Quantitative approach to the ethnomedicinal study of the ethnic communities of Rangia subdivision, Assam, North East India

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Research

Abstract

Background: In developing nations, using plants and plant resources for various ethnobotanical purposes is a prevalent practice. Assam is part of the Indo-Myanmar biodiversity hot spot, one of the 25 mega-diverse regions on planet Earth. Assam is unparalleled, as nature has been uniquely generous in endowing it with varied *ethnic groups*. This study conducted an ethnobotanical survey of plant diversity at Rangia subdivision of Kamrup District, Assam, India.

Methods: Ethnomedicinal information was gathered through carefully planned questionaries and interviews with 43 informants across 11 villages in the Rangia subdivision of Assam. The data was analyzed using various quantitative indices like Use value (UV), Informant Consensus Factor (ICF), and Family Importance Value (FIV).

Results: In the present findings, 60 plant species belonging to 42 families, and 87 genera used by the ethnic people in the study areas have been documented. A total of 43 key informants were interrogated comprising men and women. A quantitative ethnobotany index analysis helps us to identify the utility of various significant species to treat some of the common ailments that are claimed by traditional medicine practitioners

Conclusions: It is important and pertinent for society to look into the traditional knowledge of ethnic groups employing different plants to treat illnesses. In addition to providing important avenues for the promotion of traditional herbal therapeutic practices, more research into the ethnobotanical aspects of the region will also provide scientific validation. Moreover, species with strong UVs could offer helpful leads for pharmacological study in the future.

Keywords: Quantitative ethnobotany, medicinal plants, Use value, traditional knowledge

Background

Assam is a part of the Indo-Myanmar biodiversity hotspot and ranks as one of the world's 25th most biodiverse regions (Myers *et al*. 2000). There are more than 100 different tribes and ethnic groups in Assam, most of which are rural residents who still reside in remote forested areas and who heavily rely on their traditional medical practices (Baruah *et al.* 2021). However, traditional medical knowledge appears to be disappearing as newer generations are not motivated to continue this practice (Baruah *et al.* 2018, Mahesh 2023). Assam is bordered by seven other states - Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and West Bengal as well as two foreign nations- Bangladesh and Bhutan. It is also known as the

“Gateway to the North East of India”. About 50% of India's biodiversity is found in the northeast of the country, which is also known as a "Biodiversity Hot Spot" due to its proximity to the Indo-Burma and the Himalayas (Mao *et al*. 2009). According to the World Health Organization (WHO), approximately 45,000 plant species in India have therapeutic properties, and 70% of the country’s rural population relies on traditional medicine made from biological resources for primary healthcare (Ved & Goraya 2008).

The study of human interactions with plants has been a global concern because of food security, climate change, biodiversity conservation, and human health (Pei *et al*. 2020). It is a fact that ethnobotany provides knowledge on the traditional uses of plants, which can be used towards the development of societies. The ethnobotanical knowledge of plants and their use by indigenous communities are not only essential for the conservation of biodiversity but also for community healthcare practices and the drug development process (Sheng-Ji 2001). About 85% of the world population uses herbal medicines for prevention and treatment of diseases, and the demand is increasing in developed and developing countries (Abera 2014, Tefera *et al.* 2019). Over 80% of people in Africa receive their primary healthcare from traditional medicine (Who 2019). Assam has 31 districts spread across a land area of 78,438 sq. km., and its population was 31.21 million as per the 2011 census. The state is situated between longitudes 89042'E and 96002'E and latitudes 24004'N to 28000'N (Basumatary & Baruah 2023). Due to its ideal geographic location, varied topography, and favourable climatic conditions, Assam has a relatively high biodiversity. Several plants in Assam are utilized medicinally by both contemporary medicine and traditional village healers, Ayurvedic, Unani, and homeopathic medicine (Baruah *et al*. 2013, Baro *et al.* 2015, Daimary *et al.* 2019, Brahma & Baruah 2023). Assam, which is a portion of Indo-Burma and is home to indigenous tribes, offers a wealth of opportunities for ethnobotanical research. Ethnic people only utilize their own herbal treatments and have a strong belief in the traditional medical system.

