

**SHORT COMMUNICATION**

# Ethnobotanically significant plants used by the Nyishi tribe of Papum Pare District in Arunachal Pradesh

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## Abstract

An ethno-botanical study was conducted in the Papum Pare district of Arunachal Pradesh covering 13 far-flung villages. The structured, semi-structured questionnaire format, focused group discussion, open-ended interview and transect walk methods were used for gathering ethnobotanical information from 97 key informants. This study revealed 40 ethnobotanical species belonging to 27 plant families used by the Nyishi tribe of Papum Pare district as a food, housing, medicine, spice and condiments and cultural materials.

**Keywords:** Ethnobotanical Uses; Wild Edible Plants; Nyishi Tribe; Papum Pare; Arunachal Pradesh

## 1. Introduction

The Indian state of Arunachal Pradesh is one of the top 12<sup>th</sup> Global Biodiversity Hotspot Region of the world which falls within Himalayan Hotspot Region (Myers et al., 2000). The state covers a total geographical area of 83,743 sq.km of which 68,757 sq.km (82.10%) is reported to be under forest cover. The forest of Arunachal Pradesh receives heavy rainfall from both northeast and southwest monsoon that leads to the rapid proliferation of biological diversity and which adds to the richness in vegetation (Kaul and Haridasan 1987; FSAP, 2008). This region has been reported to be the home to many primitive flowering plants hence referred to as “Cradle of flowering plants” by Takhtajan (1969). The state of Arunachal Pradesh is inhabited by 26 tribes and 110 linguistic groups endowed with rich age-old traditional cultural knowledge which contribute towards effective conservation and sustainable utilization of ethnobotanical resources (Tag and Das, 2007).

The Nyishi is the largest tribe of Arunachal Pradesh inhabiting seven districts viz. Papum Pare, Lower Subansiri, Kamle, Kurung Kumey, Kra Dadi, East Kameng and Pakke Kessang districts (Showren, 2009). However, ethnobotanical information on the Nyishi tribe of Arunachal Pradesh is reported to be insufficient to date which need further exploration and documentation (Tag and Das, 2007). Therefore, present study was conducted in the Nyishi dominated villages of the Papum Pare district of Arunachal Pradesh and reported some ethnobotanically significant plants used by the local residents as food, medicines, housing and cultural materials.

## 2. Materials and methods

### 2.1. Study site

Papum Pare District of Arunachal Pradesh is mainly inhabited by the Nyishi tribe. It is situated within the geographical coordinate between 26°55' N and 28°40' N latitudes and 92°40'E and 94°21' E longitudes (Figure 1). It is bounded by Kra-Daadi District in the North, Lower Subansiri District in the East, Pakke Kessang District in the West and Assam in the South and covers a total geographical area of 3462 sq.km which accounts for 4.12% of the total

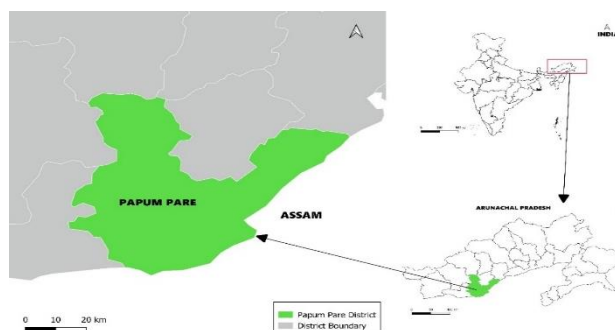


Figure 1. Map showing Nyishi dominated Papum Pare District of Arunachal Pradesh.

