

Ethnobotany of indigenous (Traditional) vegetables in Adi tribe of East Siang region of Arunachal Pradesh, India

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ABSTRACT

Arunachal Pradesh is known as land of rising Sun which is the biggest in terms of area-wise amongst the state of north east India. The region has 26 major tribe; each tribe has its own enormous indigenous knowledge on the uses of wild plants. Among the tribe, *Adi* community is one of the major tribe inhabited in the region which has its own habitual way of using horticultural (vegetables) resources for sustaining livelihood. Most of the plants are also ethnically important without which diverse rituals and festivals (Solung) of *Adi* community remain unfinished. The current survey was under taken interviewed through planned questionnaire. In our investigation among 25 wild species, 5 species belong to the Solanaceae family which was found to be most widely used family followed by Apiaceae, Rutaceae, Urticaceae and Araceae. Investigation on the basis of plant parts used reveals that the edible parts of the plants such as 6 species found to be widely used though leaves followed by 3 species fruits and 3 species whole plants besides these other plant parts like young tender leaves, tender stalks, petioles, rhizome also has been observed. This study is aim to initiated the basic information of these valuable herbs vegetable species for popularizing in future. These can compete with the best vegetables if appropriate study is initiated for production and ethnomedicine improvement.

Introduction

Northeastern states of India generally comprised of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura among these Arunachal Pradesh is the largest in terms of area. The Arunachal Pradesh generally inhabited by 26 main tribes and over 100 sub-tribes. *Adi* is foremost tribes in the district and consists of 14 sub-communities, which are *Shimong* and *Tangam Panggi*, *Pailibo*, *Ramo Millang*, *Pasi*, *Padam*, *Panggi*, *Pailibo*, *Ramo Ashing*, *Bori*, *Bokar*, *Karko*, *Komkar*, *Minyong*, *Millang* etc. The *Adi* tongue

spoken by the community belongs to Tibeto-Burman language. *Adi* people celebrated diverse festivals which are crucial parts of their socio-cultural life. Festivals are a sign of the society, costume and life style of the people. The festivals are primarily celebrated for feast, good crop harvest, happiness and for narrating the tradition, myths, folklores and mythologies (Modi, 2007). Arunachal Pradesh is the 12th mega biodiversity region of the world which is a part of Indo-Burma region as well as Himalaya

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biodiversity hotspot in world wide (Agarwal, 1999). It has a very rich reservoir of plant diversity. The wild edible species can be utilized for the improvement of new crops through selection, domestication and also capable to assistance in modern agriculture by providing crop breeders with a broad gene pool of potentially useful for crop development (Pandey, 2008). It lies between 26030'N and 29030'N latitude, with 91031'E and 97030'E longitude. It covers an area of 83,743 sq. km, out of which 67,410 sq. km area is covered with jungle (FSI, 2011). The state has various physiographies ranges from plants, foot hills and mountains with associated valleys (Dhar, 2004).

The Arunachal Pradesh falls underneath the Himalaya Biodiversity Hotspot and harbor a rich diversity of flora and fauna. Most of the community are still depend on the natural bioresources for their life sustain and occupation (Sarmah, 2010; Srivastava, 2009). As the state harbor international biodiversity it has a great possible for ethnobotany studies (Tiwari *et al.*, 1979).

The state receives heavy precipitation of about 2,000 to 4,100 mm annually, mostly from May to September. The mountains slopes and foothills are generally covered amid alpine, temperate, and sub-tropical forest. East Siang is one of the districts which are dominated by the Adi tribe. In the tribal society the use of plants as vegetable in daily diet with medicinal values is well known since early days. They used different plant species in the treatment of various diseases using the various parts of the vegetables like, roots, stems leaves, flowers, fruits, tubers rhizomes etc. of the plant (Mibang *et al.*, 2003). The *Adi* people has own way of intake raw tender leaves, fruits, inflorescences, tender stem, petioles, stalks and other plants parts as vegetable in their diet since time immemorial. These plants are consideration of having folk medicinal properties. Raw plant's parts are used with their local preparation alongside meat and fish. This custom of ingestion raw plants parts is handed down from generation to generation and believed that they obtain direct therapeutic advantage by this mode of eating. Besides used in raw of consumption, others parts are also used in cooking. These plants are used as folk medicine, juice, after boiling, crushing, direct application etc. (Jain *et al.*, 1999).