The present study was taken up to document ethnomedicinal plants commonly used by the ethnic communities of the greater Rangia subdivision, Assam.

Materials and Methods

Description of the study area

The present study was conducted in Rangia Subdivision (Figure 3), which is situated on the northern bank of the river Brahmaputra, 52 km from Guwahati, Assam. Rangia, with its cardinal points at 26.47°N and 91.63°E. According to data from the 2011 census, Rangia subdivision covers a total area of 186 km^2, including 12.46 km^2 of urban area and 173.12 km^2 of rural area. There are 1,55,333 people living in the Rangia subdivision, of which 32,533 are urban residents and 1,22,800 are rural population. Rangia town serves as the administrative centre for the Rangia subdivision of the Kamrup Rural District. Rangia is connected to all of Assam’s major cities and the rest of India by NH-31. The name Rangia or Rangiya, according to Assamese folklore, is derived from two terms, “Ran” and "Diya,” which indicate “engage in battle,” because the area served as a battleground for the Bhutias in the north, the Darrangi kingdom in the east, the Ahoms in the south, and the Mughals in the west. Some academics, however, contend that the name location actually derives from the Assamese word "rang," which means "fun," as they feel that the location was brimming with amusement and mystic delight.

Rangia shares the same hot, humid summer and cool, dry winter climate as the rest of the Brahmaputra valley. The annual maximum and lowest temperatures are 37.5 °C and 8.1 °C, respectively. With an annual rainfall of 1852.20 mm and a relative humidity of 75%, there is enough precipitation in the summer.

Selection of the study area

A total of eleven villages were chosen in the Rangia subdivision: Doloigaon, Gurkuchi, Halikuchi, Jamtola, Kekohati, Balagaon, Bangaon, Benaglikuchi, Bhatkuchi, Bichennala, and Chepti, which are mostly populated by Assamese, Nepali, Bodo, Rajbongshi, Rabha, Sarania Kachari, and Bengali peoples. The communities were chosen because they had a higher population and relied heavily on medicinal plants. Between March 2021 and May 2023, a survey was carried out. Standard procedures and methodologies have been used when gathering data on ethno-medico-botanical features. With the help of a questionnaire, interviews, and talks with a few well-known herbalists and the local healers known as “*Bej*” and "Ojha," ethnobotanical data were gathered. Herbalists were questioned in their localities. Samples of all the therapeutic plants mentioned by the herbalists were collected, identified, and authenticated at Bodoland University, Department of Botany, Kokrajhar, Assam. The data forms were then analysed, compiled, and tabulated to provide the botanical names, common names, families, and plant parts used. Photographs of the plant and its habitats, leaves, and floral parts were taken during the field study.

Figure 1. Gathering information and data collection on ethnobotanical knowledge (A-C), Mode of preparation (D), Glimpses of some plant parts used (E-M), Lataguti (E), Singrimwkhwi (F), Manimuni gidir (G), Jari (H), Haladhi (I), Silikha (J), Pathwi (K), Nwrsingh (L), Tejpat (M).

Demographic data of the participants

A total of 43 informers, including 12 farmers, 2 healers, 29 housewives, and elderly persons were interviewed to gather the information. Among them 5 were less than 20 years, 12 were 21-40 years, 22 were between 41-60, and 4 were under 61-80 years old. All the people belonging to rural areas and they are mainly dependent on agricultural practices. Demographic data of the participants with variables, categories, number of informants and percentage were denoted in Table 1 and Figure 2 respectively.

