Wild edible plants and their additional uses by the *Tangsa* community living in the Changlang district of Arunachal Pradesh, India

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Abstract

The traditional dependence on wild edible plants (WEP) is natural for the tribal communities in Arunachal Pradesh. The rich flora and dense vegetation a.most in all regions of the state provide numerous such edible plants.

The people of Tangsa tribal community living in the Kharsan Circle of Changlang district of Arunachal Pradesh. A study among them led to the record of 51 species of wild plants of which 36 species are dicotyledonous, 13 are monocotyledonous and one species each from gymnosperms and pteridophytes. These are dominated by herbaceous plants and leaves and leafy-young shoots are the most preferred plants parts to eat. While majority of the plant parts they consume after cooking, they also prepare chatneys and pickles. While just one plant part is eaten for 45 species, three parts (leaves, strobilus and seeds) of *Gnetum gnemon* and two parts of five other species (*Begonia roxburghii*, *Calamus tenuis*, *Physalis minima*, *Salacca secunda* and *Spondias pennata*) are edible.

In addition to their food value, some of these plants are also used as medicine, for thatching, handicrafts, etc. However, many of these wild-harvests are also sold in local temporary markets.

Assessment of the population structure is to be done immediately and proper conservation strategies need to be developed and implemented for their sustainable harvest and use.

Key words: Wild edible plants, Tangsa, Arunachal Pradesh, Ethnobotany

INTRODUCTION

The consumption of wild edible plants (WEP) is considered as an ancient tradition that has been increasingly neglected in modern industrialized societies (Reyes-García *et al.* 2005). There are several evidences indicating generalized abandonment of these resources (Cruz *et al.* 2013). Besides, the wild edible plants usually receive unassertive attention by scientists when evaluating and deciding issues on agriculture and nutritional planning. Nevertheless, results from several studies suggest that the dietary use of wild plants is not less than the domesticated plant species (Deshmukh & Waghmode 2011; Cruz *et al.* 2013). Their nutritional role and health benefits are being reported worldwide (Bonet & Vallès 2002; Bonet *et al.* 1999; Bremer & Humphries 1993). Although indigenous societies practice agriculture and, at the same time they are also hunters and gatherers, largely depends on wild plants and

animals. The tradition of consuming wild plants is a very common practice among the traditional people. There are records of several plants those have edible parts and might be used more extensively as food and could be cultivated if they were explored and studied methodically (Maikhuri *et al.* 1994). Some of those are also used as famine-foods (Balemie & Kebebew 2006). The nutritional status of these plants are variable and those need proper evaluation before considering their popularization (Sarma *et al.* 2016). This subject, however, had fewer academic exposure but delivers insight to potential food sources of the vegetation of an area (Rashid *et al.* 2008).

The dependency on plants for livelihood has been a tradition since generations among this tribal communities and the knowledge of selecting particular wild plants for food is an intrinsic ability of people living in connievement with nature. Also many remote villages are still not well connected to nearby towns, owing to which the villagers have minimal access to the agriculturally produced marketed food products; eventually, compelling them to depend on the naturally available wild plants for their sustenance.

Northeastern part of India is inhabited by numerous tribal communities and most of them, even today use WEP and also such products are marketed regularly (Medhi 2011; Medhi & Borthakur 2013). Some works on the WEP were undertaken in many NE states of the country and many of those are from Assam (Kar *et al.* 2008; Saikia *et al.* 2008; Boro *et al.* 2011; Pagag & Borthakur 2012; Medhi & Borthakur 2013; Medhi *et al.* 2014; Phangchopi *et al.* 2014), Nagaland (Takatemjen *et al.* 2009; Mozhui *et al.* 2011), Tripura (Majumder & Datta 2009), and Manipur (Salam *et al.* 2010, 2011, 2012; Khatoon *et al.* 2012; Devi & Salam 2016). Some works on edible plants were also conducted in Arunachal Pradesh. Boko & Narsimhan (2014) made a rapid ethnobotanical survey on Adi tribe in East Siang district and Ratan *et al.* (2016) studied the ethnobotany of Galo community and in both these works they recorded good number of wild edible plants. Apart from these, some other ethnobotanical works in Arunachal Pradesh include the studies by Dash (2009), Jeri *et al.* (2011), and Devi *et al.* (2012).