According to Food and Agriculture Organization report, over one billion populations are taking undomesticated plant as their daily diet (Burlingame, 2000). The people have accumulated knowledge about the different edible wild plants and their uses from their ancestors (Sundriyal and Sundriyal, 2004). Untamed edible species offer staple foodstuff for the local inhabitants and hand out as complementary food for non-local communities (Gemedo-Dalle *et al.*, 2005). Many studies have revealed that natural edible plants having good possible supply of nutrition and in several cases they are found to be more nourishing than conventional food crops (Grivetti, 2000).

Material and Methods

During 2019-2020, the investigation was carried out at various places of East Siang district of Arunachal Pradesh by regular observation on the indigenous edible plants being sold in the markets. Survey was done in different villages namely, Mebo, Bodak, Silluk, Ayeng, Takilalung and Rani (Figure 1).

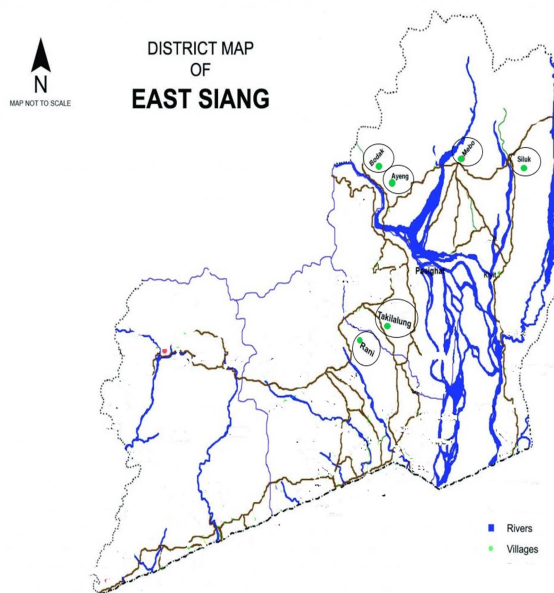


Figure 1: Location map of study area

Contacts with the local peoples in villages were made to recognize the different plant parts used as remedy and daily diet., Botanical name, Adi name, family, growth habit, plant parts used and Ethanobotany/Traditional uses against a range of ailments were recorded by using Microsoft excel sheet to categorize the category of plants parts used

in food and medicines. After 2-3 years of surveying following mentioned ethno-vegetable plants are sold frequently in the markets and had made a presence felt. The identification of plant specimens was done by various available literature viz. Deb and Dutta (1971), Chuahan *et al.* (1996) and Haridasan and Rao (1985-87). Hooker (1872-97), Kanjilal *et al.*, (1930-34), Panigrahi and Joseph (1966), Traditional ethnobotanical and floristic methods of Jain & Rao (1977) were used. Random plant species were collected and mounted herbarium were prepared, the species were then matched at the herbarium of the BSI, for further proper recognition and authentication. The

identified species are deposited at the Department of vegetable Science, Central Agriculture University, Pasighat, Arunachal Pradesh for future reference.

Results and Discussion

In the ethnobotanical study reveals the uses of 25 different wild species which is generally belong to different genera and families are used by the peoples of Adi tribe of in this region which is consumed as raw or as cooked and which they believed to have many medicinal benefits (Table 1 and Figure 2).

Table 1: Wild edible species used by Adi community alive in, East Siang district of Arunachal Pradesh, India

