard. Other uses of the food crops were identified as being medicinal plants (64.28%), house building (29.17%), and handicrafts and adhesive for animal (4.17%). In the cultural aspect, food crops were used for hunting rituals, medium of exchange (barter), welcoming guest rituals and traditional rituals. The value of Cultural Food Significance Index (CFSI) in the very high significance category was 64.58%, high significance was 27.08%, and low significance and very low significance are 4.16%.

Keywords: Local knowledge, local food crops, Togutil, Halmahera, Indonesia

INTRODUCTION

Food crops consumed by local communities in the world are those vegetable crops that grow wild and cultivated. Local communities consume food crops based on their own cultural system that have, until recently, lasted a long time. In Indonesia, local ethnic groups cultivate food crops to fulfill their life necessities. Most of the people in Indonesia work as food crops, horticultural and plantation farmers. Food crop itself consists of grains (cereals), legumes, and tubers. Food crops are the main or principal necessity to fulfill nutrition adequacy of human body for carbohydrates, proteins, vitamins, and minerals that are used for the sustainability and health of human life (Bharucha and Pretty 2010). Around 5% of total plant species in the word are functioned as being food and drink for humans (Anthony et al. 1993).

Food crops cultivated or growing wildly in the forest are used by local communities for family food security. Local food crops provide high nutrients to support family life and increase the economy (Gahukar 2015). Local food crops used by local communities are varied. Currently, local food crops that grow wild are cultivated as a rice substitute alternative food. Traditional cultivation techniques are developed by local communities to maintain the population of food crops. Non-chemical fertilizer from the traditional cultivation knowledge is used by local communities as their realization of the importance of plant crops for their life. Traditional cultivation activities are conducted for conservation purposes (FAO 1983).

The Togutil ethnical group of Halmahera Island, Indonesia consumes local food crops that are both growing wildly and cultivated. Local food consumption has lasted until recently and has deep cultural meaning. Local foods reflect the history, rich tradition, and identity of Togutil ethnic group. Local foods are important factors that are involved in every ceremony in the life cycle of the ethnic group, and are influenced by social status. Local foods are processed from food crops obtained from wood. Some of the commodities are cultivated traditionally through ways that consider sustainable cycles and use non-chemical fertilizers. Therefore, it results in superior quality, healthy, and environmentally friendly organic products.

It is important this research is done since it tries to document traditional knowledge on local food crops used by the Togutil ethnical group of Halmahera Island Indonesia . The practice of traditional food security by the Togutil is not systematically documented; therefore, the research aims to document the traditional knowledge of the Togutil on the use of food crop species based on local culture. The research will add literature in the field of ethnobotany in Indonesia. The paper also identifies other uses of wild food plants consumed by the Togutil.

MATERIALS AND METHODS

Survey technique and data collection

Information presented in the research is part of data series collected by authors in two locations: Akelamo, East

Halmahera, and Oba Tidore Islands (Figure 1) from July-September 2014 and November-December 2015. The coordinates of the research locations were 128° 40' 18'' E, and 127° 44' 43 'E. Surveys were used as the research approach to collect data on food crop ethnobotany through in-depth interviews, participant observation, and site visits (Martin 1995; Maundu 1995; Alexiades and Sheldon 1996; Cunningham 2001). An in-depth interview was conducted with key informants who were chosen based on purposive sampling (Tremblay 1987). Open questions were asked to discover a knowledge map from the key informants (Pretty et al. 1995; Kvale 1996). Informants guided the data collection process that involved a combination of observation and interview methods. Interview activity was conducted, along with observations of crops that were cultivated as well as grown wild in the wood and bushes. Informants were also asked to rank and score edible wild plants based on their own preferences.

Interviews were conducted in the local language by visiting each informant individually. Agreement was gained from each of the informants before the research was conducted referring to the ethical code of International Society of Ethnobiology (ISE 2016). The informants consisted of 84 people, as presented in Table 1. Questions related to food crop ethnobiology were asked to several age groups consisting of children (5-11 years), teenagers (12-25 years), adults (26-45 years), elders (46-65 years), and old aged (≥ 65 years). Plant specimens with unknown scientific names were collected and identified in the Herbarium Bogoriense of the Research Center for Biology of Indonesian Institute of Science (LIPI), Cibinong, Bogor, West Java, Indonesia.