Arunachal part of the Eastern Himalaya is considered to be rich with unexplored wild edible floras. However, because of the ongoing dependencies on domesticated crops plants, unavailability of sufficient written literatures and rapid modernization, the traditional knowledge along with the edible wild flora of this region are on the verge of extinction. Taking all this facts into consideration, the paper deals with the firsthand information and records on the available wild plants species consumed as food by Tangsa ethnic community.

MATERIALS AND METHOD

Study area

Tangsa tribe inhabits the Changlang district [26° 40' – 27° 40' N latitude and 95° 11' – 97° 11' E longitude; area 4662 sq km] of the state of Arunachal Pradesh, India. The region is covered with picturesque landscape and located in the southeastern corner of the state. It is bounded by the Tinsukia district of Assam and Lohit district of Arunachal Pradesh in the north, Tirap district in the West and Myanmar in the South-east (Anonymous 2011; Figure 1). Except Miao, Diyun, Bordumsa and Kharsang circles and a few narrow strips of flat land in some other circles, the remaining area of the district is hilly terrain with altitude 200 m to 4500 m AMSL over the peaks. This is responsible for abruptly fluctuating climatic conditions in most of the places and that varies from tropical to alpine. The major rivers draining Changlang district are Noa-Dehing, Namchik, Tirap and a number of other smaller rivers. The vegetation structure also varies a lot in response to prevailing climatic climate of any region and those include tropical and sub-tropical wet evergreen and semi-ever green forested vegetation in

Figure 1. Location map of Changlang district, Arunachal Pradesh

the lower reaches, mixed deciduous forest in the mid-hills and temperate forest in high altitude areas (https://datanetindia-ebooks.com/District_Factbook/Arunachal_Pradesh/Changlang). The region is falling within Takhtajan's (1969) 'cradle of angiosperms' and is extremely rich in flora and fauna. The most famous Namdapha National Park and Tiger Reserve (1985.23 sq km) is situated within this district.

The ethnic community in Kharsang Circle (Changlang district)

Although, *Tangsa* is the major tribe of this region, few other tribes, including *Singpho*, *Tutsa*, *Lisu (Yobin)* and *Deori* are also inhabitants of this district. Among the tribes *Tangsa* is with the highest number of sub-tribes, namely the *Muklom*, *Longchang*, *Mossang*, *Jugli*,

Kimsing, Tikhak, Ronrang, Mungrey, Lungphi, Longri, Havi, Ponthai, Sangwal, Yungkuk, Sakieng and Thamphang. Interestingly, these sub-tribes differ from each other in terms of their dialect and traditional customs. The *Tangsas* of Changlang district are mostly agrarian with about 80 % of the population depend totally on agriculture. Shifting cultivation is also traditionally practiced in the district, though the people have started to accept the wet cultivation and other modern agricultural and horticultural practices [<https://www.censusindia.co.in/subdistrict/kharsang-circle-changlang-arunachal-pradesh-1681>].

Field survey and data collection

For the present study was undertaken in *Tangsa* dominated areas of Kharsang circle of Changlang district of Arunachal Pradesh during April 2017 to July 2018. At the beginning the mandatory PIC was obtained from the people of selected villages. In order to collect the information, the *Participatory Rural Appraisal Approach* was followed with active involvement of local informants in interviews, meetings, open discussions, and unconcealed observations using semi-structured questionnaires (Song & Kim 2011; Song *et al.* 2013). These questionnaires comprises of several inquiries including the collection and usage of WEP, the local names, uses, plant-parts used, methods of collection and storage methods were also recorded (Martin 1995). The plant specimens were collected mostly in their reproductive stage i.e. in flowering or fruiting or sporulating condition. Mounted Herbarium specimens of all species were prepared following Jain and Rao (1977) and identification was done using different taxonomic literature [Hajra *et al.* 1996; Giri *et al.* 2008; Chowdhery *et al.* 2009; Kanjilal *et al.* 1934 - 1940] and confirmed by matching at ASSAM Herbarium. The voucher specimens were deposited in the herbarium of the Rajiv Gandhi University, Arunachal Pradesh, India. Scientific names of plants were updated by referring to the website www.theplantlist.org. For family delimitation APG-IV [2016] system has been followed.

