

# A cultural Significance of Common and Wild Edibles Consumed by Indigenous Garo Tribes of Meghalaya

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## Abstract:

The tribal communities, in general, are forest dwellers, and a majority of the local and ethnic foods used by tribal's are prepared from wild edible plants collected from forests. In Meghalaya, the indigenous people depend heavily on forests for their subsistence. On the basis of the responses of 300 participants from Garo hills a free listing of, all common and wild edibles in use on regular basis was done. Utilization frequency (f) was calculated to quantify the use frequency of species, Cultural Importance Index (CI) was calculated to determine the diversity of uses and the consensus of informants. Cultural Food Significance Index (CFSI) was calculated to evaluate the cultural significance of wild edibles. It can be concluded that, like all other indigenous tribal communities, the Garo tribe of Meghalaya is closely associated with nature. The collection and use of wild edibles are part of people's local identity, pride, and traditions. The local and ethnic foods used by Garo are not only part of their culture, festival and rituals but are also rich in nutrients and have curative effects on many diseases and disorders. For the indigenous hill tribe of Garo Hills, Meghalaya, wild local foods contribute in overcoming periods of food scarcity.

**Keywords:** Wild Edibles, Indigenous Hill Tribes, Food Security, Food Sovereignty

## Introduction

The tribal communities mostly prefer wild plants and/or their parts as food. Traditional knowledge exists among different tribes on preparing their own tribe-specific boiled foods, fermented foods, beverages and nutritionally rich traditional foods from various crop plants, forest products and the meat of wild and domesticated animals (Devi & Kumar, 2012). The nature offers a range of possibilities for tribal's to choose plants and animals, culture determines tradition, and ethics establishes the practice of food consumption (Devi & Kumar, 2012). The collection and use of wild edibles are elements of people's local identity, pride, and traditions (Geng, Zhang, Ranjitkar, Huai and Wang, 2016). The local and ethnic foods used by tribes not only are part of their culture, festival and rituals but are also rich in nutrients and have curative effects on many diseases and

disorders (Singh & Sureja, 2006). For tribal people, wild foods also play an important role in surviving times of food insufficiency (Schunko & Vogl, 2010).

The tribal communities, in general, are forest dwellers, and a majority of local and ethnic foods used by tribal's are prepared from wild edible plants collected from forests (Kumar, Kumar & Sah, 2009). In Meghalaya, 76.32% of the total area is covered by forests, and 90% of this forest area is owned by tribal communities (mostly the *Garo*, *Khasi* and *Jaintia* tribes) (Table 1) (GoI, 2019; Kayang, 2007). The indigenous people depend heavily on these forests for subsistence. It is estimated that 93,381 tonnes of fuel wood, 2,20,307 tonnes of fodder, 5,821 cum of small timber and 898 tonnes of bamboo are collected annually by people living in forest fringe villages (FFVs) from nearby forests (GoI, 2019). The sacred groves or virgin forests, a secure habitat for more than 1886 plant species (Jaiswal, 2010), mostly located in the Khasi and the Jaintia Hills, are prime examples of tribal respect for nature and conservatory efforts (Jeeva et al., 2006).

**Table 1: Forest Cover in Meghalaya (in sq km)**

Hills	Geographical Area (GA)	Very Dense Forest	Mod. Dense Forest	Open Forest	Total	% of GA
Garo Hills	8167.00	128.12	3336.75	3385.51	6850.38	83.88
Khasi Hills	10443.00	257.55	4481.85	2991.12	7730.52	74.03
Jaintia Hills	3819.00	103.31	1448.69	985.89	2537.89	66.45
Grand Total	22429.00	488.98	9267.29	7362.52	17118.79	76.32

**Source:** Computed from the India State of Forest Report (ISFR), 2019, VOLUME II, Forest Survey of India, (Ministry of Environment Forest and Climate Change), Government of India