Data analysis

Plant types were analyzed using a guide from Pieroni (2001) on the calculation of Cultural Food Significance Index (CFSI). The formula of CFSI has determined category index values: the index value of quotation index (QI) availability index (AI), frequency of utilization index (FUI), the plant parts used to index (PUI), the multifunctional food use index (MFFI), taste score appreciation index (TSAI), and the food medicinal role index (FMRI). Following is CFSI formula:

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

Research results were descriptive qualitatively analyzed using MS Excel 2010.

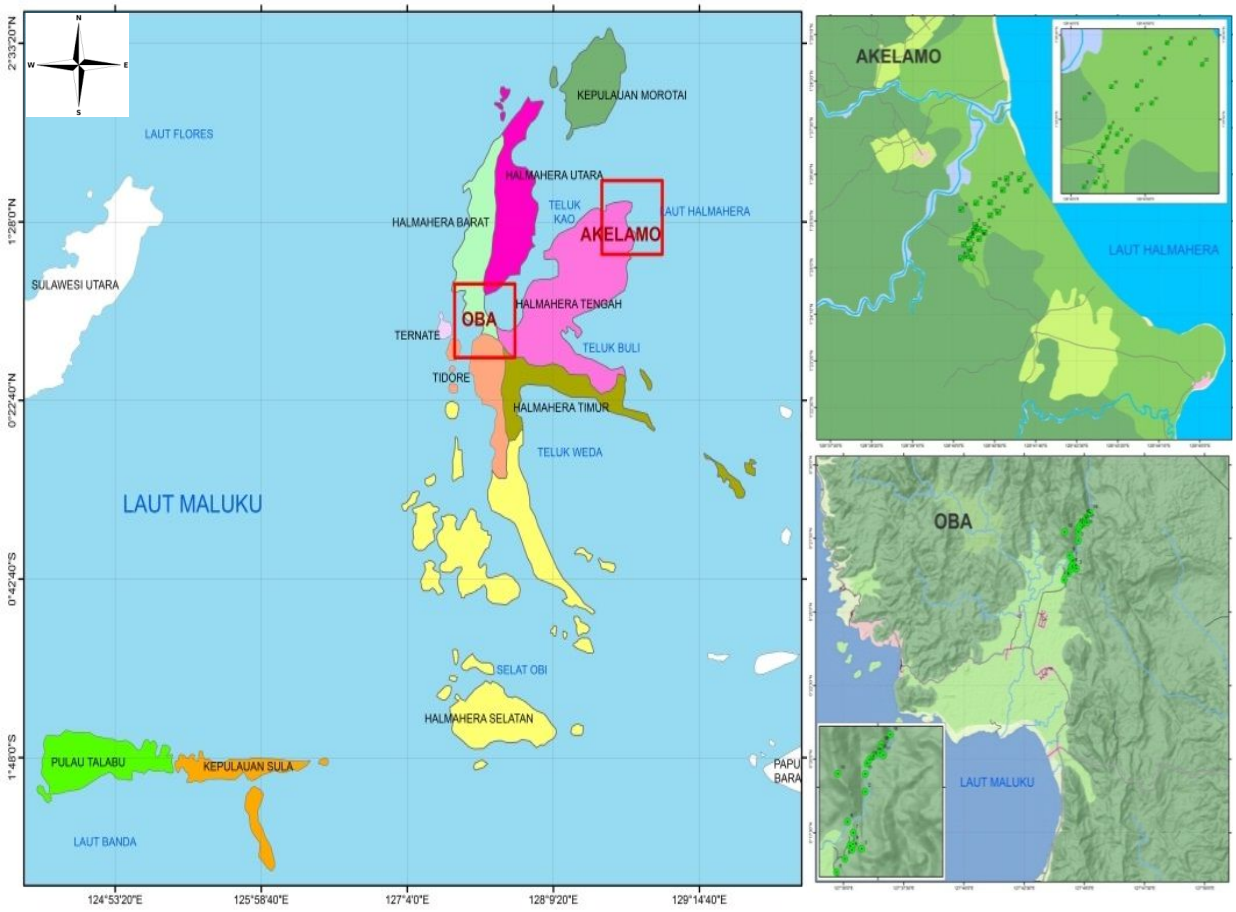

Figure 1. Study site in East Halmahera, North Maluku, Indonesia

Table 1. Demographic of interviewed informants

Category	Sub-category		Togutil ethnical group Akelamo Haltim	Togutil ethnical group Oba Tikep	Total	%
Gender	Male		23	34	57	68
	Female		15	12	27	32
Age (years)	Children	5-11	5	6	11	13
	Teenagers	12-25	10	14	14	17
	Adults	26-45	8	11	19	23
	Elder	46-65	12	11	23	27
	old aged	66 +	3	4	7	8
Marital Status	Married		27	32	59	70
	Single		11	14	25	30
Education	-		-	-	-	-