SN	Botanical name	Adi name	Family	Habit	Parts used	Ethnobotany/Traditional Uses
1	<i>Diplazium esculentum</i>	Takang	Athyriaceae	Herb	Tender leaves & shoots	Boiled young shoots & leaves are taken with boiled rice as vegetable for lactative
2	<i>Centella asiatica</i>	Kipum	Apiaceae	Herb	Whole plant	Fresh whole plant extract is taken 2-3 times a day as stomachic
3	<i>Begoniya josephii</i>	Sisi baying	Begoniaceae	Herb	Shoots & leaves	Paste of shoots & leaves is given 2-3 times a day for antidiysentric
4	<i>Chenopodium album</i>	Gilimili	Chenopodiaceae	Herb	Leaves & young shoots	The leaves & young shoots may be eaten as a leaf vegetable, either steamed in its entirety, or cooked like spinach
5	<i>Clerodendrum colebrookiamum</i>	Ongin	Verbanaceae	Shrub	Leaves	Tender leaves are taken as vegetable to check blood pressure
6	<i>Eryngium foetidum</i>	Adiori	Apiaceae	Herb	Leaves	Leaves are taken as chutney (condiments) belived to be appetizer. Paste from stem and leaf is applied togethater on forehead as a remedy for headache
7	<i>Houttuynia cordata</i>	Roram	saurururaceae	Herb	shoots	Extract of tender shoot is given for stomachache. Warmed leaves are packed in banana leaf foe snuff or massage to get from sinusities
8	<i>Mussaendra roxburghii</i>	Akshap	Rubiaceae	Shrub	Leaves	Leaves are cooked and served as vegetable
9.	<i>Physalis minima</i>	Bodopatti	Solanaceae	Herb	Fruit	Fruit extract is administrated for gasteric problem
10.	<i>Portula caoleracea</i>	Guberoyi ng	Portulaceae	Herb	Stem & leaves	Stem & leaves are takien as vegetable witrn boiled rice for stomachic
11.	<i>Solanum nigrum</i>	Kopir	Solanaceae	Herb	Stem, leaves & berries	Stem and tender leaves consumed as vegetable and considered digestive and liver stimulent. Berries are also eaten as raw or as cooked

12.	<i>Solanum torvum</i>	Kopir	Solanaceae	Shrub	Fruit	Berry is taken as raw as well as in cooked form. Good for cough and tonsillitis.
13.	<i>Solanum spirale</i>	Okobang	Solanaceae	Shrub	Leaves & fruit	Tender leaves used as stomach disorder, warm decoction of fruits is used in stomache and also as vegetable, chutney and salad
14.	<i>Solanum xanthocarpum</i>	kopir	Solanaceae	Shrub	Fruit	Expectorant, tooth-ache, cough, cold, respiratory problems
15.	<i>Spilanthes acmella</i>	Marshang	compositae	Herb	Leaves & flowers	Flower are chewed to cure toothache
16.	<i>Zanthoxylum armatum</i>	Ombe	Rutaceae	Tree	Leaves & fruits	Fruits are crushed made into paste solution to prevent malaria
17.	<i>Zanthoxyl umrhetsa</i>	Onger	Rutaceae	Tree	Leaves	Leaves are eaten as vegetable, blend of seed mix with <i>allium sativum</i> and slight salt is prescribe incase of abdomen bloating & used as hair cleaning agent
18.	<i>Sida acuta</i>	Holap	Malvaceae	Herb	Tender leaves	Tender are leaves are cooked and eaten as vegetable to improve
19.	<i>Pouzolzia viminea</i>	Oyik	Urticaceae	Herb	Leaves	Is eaten as vegetable and it is considered by Adi tribe to increase lactation in women
20.	<i>Pouzolzia hirta</i>	Oyik (big leaf)	Urticaceae	Herb	Leaves	Is eaten as vegetable and it is considered by Adi tribe to increase lactation in women
21.	<i>Oxalis corniculata</i>	Phakep	oxalidaceae	Herb	Whole plant	Whole plant is taken as vegetable, as ant dysentric and to relive intoxication from wine
22.	<i>Alocasia corriza</i>	Engee	Araceae	Shrub	Rhizome	Pain reliver from insect bite
23.	<i>Alpinia malaccensis</i>	Pupure	Zingiberaceae	Shrub	Rhizome	A piece of fresh rhizome is taken as anthelmintic
24.	<i>Calamus erectus</i>	Tara	Arecaceae	Tree	Seed & tender shoot	Fresh seed are taken as dyspepsia. Tender shoot are taken as vegetable and anthelmintic
25.	<i>Drymaria cordata</i>	Tayitoar	Caryophyllaceae	Herb	Whole plant	Fresh whole plant mixed with guava is taken in gastric

In the investigation of 25 species 5 species belong to the Solanaceae family which was found to be most widely used family followed by Apiaceae, Rutaceae, Urticaceae and Araceae Figure 3. Investigation on the basis of plant parts used reveals that the edible parts of the plants such as 6 species found to be widely used though leaves followed by 3 species fruits and 3 species whole plants besides these other plant parts like young tender leaves, tender stalks, petioles, rhizome also has been observed Figure 4. The trust behind this form of intake is excellent for fitness and acts as a medication for a variety of disease ailments. This might be recognized due to the presence of various phytochemical compositions in these wild species