Table1. Demographic details of the participants

Variables	Categories	No. of informants	Percentage
Gender ratio	**Female**	23	53.72
	Male	20	46.28
Age	<20	5	11.07
	21-40	12	27.77
	41-60	22	51.91
	61-80	4	9.26
Educational background	**Matric** (10 standard)	21	48.09
	Higher Secondary (10+2)	8	18.51
	Housewife's	9	20.33
	Farmer	3	6.44
	Healer	2	4.63
Life type	**Rural area**		100

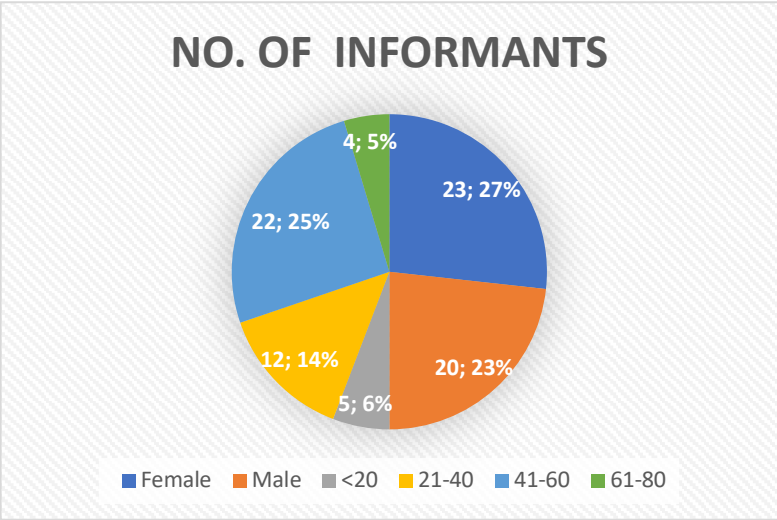

Figure 2. Percentage distribution of the number of informants

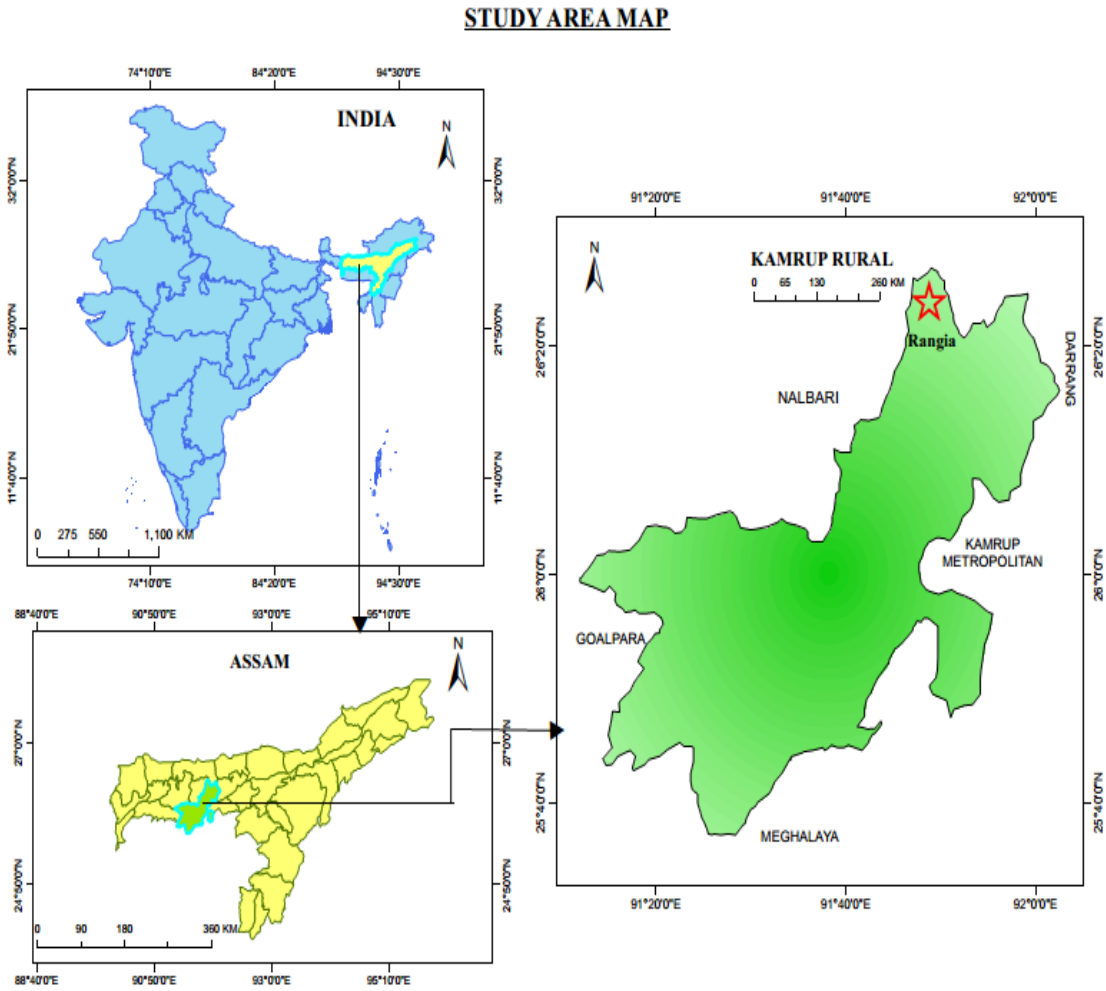

Figure 3. Map of the study area

Collection, identification and preservation of plants

Plant specimens and their medicinal parts were collected from the study area during the field survey. These samples were tagged with their local names in the field. The plant species were confirmed with the help of the local elders. The scientific names of collected plant specimens were identified following the Flora of Assam (Kanjilal *et al*. 1934-1940). The names were further updated after verification from the online website of World Flora Online (WFO 2023).

Analysis of data

The data collected through questionnaires and personal interviews about respondents and ethnomedicinal plants were analyzed using various quantitative indices like Use value (UV), Informant Consensus Factor (ICF), and Family Importance Value (FIV).

Use Value (UV)

Use value shows the relative importance of plant species by considering the number of use reports mentioned by indigenous inhabitants of the study area. It is calculated using the use-value formula:

$$UV = UVi/Ni$$

Where "UVi" is the frequency of citations for species through all respondents and "Ni" number of respondents (Vitalini *et al*. 2013).

Informant Consensus Factor (ICF)

The informant consensus factor was used to evaluate the consent of respondents about the use of plant species for curing various ailment categories.

$$ICF = Nur\text{-}Nt/Nur\text{-}1$$