RESULTS AND DISCUSSION

There were 48 species from 23 families of food crops used by the Togutil tribe in Akelamo and Oba areas of Halmahera Island Indonesia (Table 1). Around 11 species (47.83%) of the crops came from family of Arecaceae, Zingiberaceae made up 7 species (30.43%), Myrtaceae and Poaceae were 4 of the species (17.39%), Burseraceae was 3 species (13.04%), Araceae and Moraceae were 2 of the species (8.70%), and the species with only one (4.35%) individual plant was from the families Athyriaceae, Amaranthaceae, Anacardiaceae, Bromeliaceae, Caricaceae, Combretaceae, Cucurbitaceae, Convolvulaceae, Euphorbiaceae, Gnetaceae, Lamiaceae, Moringaceae, Musaceae, Oxalidaceae, Sapindaceae and Solanaceae. The identified food crops were 45.83% wild plants from bushes and primary wood habitat, and 56.72% were cultivated crops planted in the garden and yard (Figure 2). Other uses of the crop plants included 64.28% medicinal, house building consisted of 29.17%, and handicraft and adhesive for animals was 4.17% (Figure 3). Regarding the socio-cultural aspect, food crops were also used for hunting rituals, medium of exchange (barter), welcoming guest rituals, and traditional rituals.

Wild plants, such as *Arenga undulatifolia* Becc, *Artocarpus elasticus* Reinw. ex Blume, *Arenga pinnata* (Wurmb) Merr., and *Metroxylon sagu* Rottb were the main staple foods consumed by the Togutil tribe as they contain the main carbohydrates, as both the main food source and energy source. Tuber from plant types of *Xanthosoma sagittifolium, Ipomoea batatas* (L.) Lam. and *Manihot esculenta* Crantz L. were foods that originated from plant roots and contain high amounts of carbohydrates. These types of plant became hereditary food staples consumed. Local food crops can be processed into various foods, such as *papeda*, *sagu kering*, and *sinoli* (traditional name foods of the Togutil tribe). Grains were not the main staple foods, but additional foods; these included *Canarium vulgare* Leenh, *Canarium decumanum* Gaertn, *Canarium indicum* L. *Pometia pinnata* J.R.& G.Forst, *Etlingera heliconiifolia* (K.Schum.) A.D.Poulsen, *Etlingera* sp. and *Alpinia eremochlamys* K.Schum.

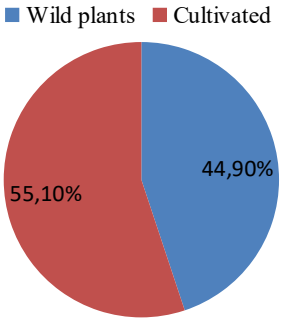

Figure 2. Percentage value of wild plants and cultivated crops

The tradition to consume staple foods and additional foods is characteristic of local wisdom that appears as a form of adaptation toward the surrounding environmental condition. Tradition to consume local food crops, as staple foods in the Togutil tribe have been running for generations. The existence of the staple foods was not only to fulfill life necessities, but also to be used in traditional ritual activities such as in paying debt if someone violated customs rules.

Multiplicity of uses, including parts used

Other uses of local food crops consumed by Togutil ethnic groups were for health, handicraft, adhesive for animal, and house building (Figure 4). The number of plants identified as having medicinal benefits was 31 species (64.28%) and the most efficacious plant was *Alpinia eremochlamys* K.Schum to protect from malaria. The number of plant species used as handicrafts was 2 (two) species (4.17%) i.e., *Saribus rotundifolius* (Lam.) Blume and *Calamus* sp and both were used to make furniture. Additional use of plants was found for house building. There were 29.17% of local food crops used for building house, such as species of *Metroxylon sagu* Rottb., *Arenga pinnata* (Wurmb) Merr., *Arenga microcarpa* Becc., *Arenga* sp., *Areca catechu* L., *Arenga undulatifolia* Becc., *Arenga brevipes* Becc. *Dendrocalamus asper* (Schult.) Backer., and *Bambusa* sp.