Table 1. Demography and age group of the informants

Informant Category	Frequency of age (In years)	Number of informants	Number of plant species reported
Male	0-20	0	0
	20-30	7	27
	30-40	14	40
	40-50	10	37
	50-60	4	23
	60-70	8	35
	70-80	7	33
	80-90	0	0
	90-100	1	15
Female	0-20	1	12
	20-30	4	19
	30-40	13	40
	40-50	10	35
	50-60	3	22
	60-70	10	40
	70-80	3	38
	80-90	2	25
	90-100	0	0

geographical area of Arunachal Pradesh. Almost 90% of the entire district is characterized by rugged topography with steep terrain (400 – 3000 msl) which is part of the Eastern Himalayan range and dissected by numerous rivers and rivulets while roughly 10% of the total geographical area of the district is characterized by river valley and plain area near Assam border. The major rivers and drainage system flowing through the district is Papum, Pare and Poma which forms the lifeline and defines the culture and tribal world view of the Nyishi community. The district receives heavy rainfall during North East and South West monsoon starting from May to September with relative humidity of more than 85%. Summer is hot and humid with maximum temperature reaches up to 35 °C during day time while winter is mild and pleasant with maximum temperature reaches up to 25 °C during day time (Anonymous, 2015-16).

## 2.2. Sample size and informants' category

A total of 97 key informants (51 males and 46 females) were randomly interviewed during house-to-house visit in 13 villages which constitute folklore experts, orators, farmers, hunters, and medicine men which possess rich biocultural and ethnobotanical knowledge system of the community. The age of key informants to be interviewed were divided into 9 groups including both male and female gender, that is, 10-20 years, 20-30 years, 30-40 years, 40-50 years, 50-60 years, 60-70 years, 70-80 years, 80-90 years and 90-100 years of age (Table 1) and total number of plant species reported against each age group were recorded in the questionnaire format and field notebook.

## 2.3. Interview schedule and collection of ethnobotanical information

The ethnobotanical study was conducted between August 2021 to July 2022. A Prior Informed Consent (PIC) were taken from the key informants following Mo'otz Kuxtal Voluntary Guidelines (2019) under Article 8 (j) of CBD (1993) prior to accessing their traditional knowledge related to bioresource utilization. The village priests, orators, herbalists, farmers and hunters were interviewed with the help of structured questionnaire, semi-structured, focused group discussion and open-ended interview session which was followed by transect walk with key informants in the community forest area as suggested by Martin (1995), Phillips et al (1996) and Tag (2007) and Tag et al (2012).

## 2.4. Collection and identification of voucher specimen

The plant materials were collected with the help of local informants and dried following the standard herbarium procedures (Jain and Rao, 1977). The ethnobotanical species were identified using standard local flora such as *Materials for the Flora of Arunachal Pradesh* (Vol.2) by Chowdhery et al (2009), *Flora of Lower Subansiri District, Arunachal Pradesh, India* (Vol.1-2) by Pal (2013), and *Flora of Kurung Kumey District, Arunachal Pradesh* by Dash and Singh (2017) and *Trees of Arunachal Pradesh* (Page et al, 2022). Voucher specimens were authenticated at BSI-APRC (ARUN) Itanagar and the accepted name of the species were verified in <https://www.plantsoftheworldonline.org> (POWO) hosted by Kew Science, RBG Kew, UK. The voucher specimens were deposited to the Herbarium of Arunachal University (HAU), Department of Botany, Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh, India for future record.

## 3. Results

### 3.1. Informants' age ranking

Of the 97 respondents interviewed for gathering ethnobotanical information, 51 were male and 46 were female (Table 1) which falls within the age group between 10 – 100 years. The majority of informants who readily participated in the interview were found belonging to age group 30 – 40 years which is followed by 40-50 years, 20 – 30 years, 60-70 years, 70 – 80 years while least participation were observed for the age group 10 – 20 years, 80-90 years and 90-100 years.