The forests of Meghalaya host a large number of plants, whose fruits, seeds, tubers, shoots, etc., form an integral part of the diet of the indigenous hill people of Meghalaya (Samati, 2004). Kayang (2007) reported 110 wild growing plants consumed whole or in part by the indigenous *Garo*, *Khasi* and *Jaintia* tribes of Meghalaya. Sawian et al. (2007) documented 249 species of wild edibles. The indigenous hill tribes collect wild edible plants from forests for consumption and marketing (Jeeva & Anusuya, 2005; Laloo, Kharlukhi, Jeeva and Mishra, 2006; MBDI, 2014). In local markets, wild edible fruits and vegetables are normally sold fresh by harvesters; however, foods preserved by traditional methods are also sold in these markets (Sarmah, Pant, Majumder and Adhikari, 2004). These wild edible plants are rich in protein, fat, sugar, and fiber and thus play a significant role in the food and nutritional security of indigenous hill people (Seal, Chaudhuri, Pillai, Chakrabarti, Auddy, & Mondal, 2020; Phawa, Dkhar & Marbaniang, 2019; Chyne, Ananthan, & Longvah, 2019). These edible plants are also used in different combinations to prepare different traditional (local and ethnic) fermented and non-fermented foods (Singh et al., 2006).

The present study is an attempt to list some commonly cited wild edibles used on a regular basis by the indigenous Garo people of Meghalaya as well as some commonly cultivated non-wild crops to understand any shifts in consumption patterns. Then, information was collected and analyzed to document the cultural value of plant gathering, preparation, and distribution of wild edibles.

## Methodology

Meghalaya is predominantly a tribal state. The population comprises three major indigenous tribal communities: the Khasi's, the Jaintia's or the Pnars and the Garo's. All three major communities—Khasi, Jaintia and the Garo are matrilineal. Regarding sample selection, initially, a list of C & RD blocks of Garo hills with more than 95% of ST households was prepared, and then five C & RD blocks were selected by following the method of simple random sampling. In the first stage, 10 tribal villages, i.e., 10 clusters, were selected (10 tribal villages from Garo Hills). This means that 2 tribal villages were selected from each of the five selected blocks, making 10 tribal villages from each hill. Then, in the second stage, 30 households were selected from each village. Thus, from the

identified hill, 10 tribal villages were selected, and 30 households were selected from each village, resulting in a total of 300 sample households selected for the study (Table 2). Before data collection began, all participants in this study were informed about the purpose and procedures of the research. Participants were assured that participation was voluntary and that they could withdraw from the study at any time without any consequences. Written informed consent was obtained from all participants. The consent form included information about the purpose of the study, the procedures to be followed, and the confidentiality of the information provided. Participants were also informed that the results of the study would be published in academic journals or presented at professional conferences, but their identities would not be linked with their responses.

**Table 2: Clusters (Villages) Selected Under Garo Hills of Meghalaya**

Sl. No.	Hills	C & RD Block	Villages (Clusters)	Elevation Above Sea Level(meter)	UNEP-WCMC Classification	Households (as per Census, 2011)	Sample Households
1	Garo Hills	Dadenggiri	Dabigre	184	Class 7	88	30
			Sadolpara	335	Class 6	150	30
		Rongram	Chandigre	820	Class 6	74	30
			Chidaogre	395	Class 6	37	30
		Gambegre	Doldegre	170	Class 7	59	30
			Dilnigre	240	Class 7	48	30
		Resubelpara	Keragalram	301	Class 6	51	30
			Doldam	386	Class 6	51	30
		Songsak	Dagal Aga	101	Class 7	45	30
			Tebil Bonegre (A)	642	Class 6	93	30
<b>Total</b>			<b>10</b>			<b>3310</b>	<b>300</b>

**Note:** 10 Clusters × 30 Households = 300 Households (based on CFSVA Guidelines, 2009)

For this study, the mountains and hills are defined according to a topographic criterion developed in 2000 by the United Nations Environment Programme - World Conservation Monitoring Center (UNEP-WCMC). Elevation data were obtained with the help of Google Earth.