Based on observations, the edible parts of plants used were fruit, flower in stem, bamboo shoots, leaves and, rhizomes (Figure 3). The highest category of consumed plant parts was fruit (77.08%). The food crops were consumed raw or cooked and depended on the use of the plants. Some plants, such as *Etlingera heliconiifolia* (K.Schum.) A.D.Poulsen, *Etlingera* sp. and *Alpinia eremochlamys* K.Schum were used as seasoning. The other edible part was flower, at around 12.50%. They were consumed from the plants producing high carbohydrates and became the staple food, such as *Metroxylon sagu* Rottb. The plant was the main choice during the dry season. Bamboo shoots were used for consumption for 6.25%, and mainly from young shoots of bamboo. The part was consumed as a specific vegetable that was cooked in hunting ritual ceremonies and other traditional ceremonies. Leaves from such as *Moringa oleifiera* L., were cooked in traditional dishes and Rhizome, this part of plant was 4.17%, was being consumed not only for seasoning but also for traditional rituals such as *Alpinia galanga* (L.) Wild. and *Curcuma longa* L.

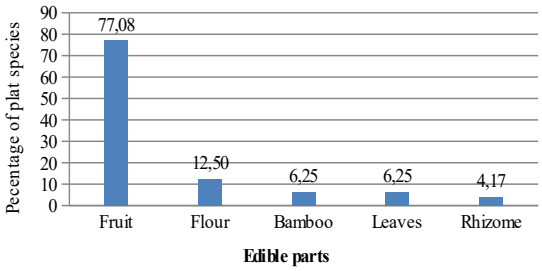

Figure 3. Edible parts of food plants

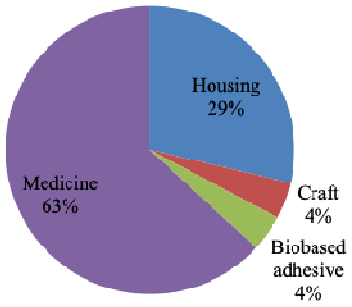

Figure 4. Additional uses of food plants

Food crops, as staple foods, and additional foods, have important benefits for the life of local communities in Indonesia as well as in various parts of the world. The food crops used in the Togutil tribe was summarized in Table 2. In addition, food crops can also be used as medicine to cure various diseases. Research shows that wild and cultivated food crops had sociocultural meaning as well as medicinal value for disease prevention. Previous research reported that food crops were useful for medicine (Tamalene et al. 2016). Plants have an overlapping use in value as not only a source of food, but also in culture and medicine. The use has been documented in various countries in Asia such as Vietnam (Ogle et al. 2003), Mediterranean (Hadjichambis et al. 2008) Inner Mongolia Autonomous Region, China (Wujisguleng and Khasbagen 2010) and Northeast Thailand (Cruz-Garcia and Price 2011).

The value of CFSI is categorized into five groups: very high, high, moderate, low, very low, and negligible (Table 4). Plants used by the Togutil tribe consisted of wild plants and cultivated plants that have a CFSI value with use value.

Food botanicals with Very High Significance values: group of plants that fell into this category consisted of plants that have a role as the main and important foods to fulfill the basic food necessity in a family. For example, the main food crops to fulfill the need for energy were *Metroxylon sagu* Rottb, *Arenga pinnata* (Wurmb) Merr, *Arenga microcarpa* Becc, *Arenga* sp. In addition, there were foods used as additional food, like seasoning or food dye, for example, *Curcuma longa* L., *Zingiber officinale* Roscoe., *Etlingera heliconiifolia* (K.Schum.) A.D.Poulsen, and *Alpinia eremochlamys* K.Schum.

Food botanicals with High Significance values: food crops that fell into this category were those with high citation index as well as high frequency of use. For example, species of *Alpinia eremochlamys* K.Schum, *Cucumis sativus* L, *Artocarpus heterophyllus* Lam, *Artocarpus elasticus* Reinw. ex Blume, *Syzygium malaccense* (L.) Merr. & L.M.Perry, *Psidium guajava* L., *Syzygium aqueum* (Burm.f.) Alston, *Psidium guineense* Sw., *Pometia pinnata* J.R.& G.Forst, *Alpinia galanga* (L.) Wild and *Alpinia eremochlamys* K.Schum. These food crops were consumed cooked, fried as well as raw.