Quantitative analysis

To determine the relative importance of different plant species used for the purpose as reported by the informants, the Fidelity Level (FL) was calculated following Kim & Song (2011; Song *et al.* 2013) using the formula: $FL(\%) = Np \times 100/N$, where Np represents the number of the informants that mentioned the specific plant species used, and N is the total number of the informants who utilized plants.

RESULTS AND DISCUSSION

Demographic profile of participants

All the 124 informants (41 men and 83 women) were randomly selected from 10 different villages dominated by Tangsa ethnic community. These residents have hardly been influenced by modernization. Of the total informants, 72.2 % of the informants have never attended any formal schooling, while only 5.6 % of them were succeeded in finishing their high school. The respondents were aged between 18 – 65 and profession they were either Students or farmers or house-wives. Ladies are the main gatherer of edible plants and for preparing food that is why more respondent women were approached.

Taxonomical evaluation and ethnobotanical investigation of the wild edible plants

In this study, a total of 51 species of vascular plants belonging to 33 families were recorded from this region (Table 1). Of these 36 (70.59 %) species are dicotyledonous, 13 (25.49 %) are monocotyledonous and gymnosperms and pteridophytes are represented by single (1.96 %) species only. Among the families, Solanaceae was most frequent with 4 species, followed by Moraceae, Anacardiaceae, Poaceae, Zingiberaceae, and Musaceae with 3 species, family Rosaceae, Asteraceae, Arecaceae, Apiaceae, Anacardiaceae with two species each and

remaining families are represented by single species (Figure 2). As depicted in Figure 3, maximum of the recorded species were herbs (20 spp. or 39.22 %), followed by shrubs (25.5 %) [here all bamboos are treated as shrubs], trees (23.53 %), and climbers (11.76 %). However, out of the 20 herbs, seven are annuals and remaining 13 are perennials. Also, two of the six climbers are liana.

The dominance of smaller plants in the list of recorded WEP is probably due to their easy accessibility. However, for fruit-trees (11 out of 19 spp.) are generally favoured.

Various parts of these wild plant species are consumed, such as fruits (32.20 %), leaves (20.34 %), young-shoot (13.56 %), leafy-shoot (8.47 %), inflorescence (8.47 %) and seeds (8.47 %) and each type of remaining plant-parts (pseudostem, rhizome, stem, strobilus and whole plant) are represented by single species (i.e. 1.69 %) only (Figure 4). It shows that leaves and fruits were the most common edible plant parts. Leaves and leafy and/or young-shoots altogether represents 24 (47.06 %) species. These were followed by seeds, inflorescence and other plant parts.

Figure 3. Representation of habit groups among the wild edible plants for Tangsas in Arunachal Pradesh

regularly sold in local markets and many people are now busy with other works and do not have enough time for collection. Also, all the edible plants are not available in one area, so the vendors collect those from different areas for marketing. [Plate-I]

In addition, common vegetables and spices from cultivation are also sold in the market and includes potato, onion, garlic, cucumber, snake-gourd, squash, chilies, brinjal, lai-patta, radish, etc.

Figure 2. Representation of different taxonomic Families in the list of the wild edible plants used by Tangsas of Arunachal Himalaya

Gnetum gnemon appeared to be the most preferred species as its three morphological parts (leaves, strobili and seeds) are edible. However, for five other species [*Begonia roxburghii*, *Calamus tenuis*, *Physalis minima*, *Salacca secunda* and *Spondias pinnata*] two plant parts are useful. For the remaining 44 spp. only one plant part is eaten by the people of Tangsa community.

Now-a-days, many of these locally harvested plant parts are

PLATE - I. Marketed wild edible plants: **A & B.** *Zanthoxylum armatum* leaves and seedling; **C.** Seeds of *Gnetum gnemon*; **D.** *Amomum aromaticum* - young inflorescence; **E.** *Eryngium foetidum*; **F.** *Lasia spinosa*; **G.** *Houttyunia cordata*; **H.** *Clerodendrum glandulosum*; **I.** Ensheathed peduncle (marked) and spadix of *Musa sanguinea*; **J.** Spadix and fruits of *Musa aurantiaca* (also marketed); **K.** *Musa balbisiana* - young spadix; **L.** Ripe fruits of *Phoebe cooperiana*; **M.** *Smilax perfoliata* twigs; **N.** *Alpinia nigra* pseudostems; **O.** Bamboo shoot (*Dendrocalamus hamiltonii*); **P.** *Hodgsonia macrocarpa* seeds; **Q.** *Rubus treutleri* fruits (sometimes marketed)