### 3.2. Diversity of ethnobotanical species

The present study has revealed 40 species of ethnobotanically significant plants that were found to be distributed across 27 plant families (Table 2). Majority of the species reported were herbaceous (45%) which is followed by tree (28%), climber (15%) and shrub (12%) (Figure 2). Asteraceae was found to be

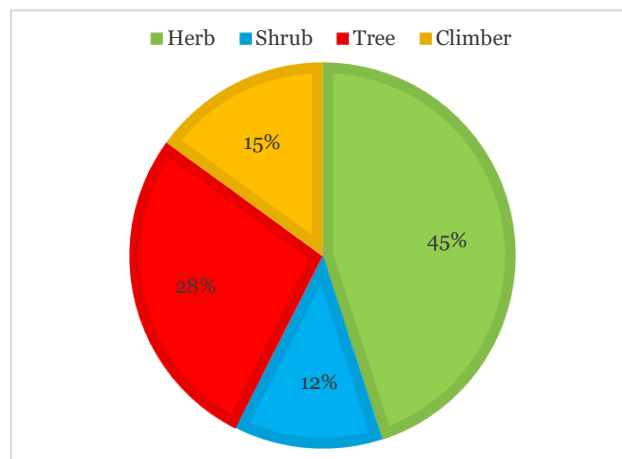


Figure 2. Distribution of ethnobotanically significant plant species (40 spp.) under different habit category used by Nyishi community of Papum Pare district of Arunachal Pradesh.

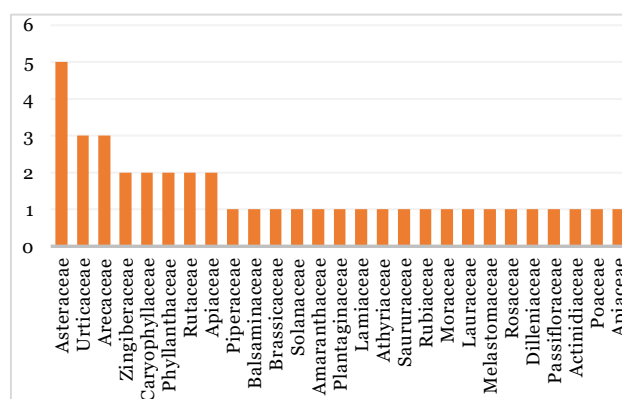


Figure 3. Species distribution within plant families used by the Nyishi tribe of Papum Pare district, Arunachal Pradesh

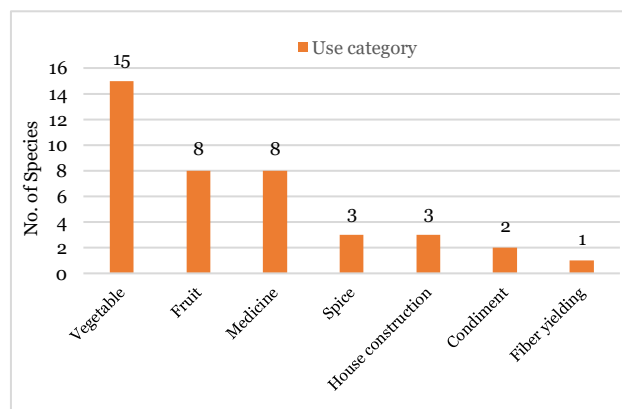


Figure 4. Diversity of ethnobotanical species (N=40) used by Nyishi community

represented by highest number of species (Figure 3), followed by Urticaceae and Arecaceae.

### 3.3. Traditional uses

Among the 40 species collected, highest number of species were reported under vegetable category (15) which is followed by fruits (8), medicine (8), spice (3), condiments (2), house construction (3) and fibre (1 species) which is presented in (Figure 4, 5) and the detail checklist of the plant species reported is presented in Table 2. Among the 40 species reported, *Litsea cubeba*, *Houttuynia cordata* and *Zanthoxylum armatum* were found frequently harvested and widely used as spice and condiments and as medicine due to their aromatic and healing properties.

Table 2. Checklist of the ethnobotanically significant plant species used by the Njishi tribe of Papum Pare District in Arunachal Pradesh, India.