Nur= number of use reports from informers for a disease category treated by plant species
Nt= total number of plant taxa used for a particular disease category
The ICF value ranges from 0 and 1. Where 1 represents the highest value of respondents and 0 indicates the lowest value (Heinrich *et al*. 1998).

Family Importance Value (FIV)

Family Importance Value (FIV) was used to determine the relative importance of families. It was calculated by taking the percentage of informants mentioning the family.

$$FIV = FC\ (family)/N \times 100$$

Where, FC is the number of informers revealing the family, while Nis is the total number of informants participated in the research (Heinrich *et al*. 1998).

Results and Discussion

A total of 60 plant species belonging to 42 families are recorded to treat various diseases in the selected study area (Table 2).

Diversity of the Medicinal Flora

A total of 60 medicinal plant species were identified to manage diverse human and livestock ailments in the study area. Leaves were the most common plant part used in remedy preparations, secondly, the fruit was followed by other parts like whole plants, bark, roots, latex, stem, seed, and flowers as shown in (Figure 4). Traditional people have a wealth of traditional knowledge of basic healthcare requirements (Brahma & Baruah 2023). Present study line with earlier ethnobotanical investigations was carried out (Bekele *et al*. 2022, Bhatia *et al*. 2014, Bibi *et al*. 2022, Daimary *et al*. 2019, Das & Saikia 2001, Mao *et al*. 2009).

The plant species were documented with their scientific name, voucher number, local name, family, parts used, preparation method, and disease cured are presented. In terms of use value (UV), frequency of citation (FC), and relative frequency of citation (RFC), informant consensus factor (ICF) and family importance value (FIV) analysis are done (Table 3), (Table 4), (Table 5).