that boost the power of protection for human body (Benny *et al.* 2004, Craig 1999). The data on plant parts used reflects leaves are favorite and broadly used parts 6 species were identified, whereas fruits and whole plants comes to the next slot. In our investigation random inspection implies that peoples are well-off in traditional comprehension but to some extent meager in ethno medicinal knowledg. Further survey observed that 16 species belongs to herbs, 7 species from shrub and 3 species from trees Figure 4. As we know uncooked plant foodstuff are considered to be rich in nutrition composition like, carbohydrates, protien, fibre etc. and energy as well as low in calories when compared to cook. These are further rich in various

vitamins and phytochemical like, ascorbic acid, vitamin A, Riboflavin, tocopherol, carotenoids, favonoid, terpenoids, alkaloids, folates as well as various minerals like calcium, magnesium, selenium, phosphorus, potassium, zinc, boron etc. Further proper documentation and domestication is needed to assess the scientific and medicinal properties of these plants. It may be hypothesized that the longevity of life in rural and forest dwelling

people are more as compared to the urban and city dwellers might be due to the fact that daily physical work combined with all these medicinal doses they took everyday as vegetables. The daily intake of herbal medicine in the form of vegetables might be one of the important reasons for the life longevity and less occurrence of the developed world killer ailments like cancer, diabetes, heart diseases.



Figure 2a: *Diplazium esculentum* (Takang)



Figure 2b: *Centella asiatica* (Kipum)



Figure 2c: *Begonia josephii* (Sisi baying)



Figure 2d: *Chenopodium album* (Gilimili)



Figure 2e: *Clerodendrum colebrookianum* (Ongin)



Figure 2f: *Eryngium foetidum* (Adiori)



Figure 2g: *Houttuynia cordata* (Roram)



Figure 2h: *Mussaenda roxburghii* (Akshap)



Figure 2i: *Physalis minima* (Bodopatti)



Figure 2j: *Portula caoleracea* (Guberoying)



Figure 2k: *Solanum nigrum* (Kopir)



Figure 2l: *Solanum torvum* (Kopir)



Figure 2m: *Solanum spirale* (Okobang)



Figure 2n: *Solanum xanthocarpum* (Kopir)



Figure 2o: *Spilanthes acmella* (Marshang)



Figure 2p: *Zanthoxyl umrhetsa* (Onger)



Figure 2q: *Sida acuta* (Holap)



Figure 2r: *Pouzolzia hirta* (Oyik, big leaf)



Figure 2s: *Pouzolzia viminea* (Oyik, small leaf)



Figure 2t: *Oxalis corniculata* (Phakep)



Figure 2u: *Alocasia macrorrhiza* (Engee)



Figure 2v: *Drymaria cordata* (Tayitoar)

Figure 2: Glimpse of indigenous vegetable used by *Adi* community in East Siang district