Table 1. Wild edible plants used by Tangsa ethnic community in Changlang district of Arunachal Himalaya

[Abbreviations used: **Habit groups:** C = Climber; HA = Annual Herb; HP = Perennial Herb; L = Liana; S = Shrub; T = Tree; TS = Small tree. **Parts used:** Fr = Fruits; Inf = Inflorescence; Ls = Leafy shoot; Lv = Leaves; Pst = Pseudostem; Rz = Rhizome; Sd = Seeds; St = Stem; Str = Strobilus; Wp = Whole plant; Ys = Young sprout]

Scientific name [Family]; Voucher specimen	Local name	Habit	Parts Used	Mode of consumption	FL (%)
<i>Acmella paniculata</i> (Wall. ex DC.) R.K. Jansen [Asteraceae]; <i>PLungphi</i> - 011	<i>Pajong Nam</i>	HP	Lv	Cooked	75.44
<i>Alpinia nigra</i> (Gaertn.) Burt [Zingiberaceae]; <i>PLungphi</i> - 066	NA	HP	Pst	Cooked	NA
<i>Amaranthus viridis</i> L. [Amaranthaceae]; <i>PLungphi</i> - 038	<i>Khahram</i>	HA	Ls	Cooked	38.6
<i>Amomum aromaticum</i> Roxb. [Zingiberaceae]; <i>PLungphi</i> - 087	<i>Khuk</i>	HP	Inf	Cooked; also as chatney	64.91
<i>Amomum dealbatum</i> Roxb. [Zingiberaceae]; <i>PLungphi</i> - 094	<i>Tingnyang</i>	HP	Ys	Cooked; roasted to make chatney	56.14
<i>Angiopteris evecta</i> (G. Forst.) Hoffm. [Marattiaceae]; <i>PLungphi</i> - 044	<i>Chahmah</i>	HP	Rz	Cooked	19.3
<i>Ardisia solanacea</i> (Poir.) Roxb. [Primulaceae]; <i>PLungphi</i> - 023	<i>Nyampen</i>	S	Fr	Ripe fruit raw	75.44
<i>Artocarpus hirsutus</i> Lam. [Moraceae]; <i>PLungphi</i> - 069	<i>Jat Malang</i>	T	Sd	Fried, roasted	100
<i>Baccaurea ramiflora</i> Lour. [Phyllanthaceae]; <i>PLungphi</i> - 017	<i>Haichao</i>	T	Fr	Ripe fruit raw	100
<i>Bambusa nutans</i> Wall. ex Munro [Poaceae]; <i>PLungphi</i> - 032	<i>Wah mi</i>	S	Ys	Cooked; pickles	85.96
<i>Begonia roxburghii</i> A.DC. [Begoniaceae]; <i>PLungphi</i> - 020	<i>Sihai</i>	HP	Lv, St	Cooked; salad	70.18
<i>Calamus tenuis</i> Roxb. [Arecaceae]; <i>PLungphi</i> - 079	<i>Rih</i>	C	Ys, Fr	Cooked; chewed (masticator)	100
<i>Centella asiatica</i> (L.) Urb. [Apiaceae]; <i>PLungphi</i> - 062	<i>Ningkhohi</i>	HA	Wp	Salad	52.63
<i>Clerodendrum glandulosum</i> Lindl. [Lamiaceae]; <i>PLungphi</i> - 007	<i>Khahmao</i>	S	Lv	Cooked	100
<i>Crassocephalum crepidioides</i> (Benth.) S.Moore [Asteraceae]; <i>PLungphi</i> - 001	<i>Thangbang</i>	HA	Ls	Cooked	42.11
<i>Dendrocalamus hamiltonii</i> Nees & Arn. ex Munro [Poaceae]; <i>PLungphi</i> - 030	<i>Wah mi</i>	S	Ys	Cooked; pickles	91.23
<i>Dillenia indica</i> L. [Dilleniaceae]; <i>PLungphi</i> - 056	<i>Masangsi</i>	T	Fr	Cooked; chatney; pickles	100
<i>Duchesnea indica</i> (Jacks.) Focke [Rosaceae]; <i>PLungphi</i> - 031	<i>Pungbang</i>	HA	Fr	Ripe fruit raw	45.61
<i>Entada rheedii</i> Spreng. [Leguminosae : Mimosoideae]; <i>PLungphi</i> - 078	<i>Wijang</i>	L	Sd	Cooked	33.33