Table 2. List of medicinal plants used by the ethnic communities of Rangia, Kamrup, Assam

Species	Family	Local name	Parts used	Preparation method	Disease cured
Justicia adhatoda L. Coll no. 61	Acanthaceae	Bahaka-tita (A)	Leaf	The Leaf extract is mixed with honey	Cold, cough
Acorus calamus L. Coll no. 15	Acoraceae	Bosh gos (A)	Roots	Rhizome is crushed and the juice is consumed	Irregular menstrual cycle
Amaranthus spinosus L. Coll no. 8	Amaranthaceae	Kata khutura (A)	Leaf	Leaves are boiled without salt	Jaundice, diarrhea, anemia
Mangifera indica L. Coll no. 77	Anacardiaceae	Aam, taijou (A/B)	Leaf	Juice is prepared from leaf and consumed	Gastric problems, ulcers and diarrhea
Monoon longifolium (Sonn.) B.Xue & R.M.K.Saunders Coll no. 96	Annonaceae	Debodaru (A/B)	Bark	Paste of bark	Menstruation discomfort
Centella asiatica (L.) Urb. Coll no. 33	Apiaceae	Dangor manimuni (A)	Leaf	Leaf is cooked or the fresh leaf are ground and taken orally.	Stomach pain, digestive problems
Daucus carota L. Coll no. 47	Apiaceae	Gajor (A)	Roots	Peeled roots are applied in the infected parts	Burnt
Catharanthus roseus L. Coll no. 31	Apocynaceae	Nayantora (A)	Leaf	Leaf paste is directly applied to the forehead	Headache
Colocasia esculenta (L.) Schott. Coll no. 35	Araceae	Kosu/thaso (A/B)	Petiole	Petiole is heated and the juice is given	Minor cuts
Enydra fluctuans Lour. Coll no. 44	Asteraceae	Helechi (A)	Leaf	Paste of leaf is consumed	Ringworm
Spilanthes acmella Wall. ex DC. Coll no. 82	Asteraceae	Jari (A)	Flower	The flower is consumed raw	Tongue disease, toothache
Bombax ceiba L. Coll no. 3	Bombacaceae	Simalu (A)	Leaf, flower, seed	Leaf juice is consumed, and the seed is used	Diarrhea, worm, weakness, liver and stomach troubles
Carica papaya L. Coll no. 9	Caricaceae	Omita (A)	Latex	Latex is mixed with khor part, and the fruit is smashed, the prepared paste is applied to the face	Ringworm infection, pimples
Drymaria cordata (L.)Willd. ex Schult. Coll no. 60	Caryophyllaceae	Laijabri (A)	Whole plant	It is cooked and consumed	Insect bites, stomach problems
Chenopodium album L. Coll no. 40	Chenopodiaceae	Buthua (A)	Leaf	Fresh juice of leaf is consumed	Common worm
Garcinia cowa Roxb. Coll no. 50	Clusiaceae	Kujithekera(A)	Fruits	Dried fruits are mixed with water	Control high blood pressure