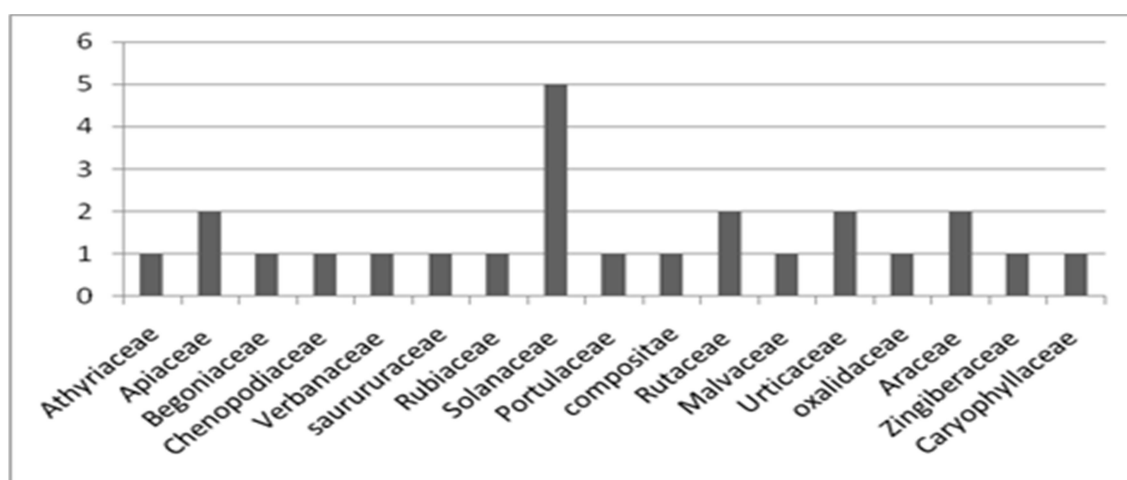


Figure 3: Graphical representation of family dominance in traditional vegetables

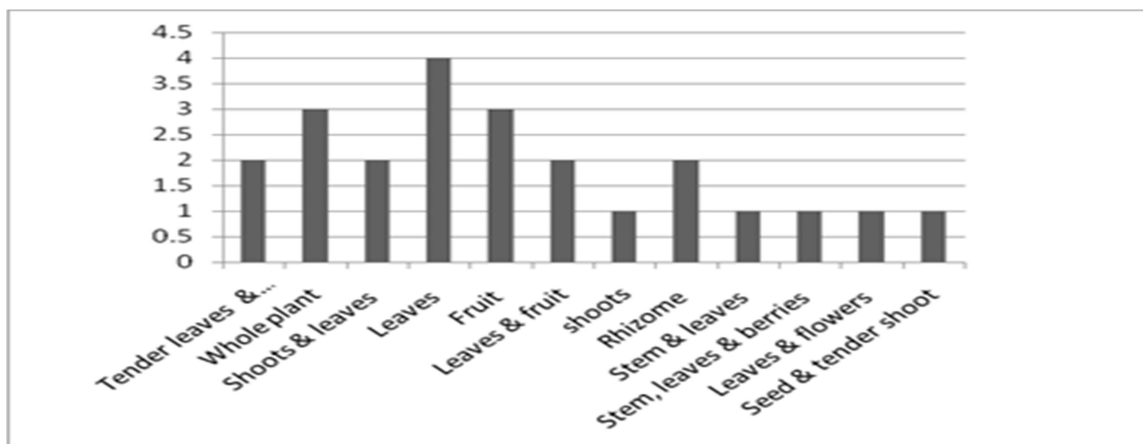


Figure 4: Graphical representation of edible parts dominance in traditional vegetables

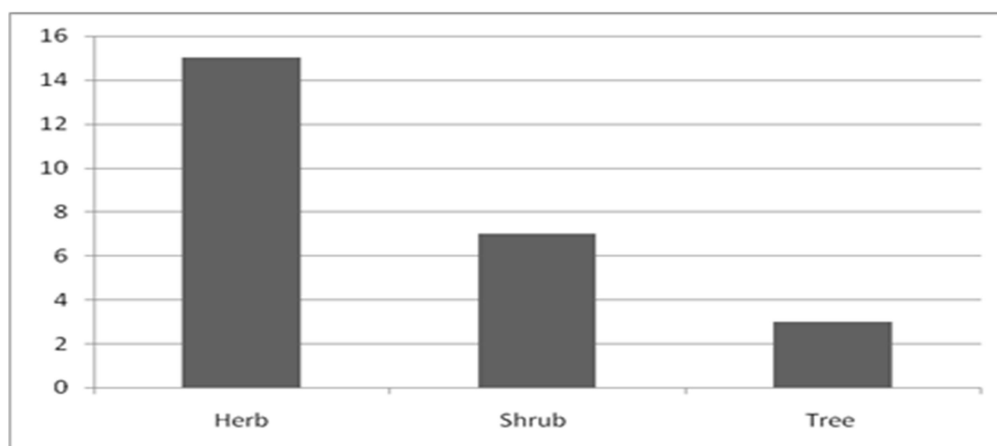


Figure 5: Graphical representation of growth habit dominance in traditional vegetables

Conclusion

The current exploration concluded that only a division of conventional comprehension of local plants used by the people (Adi community) of East Siang district of Arunachal Pradesh. It was observed that the villages of the district rich in natural vegetables species of equally foodstuff and the rapeutic aspects. Through out investigation it was observed that villagers have their own local remedial familiarity of using plant based conventional medication for treating frequent ailments but such knowledge seems to be declining as majority of the villager's could not proper identify traditional plants which are existing by their society forest field. Such decline traditional knowledge could be due to the rising in clination towards modern medicine as well as lack of the script to documentation the information past

centuries. Such related decline of traditional knowledge associated to classification and use of edible plants has been reported by earlier reasrchers. A detailed and good quality research is needed especially on nutritional aspects for understanding and documentation of indigenous knowledge acquire by the community people and its cultural association. It is aslo essential to conserve the language as well as habitual life fashion to promote the tribal awareness for generation to generation.

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