Based on the objective of the study, the villages with only tribal populations were short-listed for inclusion in the sample. In the present study, the native plants that are grown most commonly in the natural environment of the Garo hills, Meghalaya, are considered wild edibles. Those introduced plants that have been grown for a long time and are now being naturalized are also included in the definition of wild edibles (Menendez-Baceta, Aceituno-Mata, Tardío, Reyes-García, Pardo-de Santayana, 2012; Geng et al., 2016). On the basis of the responses of the participants, all wild edibles in use on a regular basis were freely listed (Reyes-García, Huanca, Vadez, Leonard & Wilkie, 2006). The objective was not to prepare an exhaustive list, but on the basis of the responses of participants, the list included some commonly cited wild edibles used on a regular basis by the indigenous Garo people of Meghalaya as well as some commonly cultivated non-wild crops to understand any shifts in consumption patterns. Then, information was collected to document the cultural value of plant gathering, preparation, and distribution of wild edibles (Geng et al., 2016). The nomenclature of all the identified plants was done in consultation with key informants and experts and adopted from the documentation of Kayang (2007); Sawian et al., 2007; Singh et al., 2012; Jaiswal, 2010; Hynniewta, 2010; Phawa et al., 2019). Utilization frequency (f) was calculated to quantify the use frequency of species (Ladio & Lozada, 2001), Cultural Importance Index (CI) was calculated to determine the diversity of uses, the consensus of informants (Tardío & Pardo-de-Santayana, 2008) and Cultural Food Significance Index (CFSI) was calculated to evaluate the cultural significance of wild edibles (Pieroni, 2001).

**>Cultural Importance Index (CI):** The CI is defined by the following formula (Tardío and Pardo-De-Santayana, 2008):

$$CI = \sum_{u=1}^{u_{NC}} \sum_{i=1}^{i_N} UR_{ui} / N$$

Informant i mentions the use of species s in use category u. User report (UR) is a combination of these three variables (Kufer, Heinrich, Förther, and Pöll, 2005). N is the number of informants who participated in the survey, and CI is the cultural importance index.

>**Cultural Food Significance Index (CFSI):** The CFSI, which is specifically used to evaluate the cultural significance of wild edibles, was calculated as follows (Pieroni, 2001):

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

The formula considers seven indices that express the frequency of quotation (QI), availability (ALI), frequency of utilization (FUI), plant parts used (PUI), multifunctional food use (MFFI), taste score appreciation (TSAI), and food-medicinal role (FMRI).

## Results and Discussion

One of the three main tribes of Meghalaya, the *Garo* tribe, which resides in the Garo Hills of Meghalaya, is believed to be a member of the Tibet-Burman family. Rice, millet, maize and tapioca are the main food sources of the *Garo* tribe. The abundant presence of jungle yams and some other jungle roots in forests support them in time of their scarcity. They eat almost any kind of animal food as well as almost all kinds of aquatic animals that are found in their rivers and Bhils (Sangma, 2012). Na-kam or dry fish is one of the most common food sources for the Garos. *Katchi*, a kind of potash obtained by burning dry pieces of stems or young bamboos, is used for cooking curries instead of oils. Chillies, which are abundant in jhum fields, are widely used. The jhum fields and forests provide them with a number of wild edible plants and their parts that can be used as vegetables as well as sources of carbohydrates, e.g., bamboo shoots and plant roots (Sangma, 2012; Momin, 1995).

In Meghalaya, extensive ethno botanical works are available for various tribes; however, very few published works are available on ethno botany of *Garo* tribes (Singh et al, 2012), that too are also mostly concentrated in the Nokrek Biosphere Reserve. Singh et al. (2012) cataloged 71 species of wild edible plants of the Nokrek Biosphere Reserve, 38 of which are used as vegetables and 33 of which are consumed raw or cooked. Singh, Mathew and Mohan (2016) listed 13 wild edible plants as ethno botanically important among the *Garo* tribe. Rao (1981) described 31 interesting medicinal plants used by the *Garo* people in Meghalaya. Vasudeva and Shanpru (1981) documented a number of plant species that are used for food (25 species), medicine (24 species), fish poison (5 species), fiber (seven species), etc. Sawian et al. (2007) and Kayang (2007), while identifying wild edible plants of Meghalaya and documented information about a large number of wild edible plants of Garo Hills. Maikhuri & Gangwar (1993) recorded a total of 105 plants that are used for food and medicine by local communities. They also reported 11 animal species that were hunted and gathered for meat by the indigenous communities of the state.