Scientific name [Family]; Voucher specimen	Local name	Habit	Parts Used	Mode of consumption	FL (%)
<i>Eryngium foetidum</i> L. [Apiaceae]; PLungphi - 021	Panchi	HP	Lv	Cooked; Salad	100
<i>Ficus auriculata</i> Lour. [Moraceae]; PLungphi - 042	Nee Ri	T	Fr	Ripe fruit raw	47.37
<i>Gnetum gnemon</i> L. [Gnetaceae]; PLungphi - 028	Phalap ri	S	Lv, Str, Sd	Cooked; seeds fried	59.65
<i>Hodgsonia macrocarpa</i> (Blume) Cogn. [Cucurbitaceae]; PLungphi – 009, 064	Pie	C	Sd	Seeds fried; chatney	78.95
<i>Houttuynia cordata</i> Thunb. [Saururaceae]; PLungphi - 040	Thalai naam	HP	Ls	Made into chatney	52.63
<i>Lasia spinosa</i> (L.) Thwaites [Araceae]; PLungphi - 058	Hamwey	HP	Lv	Cooked	50.88
<i>Mangifera sylvatica</i> Roxb. [Anacardiaceae]; PLungphi - 065	Jat aam	T	Fr	Green or ripe fruit raw; pickled	84.21
<i>Melastoma malabathricum</i> L. [Melastomataceae]; PLungphi - 047	Kengjang	S	Fr	Ripe fruit raw	100
<i>Morus alba</i> L. [Moraceae]; PLungphi - 083	Ahairi	S	Fr	Ripe fruit raw	96.49
<i>Musa aurantiaca</i> G.Mann ex Baker [Musaceae]; PLungphi - 022	Nyaprom	HP	Inf	Cooked	49.12
<i>Musa balbisiana</i> Colla [Musaceae]; PLungphi - 045	Cha ngok	HP	Inf	Cooked	100
<i>Musa sanguinea</i> Hook.f. [Musaceae]; PLungphi - 070	Kamchi	HP	Inf	Cooked	98.25
<i>Nephelium lappaceum</i> L. [Sapindaceae]; PLungphi - 051	Haicha	T	Fr	Ripe fruit raw	59.65
<i>Paederia foetida</i> L. [Rubiaceae]; PLungphi - 012	Raonam	C	Lv	Cooked	40.35
<i>Persicaria chinensis</i> (L.) H.Gross [Polygonaceae]; PLungphi - 014	Sahai	HP	Lv	Cooked; salad	49.12
<i>Phlogacanthus thyrsoformis</i> (Roxb. ex Hardw.) Mabb. [Acanthaceae]; PLungphi - 067	Phikhip	S	Inf	Cooked	47.37
<i>Phoebe cooperiana</i> P.C.Kanjilal & Das [Lauraceae]; PLungphi - 071	Huk	T	Fr	Ripe fruits eaten raw	75.44
<i>Phyllostachys bambusoides</i> Siebold & Zucc. [Poaceae]; PLungphi - 034	Wah mi	S	Ys	Cooked; pickles	NA
<i>Physalis minima</i> L. [Solanaceae]; PLungphi - 036	Tungnyai ri	HA	Lv, Fr	Cooked; ripe fruit raw	38.6
<i>Pouzolzia hirta</i> Blume ex Hassk. [Urticaceae]; PLungphi - 093	Oyik	HA	Ls	Cooked	21.05
<i>Rhus chinensis</i> Mill. [Anacardiaceae]; PLungphi - 068	Metqha	T	Fr	Ripe fruit raw; pickled	38.6
<i>Rubus rugosus</i> Hook.f. [Rosaceae]; PLungphi - 026	Sukhath ri	S	Fr	Ripe fruit raw	66.67