Food botanicals with low Significance: the citation index and frequency of use of this category are low. Plant species that fell into this category were *Oncosperma horridum* (Griff.) Scheff. and *Calamus* sp. In addition, to be consumed as food, these plants were used to make handicrafts and as material to build houses as well as to be used for traditional ritual activities.

Food botanicals with very low Significance: the citation index and frequency of use of the plant that fell into this category were very low or very rare to be used. For example, species of *Saribus rotundifolius* (Lam.) Blume and *Terminalia catappa* L. In addition to be used as food, *Saribus rotundifolius* (Lam.) was used as material for hunting rituals; however, these species were very rarely used. It will only be used when it is needed most.

The higher the use value of a plant species, the higher is the value of interest of the species (Turnner 1998). Local knowledge and trust have important role in the use of plant species for biodiversity conservation and the sustainable and responsible use of various natural resources. The use value shows that the plant has high value for humans especially local people who live side by side with nature. The ICS value could change any time since the plants that are currently used were the legacy of the ancestors that still maintained up until now. If a knowledge shift occurs due to the presence of foreign culture, it is likely that every plant species would have more benefit than that found in the research. Therefore, data on the use of plant as well as ICS value has prevailed only for the current nomadic and sedentary Togutil tribe in Halmahera Island.

The study shows the important role of Togutil ethnic group in Halmahera Island-Indonesia, who used 48 species from 23 families of food crops to fulfill their life necessities. The dependency of the community was more toward the food crops that grow wildly in natural ecosystem than those of cultivated plants. From the diversity of species of food crops used as staple food, there is a very high Cultural Food Significance Index value as this contributes to the food security of a family. Food crops were used by all age groups during the seasonal changes, which include the dry season and rainy season. Some species of the food crops were also used as medicinal plants, house building, adhesive for animal, and handicrafts. The use of plant as food and medicine, can be considered very sustainable. In addition, food crops identified in the research were also used for sociocultural interest, such as hunting rituals, medium of exchange (barter), welcoming guest rituals, and traditional rituals. Therefore, specific attention should be given to those plants that are being used as staple food and additional food and efforts need to do in creating awareness on the use of the plants through local culture based sustainable conservation education.