Table 3 is an inventory of wild edibles gathered/consumed by the indigenous hill tribe of Garo Hills. The indigenous hill communities of Garo Hills reported 45 common and wild edibles gathered/consumed by them. Although more common and wild edibles are reported in Garo Hills, this does not mean that there are more local and wild edibles in Garo Hills. A correct picture of the actual number of wild edibles can only be drawn from comprehensive ethno-botanical surveys. It is only a sample representative. Local brinjal, pumpkin and potato occupied the top three positions in terms of FC and f, respectively. Of these three, potato was ranked 4<sup>th</sup>, and pumpkin was ranked 5<sup>th</sup> on the CFSI. Brinjal was ranked 15<sup>th</sup> on the CFSI. *Zingiber officinale*, *Moringa oleifera* and *Houttuynia Cordata* ranked top three positions respectively in terms of CFSI. These plants also have medicinal properties. *Cucurbita pepo*, *Abelmoschus esculentus* and *Vigna Unguiculata* Ssp. *Sesquipedalis* ranked in the top three positions in terms of CI. Similar to the indigenous hill communities of the Jaintia and Khasi Hills, it has been observed that the indigenous hill communities of the Garo Hills, along with wild edibles, consume some common vegetables also. This clearly shows a visible movement from indigenous consumption patterns to the inclusion of some modern crop varieties in their consumption patterns.