Scientific name [Family]; Voucher specimen	Local name	Habit	Parts Used	Mode of consumption	FL (%)
<i>Salacca secunda</i> Giff. [Arecaceae]; <i>PLungphi - 054</i>	<i>Sap</i>	S	Ys, Fr	Cooked; young fruits raw	100
<i>Smilax perfoliata</i> Lour. [Smilacaceae]; <i>PLungphi - 005</i>	<i>Phanthok</i>	C	Ys	Cooked	31.58
<i>Solanum americanum</i> Mill. [Solanaceae]; <i>PLungphi - 003</i>	<i>Mangkhoi</i>	HA	Ls	Cooked	38.6
<i>Solanum spirale</i> Roxb. [Solanaceae]; <i>PLungphi - 081</i>	<i>Kaithuh</i>	S	Ys	Cooked	31.58
<i>Solanum torvum</i> Sw. [Solanaceae]; <i>PLungphi - 033</i>	<i>Kemko</i>	S	Fr	Green fruit cooked	33.33
<i>Spondias pinnata</i> (L. f.) Kurz [Anacardiaceae]; <i>PLungphi - 060</i>	<i>Makok</i>	T	Fr, Lv	Ripe fruits eaten raw; young fruits and leaves cooked	94.74
<i>Sterculia villosa</i> Roxb. [Malvaceae]; <i>PLungphi - 039, 063</i>	<i>Chahrao</i>	T	Sd	Seeds fried & roasted	35.09
<i>Stixis suaveolens</i> (Roxb.) Pierre [Capparaceae]; <i>PLungphi - 053</i>	<i>Lahut-rih</i>	L	Fr	Ripe fruits eaten raw	59.65
<i>Terminalia chebula</i> Retz. [Combretaceae]; <i>PLungphi - 024</i>	<i>Lakcha Ri</i>	T	Fr	Ripe & green fruits raw	100
<i>Zanthoxylum armatum</i> DC. [Rutaceae]; <i>PLungphi - 002</i>	<i>Changkao</i>	TS	Lv	Cooked	100

Mode of consumption

The main method of consumption of different plants or plant-parts is after cooking (mainly boiled in water) and 32 of the recorded species are cooked. Leaves, leafy and young shoots, inflorescence, and young/green-fruits are cooked. Tangsa people also like to take many plant parts fried and roasted. For long-time use they make pickles of many plant

Table 2: Habit group classification

Detailed habit groups	Number of species	Number in broad habit groups
Annual Herb (HA)	7	Herbs: 20 or 39.22 %
Perennial Herb (HP)	13	
Shrub (S)	13	
Climber (C)	4	Climbers: 6 or 11.76 %
Liana (L)	2	Trees: 12 or 23.53 %
Tree (T)	11	
Small Tree (TS)	1	
TOTAL:	51	

parts (bamboo-shoots, acrescent-succulent calyx of *Dillenia indica*, and fruits of *Mangifera sylvatica* and *Rhus chinensis*). Sometimes plant-parts are also taken as salad and after made into chatney. However, the fruits of 15 species are taken raw, mostly after ripening but unripe ones of few species are also taken raw. The fruits of *Calamus tenuis* are used as masticatory.

Figure 4. Plant parts use of the wild edible plants used by Tangsa ethnic community of Arunachal Himalaya

Table 3. Additional uses of wild edible plants among the people of Tangsa community

Scientific name	Additional uses	Useful part
<i>Angiopteris evecta</i>	Medicine [anti-venom]	Rhizome
<i>Baccaurea ramiflora</i>	Medicine [dysentery]	Good amount of fruits
<i>Begonia roxburghii</i>	Medicine [rashes, anti-sting]; Remove stains from skin	Whole plant
<i>Calamus tenuis</i>	Handicrafts	Whip of leaf-rachis
<i>Clerodendrum glandulosum</i>	Medicine [High Blood Pressure]	Leafy shoots
<i>Dillenia indica</i>	Shampoo and hair-conditioner	Extract of clusters of fruits
<i>Entada rhedii</i>	Medicine [gastric, cough, fever, body ache]	Seeds
<i>Ficus auriculata</i>	Latex as chewing-gum	Latex
<i>Musa aurantiaca</i>	Fodder for pigs	Pseudostem
<i>Paederia foetida</i>	Medicine [dysentery]	Leaves
<i>Persicaria chinensis</i>	Medicine [energy tonic]	Leafy shoots
<i>Phlogacanthus thyrsoformis</i>	Medicine [malaria, cough, rashes]	Leaf-decoction
<i>Rhus chinensis</i>	Medicine [high blood-pressure, dysentery]	Juicy extract of inflorescence
<i>Salacca secunda</i>	Handicrafts and thatching	Leaves
<i>Solanum spirale</i>	Medicine [High Blood Pressure]	Leafy shoots
<i>Solanum torvum</i>	Medicine [High Blood Pressure]	Cooked fruits
<i>Spilanthes paniculata</i>	Medicine [toothache]; fodder for pigs	Capitulum; whole plants
<i>Sterculia villosa</i>	Ropes from bark; water from roots is extracted during dry period	Bark; root
<i>Zanthoxylum armatum</i>	Stupefying fishes	Ground fruits