Sl. No.	Botanical Name	Family	Local Name (Njishi)	Habit	Traditional use	Use Category
1	<i>Acmella paniculata</i> (Wall.ex DC.) R.K. Jansen TY/HT/HAU-36, 15.07.2022; Kullung	Asteraceae	Marshang oh	Herb	Tender leaves are consumed as vegetable	Vegetable
2	<i>Ageratum conyzoides</i> L. TY/HT/HAU-12, 23.08.2022; Lichi	Asteraceae	Pas pai	Herb	Leave paste is used in blood clotting	Medicine
3	<i>Amaranthus spinosus</i> L. TY/HT/HAU-04, 22.08.2022; Lichi	Amaranthaceae	Pochu koyu oh	Herb	Tender leaves are consumed as vegetable	Vegetable
4	<i>Bischofia javanica</i> Blume TY/HT/HAU-32, 23.08.2022; Lichi	Phyllanthaceae	Mub ahi	Tree	Fruit is consumed	Fruit
5	<i>Breynia androgyna</i> (L.) Chakrab. & N.P. Balakr. TY/HT/HAU-06, 22.08.2022; Lichi	Phyllanthaceae	Nyoro/Moro tahe oh	Shrub	Tender leaves are consumed as vegetable	Vegetable
6	<i>Calamus leptospadix</i> Griff TY/HT/HAU-26, 22.08.2022; Par Lichi	Arecaceae	Raasin oso/bet ahi	Climber	i. Fruit is consumed; ii. Stem is used for binding and handicrafts	Fruit/House construction
7	<i>Calamus acanthapathus</i> Griff. TY/HT/HAU-27, 22.08.2022; Par Lichi	Arecaceae	Lichi oso/bet ahi	Climber	i. Fruit is consumed; ii. Stem is used for binding and handicrafts	Fruit/House construction
8	<i>Cardamine hirsuta</i> L. TY/HT/HAU-03, 23.08.2022; Lichi	Brassicaceae	Seram patu oh	Herb	Whole plant is consumed as vegetable	Vegetable
9	<i>Centella asiatica</i> L. (Urb.) TY/HT/HAU-20, 23.08.2022; Lichi	Apiaceae	Nguti hik	Herb	Leaves are used for treating gastritis	Medicine
10	<i>Chromolaena odorata</i> L. TY/HT/HAU-16, 23.08.2022; Lichi	Asteraceae	Bodmas nemu	Shrub	Leave paste is used in blood clotting	Medicine
11	<i>Citrus maxima</i> (Burm.) Merr. TY/HT/HAU-29, 01.07.2022; Sagalee	Rutaceae	Rubup ahi	Tree	Fruit is consumed	Fruit
12	<i>Clerodendrum colebrookeanum</i> Walp. TY/HT/HAU-09, 23.08.2022; Lichi	Lamiaceae	Poto oh	Shrub	Tender leaves are consumed as vegetable	Vegetable
13	<i>Crassocephalum crepidioides</i> (Benth.) S. Moore TY/HT/HAU-17, 20.07.2022; Paga	Asteraceae	Genita oh	Herb	Soft leaves are consumed raw	Vegetable
14	<i>Dendrocalamus hamiltonii</i> Nass & Arn. ex. Munro TY/HT/HAU-37, 23.08.2022; Lichi	Poaceae	Het vu	Tree-like grass	Young shoots are consumed as vegetable	Vegetable
15	<i>Dillenia indica</i> L. TY/HT/HAU-28, 22.08.2022; Par Lichi	Dilleniaceae	Jampa ahi	Tree	Fruit is consumed	Fruit
16	<i>Diplazium esculentum</i> (Retz.) Sw. TY/HT/HAU-10, 14.07.2022; Sakiang	Aspleniaceae	Hoka pada/hoka oh	Fern	Tender leaves are consumed as vegetable	Vegetable
17	<i>Drymaria cordata</i> (L.) Willd. ex Schult. TY/HT/HAU-15, 23.08.2022; Lichi	Caryophyllaceae	Ked ker/hed her	Herb	Leaves are used for treating ringworm	Medicine
18	<i>Ficus auriculata</i> Lour. TY/HT/HAU-21, 20.07.2022; Paga	Moraceae	Taw sun	Tree	Fruit is consumed	Fruit
19	<i>Girardinia diversifolia</i> (Link) Friss TY/HT/HAU-31, 22.07.2022; Tapo	Urticaceae	Pasu payu	Herb	The plant is used for yielding fibre	Fibre Yielding
20	<i>Gonostegia hirta</i> (Blume) Miq. TY/HT/HAU-07, 20.07.2022; Paga	Urticaceae	Oyik/Hoyik oh	Herb	Tender leaves are consumed as vegetable	Vegetable