Table 2. List of food crops used by Togutil tribe, North Maluku, Indonesia

Family name	Scientific name	Local name	Life form	Edible parts	Additional use (s)	Cultural use
Arecaceae	*Metroxylon sagu* Rottb.	Ketoko**	Tree	Flour	House building	Medium of exchange (barter)
	Arenga pinnata (Wurmb) Merr.	Hepata**	Tree	Flour and fruit	House building	Medium of exchange (barter)
	Arenga microcarpa Becc.	Baru**	Tree	Flour	House building	Medium of exchange (barter)
	Arenga sp.	Sali**	Tree	Flour	House building	Medium of exchange (barter)
	Saribus rotundifolius (Lam.) Blume	Weka **	Tree	Flour	Craft	Hunting ritual
	Areca catechu L.	Makuro**	Tree	Fruit	House building	Welcome ritual
	Arenga undulatifolia Becc.	Baru**	Tree	Flour	House building	Medium of exchange (barter)
	Arenga brevipes Becc.	Golobe**	Tree	Fruit	House building	Medium of exchange (barter)
	Cocos nucifera L.	Oigono*	Tree	Fruit	Medicine	Medium of exchange (barter)
	Oncosperma horridum (Griff.) Scheff.	Oweka weka**	Tree	Fruit	House building	Hunting ritual
	Calamus sp.	Take**	Tree	Bamboo shoots	Craft	Hunting ritual
Athyriaceae	*Diplazium esculentum* (Retz.) Sw.	Pako**	Herb	Fruit	Medicine	Medium of exchange (barter)
Amaranthaceae	*Amaranthus hybridus* L.	Bayam	Herb	Leaves	Medicine	Medium of exchange (barter)
Araceae	*Colocasia esculenta* L.	Talas*	Herb	Fruit	Medicine	Medium of exchange (barter)
	Xanthosoma sagittifolium L.	Obbete*	Herb	Fruit	Medicine	Medium of exchange (barter)
Anacardiaceae	*Anacardium occidentale* L.	Buahyakis*	Tree	Fruit	Medicine	Medium of exchange (barter)
Burseraceae	*Canarium vulgare* Leenh.	Hoburu*	Tree	Fruit	House building	Traditional ritual
	Canarium decumanum Gaertn.	Hoburu**	Tree	Fruit	House building	Traditional ritual
	Canarium indicum L.	Niara**	Tree	Fruit	House building	Traditional ritual
Bromeliaceae	*Ananas comosus* (L.) Merr.	Nanasi*	Tree	Fruit	Medicine	Medium of exchange (barter)
Caricaceae	*Carica papaya* L.	Tapaya*	Tree	Fruit	Medicine	Medium of exchange (barter)
Combretaceae	*Terminalia catappa* L.	Tiliho Maddubo**	Tree	Fruit	Medicine	No information
Cucurbitaceae	*Cucumis sativus* L.	Timu*	Herb	Fruit	Medicine	Medium of exchange (barter)
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Ogomini*	Herb	Fruit	Medicine	Medium of exchange (barter)
Euphorbiaceae	*Manihot esculenta* Crantz	Saibi*	Herb	Fruit	Medicine	Medium of exchange (barter)
Gnetaceae	*Gnetum gnemon* L.	Rukiti**	Tree	Fruit	Medicine	Hunting ritual
Lamiaceae	*Ocimum citriodorum* Vis.	Kemangi*	Herb	Leaves	Medicine	Medium of exchange (barter)
Moringaceae	*Moringa oleifiera* L.	Kelo*	Tree	Leaves and Fruit	Medicine	Medium of exchange (barter)
Moraceae	*Artocarpus heterophyllus* Lam.	Onaka*	Tree	Fruit	Glue	Hunting ritual
	Artocarpus elasticus Reinw. ex Blume	Loenge**	Tree	Fruit	Glue	Hunting ritual
Musaceae	*Musa* × *paradisiaca* L.	Gogurati*	Tree	Fruit	Medicine	Medium of exchange (barter)
Myrtaceae	*Syzygium malaccense* (L.) Merr. & L.M.Perry	Ogora*	Tree	Fruit	Medicine	Medium of exchange (barter)
	Psidium guajava L.	Gogoya 1*	Tree	Fruit	Medicine	Medium of exchange (barter)
	Syzygium aqueum (Burm.f.) Alston	Gogora 2*	Tree	Fruit	Medicine	Medium of exchange (barter)
	Psidium guineense Sw.	Gogora*	Tree	Fruit	Medicine	Medium of exchange (barter)
Oxalidaceae	*Averrhoa bilimbi* L.	Balibi*	Tree	Fruit	Medicine	Medium of exchange (barter)
Poaceae	*Saccharum spontaneum var. edulis* (Hassk.) K.Schum.	Sayur lilin*	Tree	fruit	Medicine	Medium of exchange (barter)
	Dendrocalamus asper (Schult.) Backer	Otibaha 1**	Tree	Bamboo shoots	House building	Hunting ritual
	Bambusa sp.	Otibaha 2**	Tree	Bamboo shoots	House building	Hunting ritual
	Zea mays L.	Kehetela*	Tree	Fruit	Medicine	Medium of exchange (barter)
Sapindaceae	*Pometia pinnata* J.R.& G.Forst	Omotoa**	Tree	Fruit	House building	Medium of exchange (barter)
Solanaceae	*Solanum melongena* L.	Woki-woki*	Tree	Fruit	Medicine	Medium of exchange (barter)
Zingiberaceae	*Etlingera elatior* (Jack) R.M.Sm.	Ogolobata**	Tree	Fruit	Medicine	Medium of exchange (barter)
	Alpinia galanga (L.) Willd.	Liri*	Tree	Fruit	Medicine	Welcoming guests ritual
	Curcuma longa L.	Gurati*	Tree	Rhizome	Medicine	Medium of exchange (barter)
	Zingiber officinale Roscoe	Gihoro*	Tree	Rhizome	Medicine	Welcoming guests ritual
	Etlingera heliconiifolia (K.Schum.) A.D.Poulsen	Goobe**	Tree	Fruit	Medicine	No information
	Etlingera sp.	Goloba kecil**	Tree	Fruit	Medicine	No information
	Alpinia eremochlamys K.Schum.	Goobe utan**	Tree	Fruit	Medicine	No information

Note: *cultivated and **wild plants

Table 3. The value of CFSI of food crops used by Togutil tribe of Halmahera Island, North Maluku, Indonesia