**Table 3: Evaluation of Common and Wild Edibles Consumed by the Indigenous Hill Tribe of Garo Hills, Meghalaya**

Latin name	Vernacular name	Indices				Ranking			
		FC	f	CI	CFSI	FC	f	CI	CFSI

<i>Colocasia Esculenta</i>	Ta'ring	290	0.97	3.87	190.86	15	15	15	7
<i>Solanum Lycopersicum</i>	Baring Belati	255	0.85	3.40	72.29	33	33	22	22
<i>Solanum Lycopersicum Var. Cerasiforme</i>	Baring Belatichongipa	170	0.57	1.70	2.73	42	42	43	41
<i>Solanum Melongena</i>	Baring	300	1.00	4.00	118.13	1	1	9	15
<i>Musa Acuminata</i>	Terik/Sobok	270	0.90	4.50	81.00	29	29	7	19
<i>Cucurbita Pepo</i>	Gominda	300	1.00	5.00	212.63	2	2	1	5
<i>Benin Casa Hispida</i>	Akaru/AkaruKambi	280	0.93	4.67	158.76	23	23	5	11
<i>Langenaria Siceraria</i>	Lao/Lao Kambi	285	0.95	4.75	161.60	20	19	4	10
<i>Zanthoxylum Oxyphyllum</i>	Mecheng	280	0.93	2.80	49.14	24	24	33	24
<i>Houttuynia Cordata</i>	Matchaduri	286	0.95	2.86	283.14	19	20	32	3
<i>Allium Sativum</i>	RasinChisik	285	0.95	3.80	130.25	21	21	17	13
<i>Solanum Tuberosum</i>	Allu	300	1.00	4.00	233.89	3	3	10	4
<i>Hibiscus Sabdariffa</i>	Galda	293	0.98	3.91	140.91	14	10	14	12
<i>Momordica Charantia</i>	Karela	170	0.57	2.27	26.11	43	43	39	27
<i>Moringa Oleifera</i>	Sojina	275	0.92	4.58	367.38	26	26	6	2
<i>Oroxylum Indicum</i>	KiringKambi/bibal	150	0.50	2.00	4.05	44	44	40	40
<i>Bauhinia Tomentosa</i>	MigongBijak	265	0.88	4.42	11.33	30	30	8	31
<i>Brassica Oleracea Var. Capitata</i>	Kobi	280	0.93	3.73	84.75	25	25	19	18
<i>Brassica Oleracea Var. Botrytis</i>	PulKobi	240	0.80	3.20	77.96	36	36	24	20
<i>Abelmoschus Esculentus</i>	Dorai	300	1.00	5.00	25.31	4	4	2	28
<i>Amaranthus</i>	Denga	285	0.95	3.80	35.17	22	22	18	26
<i>Diplazium Esculentum</i>	Gonginjak	295	0.98	2.95	89.61	10	11	28	17
<i>Agaricus</i>	Dambong	180	0.60	1.80	5.32	41	41	42	37
<i>Bambusa Vulgaris</i>	Mea/meawal	300	1.00	3.00	20.93	5	5	26	29
<i>Cucumis Sativus</i>	Temit	287	0.96	2.87	18.40	16	16	30	30
<i>Manihot Esculenta</i>	Tabolchu	300	1.00	4.00	164.03	6	6	11	9
<i>Phlogocanthus Thyrsoiflorus</i>	Alot/Kimchit	275	0.92	3.67	8.80	27	27	20	32
<i>Dioscorea</i>	Ta.jong	205	0.68	2.73	2.54	39	39	34	42
<i>Ipomoea Batatas</i>	Ta.milang	258	0.86	3.44	37.15	32	32	21	25
<i>Luffa Acutangula</i>	Jingka	260	0.87	2.60	2.19	31	31	36	43
<i>Sechium Edule</i>	Scot	273	0.91	2.73	6.91	28	28	35	34
<i>Caraya Papaya</i>	Modipol	294	0.98	3.92	182.57	12	12	13	8
<i>Parkia Speciosa</i>	Awilgep/Amilgep	130	0.43	1.30	1.53	45	45	44	45
<i>Zingiber Officinallis</i>	Eching	300	1.00	3.00	420.00	7	7	27	1
<i>Raphanus Sativus</i>	Mulla	287	0.96	2.87	208.84	17	17	31	6
<i>Solanum Aethiopicum</i>	Kimka baring	230	0.77	2.30	54.68	38	38	38	23
<i>Solanum Indicum</i>	Kimka	240	0.80	3.20	5.72	37	37	25	36
<i>Asparagus Officinalis</i>	Chonggi	190	0.63	1.90	1.67	40	40	41	44
<i>Amorphophallus Paeoniifolius</i>	Songru	245	0.82	3.27	5.75	35	35	23	35
<i>Corchorus Olitorious</i>	Kosta/Laila bijak	255	0.85	2.55	4.48	34	34	37	39
<i>Brassica Juncea</i>	Lai	294	0.98	2.94	91.68	13	13	29	16
<i>Momordica Dioica</i>	Gambilore	287	0.96	3.83	4.84	18	18	16	38
<i>Luffa Aegyptiaca</i>	Sawil	295	0.98	3.93	7.67	11	14	12	33
<i>Vigna Unguiculata Ssp. Sesquipedalis</i>	Karek	300	1.00	5.00	128.46	8	8	3	14
<i>Phaseolus Vulgaris</i>	Nakap	300	1.00	5.00	73.41	9	9	45	21

**Note:** Based on the responses of 300 sample households from Garo Hills. No particular order was used for the species. FC- frequency of citations, f- frequency of use, CFSI- cultural food significance index, CI- cultural importance index

## Conclusion:

It can be concluded that, like all other indigenous tribal communities, tribes of Meghalaya are closely associated with nature. The collection and use of wild edibles are part of people's local identity, pride, and traditions. The local and ethnic foods used by tribes not only are part of their culture, festivals and rituals but are also rich in nutrients and have curative effects on many diseases and disorders. For tribal people, wild local foods contribute to overcoming periods of food scarcity.

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**Conflict of interest**

The authors declare no conflicts of interest.

**Data availability Statement:** Data available upon reasonable request from the corresponding author

**Author contributions:**

D.B., and S.P. conceived of the presented idea.

D.B., A.M and S.T. developed the theory and performed the computations.

D.B., S.P., S.T and A.M. verified the analytical methods.

All authors discussed the results and contributed to the final manuscript.

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