Table 2. Checklist of the ethnobotanically significant plant species used by the Nyishi tribe of Papum Pare District in Arunachal Pradesh, India.....

Sl. No.	Botanical Name	Family	Local Name (Nyishi)	Habit	Traditional use	Use Category
21	<i>Helleborus speciosa</i> (J.Koenig) S.R.Dutta TY/HT/HAU-35, 15.07.2022; Kullung	Zingiberaceae	Yaach baphi	Herb	i. Stem is used in treating burn wounds; ii. Leaves are consumed for treating diabetes	Medicine
22	<i>Houttuynia cordata</i> Thunb. TY/HT/HAU-11, 15.07.2022; Kullung	Saururaceae	Huyaj/Heyaj oh	Herb	Leaves are used as condiments/ consumed raw	Condiment
23	<i>Impatiens vidyae</i> R.C. Srivast. TY/HT/HAU-01, 15.07.2022; Kullung	Balsaminaceae	Lvm/Langum oh	Herb	Leaves are consumed as vegetable	Vegetable
24	<i>Litsea cubeba</i> (Lour.) Pers. TY/HT/HAU-48, 14.07.2022; Sakiang	Lauraceae	Tajir Ahi	Tree	The fruits are used as a spice	Spice
25	<i>Livistona jenkinsiana</i> Griff. TY/HT/HAU-30, 22.08.2022; Par Lichi	Arecaeae	Toko Patta	Palm Tree	Leaves are Used for thatching the roof of Stilt house	Roofing (House construction)
26	<i>Melastoma malabathricum</i> L. TY/HT/HAU-22, 14.07.2022; Sakiang	Melastomaceae	Dai dasa/das dai	Shrub	Fruit is consumed	Fruit
27	<i>Mikania micrantha</i> Kunth. TY/HT/HAU-14, 22.08.2022; Hawa Camp	Asteraceae	Japan/China ter	Climber	Leave paste is used in blood clotting	Medicine
28	<i>Oenanthe javanica</i> (Blume) DC. TY/HT/HAU-40, 01.07.2022; Chumbang	Apiaceae	Babu raru oh	Herb	Leaves are used as condiments	Condiment
29	<i>Paederia foetida</i> L. TY/HT/HAU-13, 14.07.2022; Sakiang	Rubiaceae	Epe taar/Wp ter	Climber	Leave paste is used in blood clotting	Medicine
30	<i>Passiflora edulis</i> Sims TY/HT/HAU-25, 22.08.2022; Hawa Camp	Passifloraceae	Bhel ahi	Climber	Fruit is consumed	Fruit
31	<i>Piper pedicellatum</i> C. DC. TY/HT/HAU-38, 23.08.2022; Lichi	Piperaceae	Yer/Raru oh	Climber	Leaves are consumed as vegetable	Vegetable
32	<i>Pilea melastomoides</i> (Poir.) Wedd. TY/HT/HAU-39, 23.08.2022; Lichi	Urticaceae	Gunghi/Gun-gi oh	Shrub	Leaves are consumed as vegetable	Vegetable
33	<i>Plantago asiatica</i> L. TY/HT/HAU-08, 23.09.2022; Lichi	Plantaginaceae	Nyed nyer/mub yuru oh	Herb	Leaves are consumed as vegetable	Vegetable
34	<i>Psidium guajava</i> L. TY/HT/HAU-34, 01.07.2022; Pareng	Myrtaceae	Mudri sum nana	Tree	Tender leaves are consumed to treat indigestion	Medicine
35	<i>Pyrus cummis</i> L. TY/HT/HAU-23, 22.07.2022; Tapo	Rosaceae	Naspati sun	Tree	Fruit is consumed	Fruit
36	<i>Saurauia roxburghii</i> Wall. TY/HT/HAU-24, 25.07.2022; Kullung	Actinidiaceae	Suncho nyinch	Tree	Fruit is consumed	Fruit
37	<i>Solanum nigrum</i> L. TY/HT/HAU-02, 23.08.2022; Lichi	Solanaceae	Hor oh	Herb	Tender leaves are consumed as vegetable	Vegetable
38	<i>Stellaria media</i> L. TY/HT/HAU-05, 23.08.2022; Lichi	Caryophyllaceae	Jamiyi oh	Herb	Whole plant is consumed as vegetable	Vegetable
39	<i>Zanthoxylum armatum</i> DC. TY/HT/HAU-19, 22.07.2022; Tapo	Rutaceae	Suna ter	Tree	The fruits are used as a spice	Spice
40	<i>Zingiber officinale</i> TY/HT/HAU-33, 23.08.2022; Lichi	Zingiberaceae	Takhe	Herb	Rhizome is used as spice	Spice