Scientific names	Botanical family	Local names	Detail of calculation of the CFSI								CFSI
			QII	AI	UFI	PUI	MFFI	TSAI	FMRI		
Metroxylon sagu Rottb.	Arecaceae	Ketoko**	84	4.0	5.0	1.5	1.0	9	2.0	10	453.6
Arenga pinnata (Wurmb) Merr.	Arecaceae	Hepata**	57	3.0	3.0	1.5	1.0	7.5	2.0	10	115.42
Arenga microcarpa Becc.	Arecaceae	Baru**	75	4.0	5.0	1.5	1.0	9	2.0	10	405
Arenga sp.	Arecaceae	Sali**	84	4.0	5.0	1.5	1.0	9	2.0	10	453.6
Saribus rotundifolius (Lam.) Blume	Arecaceae	Weka **	24	2.0	2.0	0.75	0.5	6.5	2.0	10	4.68
Areca catechu L.	Arecaceae	Makuro**	53	4.0	5.0	1.5	1.0	6.5	4.0	10	413.4
Arenga undulatifolia Becc.	Arecaceae	Baru**	84	4.0	3.0	1.5	1.0	9	2.0	10	272.16
Arenga brevipes Becc.	Arecaceae	Golobe**	41	3.0	4.0	1.5	0.5	7.5	2.0	10	55.35
Cocos nucifera L.	Arecaceae	Oigono*	84	4.0	5.0	1.5	0.75	9	3	10	510.3
Oncosperma horridum (Griff.) Scheff.	Arecaceae	Oweka weka**	36	2.0	2.0	1.5	0.5	6.5	2.0	10	14.04
Calamus sp.	Arecaceae	Take**	43	2.0	2.0	1.5	0.5	6.5	2.0	10	16.77
Diplazium esculentum (Retz.) Sw.	Athyriaceae	Pako**	64	3.0	5.0	1.5	1.5	7.5	2.0	10	324
Amaranthus hybridus L.	Amaranthaceae	Bayam	76	3.0	4.0	1.5	1.5	9	4.0	10	738.72
Colocasia esculenta L.	Araceae	Obetas*	50	2.0	3.0	1.5	1.5	7.5	2.0	10	101.25
Xanthosoma sagittifolium L.	Araceae	Obbete*	75	2.0	3.0	1.5	1.5	7.5	2.0	10	151.875
Anacardium occidentale L.	Anacardiaceae	Buahyakis*	52	2.0	2.0	1.5	1.5	7.5	3.0	10	105.3
Canarium vulgare Leenh.	Burseraceae	Hoburu*	84	3.0	2.0	1.5	0.5	10	5.0	10	189
Canarium decumanum Gaertn.	Burseraceae	Hoburu**	84	3.0	2.0	1.5	0.5	10	5.0	10	189
Canarium indicum L.	Burseraceae	Niara**	84	3.0	2.0	1.5	0.5	10	5.0	10	189
Ananas comosus (L.) Merr.	Bromeliaceae	Nanasi*	84	4.0	4.0	1.5	0.5	7.5	3.0	10	226.8
Carica papaya L.	Caricaceae	Tapaya*	84	4.0	5.0	1.5	1.0	7.5	4.0	10	756
Terminalia catappa L.	Combretaceae	Tiliho Maddubo**	24	1.0	2.0	1.5	0.5	6.5	2.0	10	4.68
Cucumis sativus L.	Curcubitaceae	Timu*	63	1.0	3.0	1.5	1.5	7.5	3.0	10	95.68
Ipomoea batatas (L.) Lam.	Convolvulaceae	Ogomini*	84	2.0	4.0	1.5	1.5	10	3.0	10	453.6
Manihot esculenta Crantz	Euphorbiaceae	Saibi*	84	4.0	4.0	1.5	1.5	10	3.0	10	907.2
Gnetum gnemon L.	Gnetaceae	Rukiti**	50	2.0	2.0	3.0	1.0	10	5.0	10	300
Ocimum citriodorum Vis.	Lamiaceae	Kemangi*	68	3.0	5.0	3	0.75	9	3.0	10	619.65
Moringa oleifiera L.	Moringaceae	Kelo*	72	2.0	3.0	1.5	1.0	9	3.0	10	174.96
Artocarpus heterophyllus Lam.	Moraceae	Onaka*	84	2.0	3.0	1.5	0.5	9	2.0	10	68.04
Artocarpus elasticus Reinw. ex Bl.	Moraceae	Loenge**	33	2.0	3.0	1.5	1.0	9	2.0	10	53.46
Musa × paradisiaca L.	Musaceae	Gogurati*	84	4.0	5.0	1.5	1.5	10	2.0	10	756
Syzygium malaccense (L.) Merr. & L.M.Perry	Myrtaceae	Ogora*	84	3.0	3.0	1.5	0.5	7.5	2.0	10	85.05
Psidium guajava L.	Myrtaceae	Gogoya 1*	84	3.0	3.0	1.5	0.5	7.5	2.0	10	85.05
Syzygium aqueum (Burm.f.) Alston	Myrtaceae	Gogora 2*	84	3.0	3.0	1.5	0.5	7.5	2.0	10	85.05
Psidium guineense Sw.	Myrtaceae	Gogora*	84	3.0	3.0	1.5	0.5	7.5	2.0	10	85.05
Averrhoa bilimbi L.	Oxalidaceae	Balibi*	84	3.0	5.0	1.5	0.75	9	2.0	10	255.15
Saccharum spontaneum var. *edulis* (Hassk.) K.Schum.	Poaceae	Sayur lilin*	75	3.0	2.0	1.5	1.0	10	2.0	10	135
Dendrocalamus asper (Schult.) Backer	Poaceae	Otibaha 1**	41	4.0	5.0	1.5	1.0	9	2.0	10	221.4
Bambusa sp.	Poaceae	Otibaha 2**	41	4.0	5.0	1.5	1.0	9	2.0	10	221.4
Zea mays L.	Poaceae	Kehetela*	84	4.0	2.0	1.5	1.0	10	2.0	10	201.6
Pometia pinnata J.R.& G.Forst	Sapindaceae	Omotoa**	84	4.0	1.0	1.5	0.5	10	2.0	10	50.4
Solanum melongena L.	Solanaceae	Woki-woki*	84	4.0	5.0	1.5	1.5	9	2.0	10	680.4
Etlingera elatior (Jack) R.M.Sm.	Zingiberaceae	Ogolobata**	84	3.0	2.0	1.5	0.5	9	2.0	10	68.04
Alpinia galanga (L.) Willd.	Zingiberaceae	Liri*	84	3.0	2.0	1.0	0.75	7.5	2.0	10	56.7
Curcuma longa L.	Zingiberaceae	Gurati*	84	4.0	4.0	1.5	1.0	10	4.0	10	806.4
Zingiber officinale Roscoe	Zingiberaceae	Gihoro*	84	4.0	3.0	1.5	1.0	10	4.0	10	604.8
Etlingera heliconiifolia (K.Schum.) A.D. Poulsen	Zingiberaceae	Goobe**	84	3.0	2.0	1.5	0.5	9	2.0	10	68.04
Alpinia eremochlamys K.Schum.	Zingiberaceae	Goobe utan**	84	3.0	2.0	1.5	0.5	7.5	2.0	10	56.7