Stress-time food

Some plants are edible but only when there is scarcity of food. The tuberous root-stock of *Angiopteris evecta* is one such good example.

Other uses of wild edible plants

Apart from being part of their diet, many of the recorded WEP of Kharsang Circle were also reported to have other uses including as medicines (Table 3). Of these, 12 species are used against different human-ailments like malaria, cough, rashes, high blood pressure, dysentery, toothache, anti-sting, anti-venom, gastric trouble, fever, and body-ache. Among people of the Tangsa community most commonly occurring disease is High Blood Pressure and plants like *Solanum spirale*, *S. torvum*, *Clerodendrum glandulosum*, and *Rhus chinensis* are reported to be effective in its treatment. Figure 5 shows the proportion of different diseases treated with these plants.

Figure 5. Human ailments (in %) cured by using indigenous medicinal plants among the people of Tangsa ethnic community

Interestingly, a total of 14 WEP species were reported to be used for other purposes (Table 3). For instance, leaves and stems of *Salacca secunda* are used for thatching roofs and in handicrafts. The prickly whip of leaf-rachis of *Calamus tenuis* is also used in handicrafts. The Fruits of *Zanthoxylum armatum* are used for fishing. The latex of *Ficus auriculata* is chewed as a stimulant. A strong rope is made from the bark of *Sterculia villosa*, while usable potable water is extracted from its roots is done during dry period. Ripe-fleshy pericarp and seeds of *Artocarpus hirsutus* are also consumed as food substitute. The slimy fruit-clusters of *Dillenia indica* (those remain covered with fleshy sepals) has conditioning effect, therefore used as shampoo for hairs. Juice of the entire inflorescence of *Rhus chinensis* is sometime consumed as refreshing beverage. The leafy-shoot of *Begonia roxburghii* is bruished to remove stains on skin. The whole plants of *Spilanthes paniculata* and *Musa* spp. are used in preparing fodder-mixture for livestock like pigs.

Quantitative Analysis

The Fidelity Level (FL) is useful for identifying the informants' most preferred plant species and its preparatory methods (Song *et al.* 2013). In the present work, FL values vary from 19.3 % to 100 %. Eleven plant species viz. *Baccaurea ramiflora*, *Dillenia indica*, *Eryngium foetidum*, *Musa balbisiana*, *Terminalia chebula*, *Salacca secunda*, *Calamus tenuis*, *Zanthoxylum armatum*, *Melastoma malabathricum*, *Artocarpus hirsutus* and *Clerodendrum glandulosum* are with recorded FL value of 100 % (Table 1). On the other hand, *Angiopteris evecta* was recorded with the lowest FL value of 19.3. Any specific plant with FL value of 100 % indicates that all of the informants recognized the same uses of the plant species (Srithi *et al.* 2009).

CONCLUSION

The present study elucidated the rich traditional knowledge of the people of *Tangsa* community living in the villages of Kharsang Circle in the Changlang district of Arunachal Pradesh on edible plants. The dependency on plants for livelihood has been a tradition since generations and the knowledge of selecting particular wild plants for food is their one intrinsic ability. Such knowledge-culture is on their basic livelihood is being orally transferred for generations since the time immemorial. As such, the ethnobotanical knowledge on plants is diminishing fast with time due to inroad of the products from more developed regions that are more attractive and much easily available. So, it is high time for proper documentation of traditional knowledge of the people living in such remote areas. In spite of region being rich with wild edible floras many are still unexplored and calls for research in this field and the present study is one of its kinds.

It is also immediate need to assess pressure on the population structure of these edible plants and to frame the necessary strategies for their conservation as well as sustainable harvest for consumption.

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