**Figure 5.** A. Author with local informants in the field; B. Interview schedule with informants; C. *Stellaria media*; D. *Ficus auriculata*; E. *Melastoma malabathricum*; F. *Impatiens vidyae*; G. *Helлена speciosa*

#### 4. Discussion

This study revealed that Nyishi tribe of Arunachal Pradesh has developed a unique traditional knowledge system which allows the better utilization of food resources of their natural surroundings in order to sustain their livelihood. Earlier Murtem (2000) also reported some ethnobotanically significant wild edible plants used by the Nyishi Tribe. Greater majority of the species reported are found to be harvested from wild sources except for *Psidium guajava* and *Passiflora edulis* which were found to be domesticated by villagers. Leaf of *Livistona jenkisiana* harvested for roofing traditional house were collected from the wild but also found cultivated in their home garden. In another study traditional communities of Arunachal Pradesh primarily rely on wild ethnobotanical resources for both food and medicine medicinal purposes (Tangiang et al., 2011; Das et al., 2019; Yanka et al., 2019). Papum pare district ranges from tropical, sub-tropical and temperate zones experiencing wide range of humidity throughout the year favours condition for the growth of wild edible, medicinal and economic plants of higher commercial importance. Quantitative ethnobotanical studies could help in prioritization of commercially viable ethnobotanical species for sustainable livelihood.

#### 5. Conclusion

Present studies have reported 40 species of ethnobotanically significant plants with food, medicinal, cultural and commercial importance. Greater majority of the species (82%) were found to be directly harvested from the wild sources whereas very few species (18%) were found cultivated in the village kitchen gardens. It was also observed that the elderly people with higher age group reported a greater number of medicinal and wild edible plants

species when compared with younger age group informants while women tend to have better information on wild edible plants compared to their male counterparts. The species reported in present studies have immense ethnomedicinal and food values with high marketing prospects capable of supporting rural livelihood in the Eastern Himalayas.

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#### Authors' contributions

The first author (TY) conducted field work, prepared draft manuscript. Second and third authors (HT and PKH) conceptualized this study and finalized the manuscript.

#### Conflict of interests

Authors have no conflict of interests.

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