Local wisdom-based conservation strategy needs to be optimized to reduce deforestation, habitat change, environmental degradation, and cultural transformation since these factors are the main indicators for the loss of natural vegetation. In the future, the disappearance of local wisdom will be the factor for the loss of useful plants as well as knowledge related to those plant species. Therefore, enabling a conservation strategy by involving local communities participation and strengthening custom rules could help the rehabilitation of natural environment. Despite the general benefit of local food crops as part of local vegetation, the potential and the additional use of those plants are the important part to maintain food security of the families in the research location.

Table 4. Value of CFSI of Togutil ethnic group of Halmahera, North Maluku, Indonesia

Category of *Cultural Food Significance Index* (CFSI)	∑ types of plant	%
Very High Significance [100 and over]	31	64.58
High Significance [50-99]	13	27.08
Moderate Significance [20-49]	0	0
Low Significance [5-19]	2	4.16
Very Low Significance [1-4]	2	4.16
Negligible Significance [0]	0	0
Total	48	100

Data of identified plants in the research locations highlights the importance of understanding the role of natural ecosystem in providing local food crops that have meaning in the socio-cultural life of the community. Further, research is needed about other local ethnic groups on the mapping of wild food plants in small islands that have potential in improving the community economy and as effort for local wisdom-based conservation. Finally, the research on local food crops used by the Togutil tribe of Halmahera Island is important data in understanding remote local communities in utilizing plants to survive and maintain the availability of food security for the family during dry season.

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