Terminalia arjuna (Roxb. ex DC.) Wight & Arn. Coll no. 80	Combretaceae	Arjun (A/B)	Bark	Bark is mixed with little milk and boiled	Heart disease
Terminalia chebula Retz. Coll no. 65	Combretaceae	Silikha (B/A)	Fruits	unripe and ripe fruit are eaten raw	Loss of appetite, jaundice
Bryophyllum pinnatum (Lam.) Oken. Coll no. 31	Crassulaceae	Pategoja (A)	Leaf	Leaf extract	Kidney stone and constipation
Momordica charantia L. Coll no. 79	Cucurbitaceae	Titakerela (A)	Leaf	Juice of the leaf	Menstruation irregularities
Dillenia pentagyna Roxb. Coll no. 52	Dilleniaceae	Thaigir,ow tenga (B/A)	Bark, fruit	Barks are extracted and mix with water	Body inflammation
Emblica officinalis Gaertn. Coll no. 43	Euphorbiaceae	Amlokhi (A)	Fruits	Paste is prepared from fruit and applied	Wrinkled skin
Euphorbia milii var. *splendens* Coll no. 48	Euphorbiaceae	Sijou (B)	Branches	The branches are crushed, and a paste is applied	Boils
Caesalpinia bonduc (L.) Roxb. Coll no. 7	Fabaceae	Letaguti (A)	Fruit	Fruits are grounded and prepared as juice	Pneumonia, Gastritis
Cassia fistula L. Coll no. 23	Fabaceae	Sonaru (A)	Leaf and bark	The paste of the leaves and bark is ground, and both the paste is mixed with oil.	Insect bites, pustules
Clitoria ternatea L. Coll no. 27	Fabaceae	Aparajita (A)	Flower	Flower is boiled and consumed	Improves heart and brain health.
Trigonella foenum-graecum L. Coll no. 55	Fabaceae	Methi guti (A)	Seed	Seed is grinded and mixed with milk	Uterus infection
Hypericum japonicum Thunb. Coll no. 56	Hypericaceae	Sonaphuli (A)	whole shoot	Cooked and consumed	Fever, cough and cold
Clerodendrum infortunatum L. Coll no. 15	Lamiaceae	Lwkhwna,dhopati tita (B/A)	Leaf and roots	Fresh leaf or the extracted juice from roots is consumed directly	Diarrhea
Leucas aspera (willd.) Link Coll no. 68	Lamiaceae	Dharamphul (A)	Flower	Paste of flower is directly mix with water	Stops bleeding in nose
Mentha arvensis L. Coll no. 88	Lamiaceae	Khudwna (B)	Leaf	Leaves are put in water for few hours and the decanted extract is given	Jaundice
Mentha viridis L. Coll no. 85	Lamiaceae	Pudina (B/A)	Leaf, stem	Fresh or dried leaves and stem are consumed	Acidity and stomach problem

Ocimum sanctum L. Coll no. 71	Lamiaceae	Tulshi,Thulumsi (A/B)	Leaf	Leaf juice is mixed with honey	Cough, eye disease
Cinnamomum tamala (Buch.-Ham.) Coll no. 19	Lauraceae	Tejpat (A)	Leaf, bark	Leaf and bark is cooked and consumed	Diarrhea
Allium sativum L. Coll no. 12	Liliaceae	Rasun (A)	Leaf	Bulb paste combined with moderately heated mustard oil	Reduces body ache
Aloe barbadensis Mill. Coll no. 5	Liliaceae	Aloe vera (A/B)	Leaf	The leaves are crushed, and the paste is applied	Pimples
Hibiscus rosa sinensis L. Coll no. 63	Malvaceae	Joba (A)	Flower	The paste of flower is applied on cuts and wounds	Cuts and wounds, irregular menstruation troubles
Melastoma malabathricum L. Coll no.83	Melastomataceae	Thingkhu bergao (B)	Stem	Paste of stem is used	Toothache
Azadirachta indica A. Juss. Coll no. 26	Meliaceae	Neem (A/B)	Leaf, bark	Leaves are cooked or applied directly	chicken pox, skin disease, malaria
Tinospora cordifolia (Willd.) Miers ex Hook.f. & Thomson Coll no. 49	Menispermaceae	Amorlota (A)	Leaf, stem	Leaves and stem are boiled and consumed	Diarrhea, dysentery
Artocarpus heterophyllus Lam. Coll no. 1	Moraceae	Kathal (A)	Bark	Paste of bark	Breast wounds or infection
Moringa oleifera Lam. Coll no. 66	Moringaceae	Sojina (A)	Leaf	Fresh leaves are grounded and prepared as juice	Reduce menstrual pain
Nyctanthes arbor-tristis L. Coll no. 73	Oleaceae	Sewali (A)	Leaf	Leaf paste	Liver, fever
Averrhoa carambola L. Coll no .20	Oxalidaceae	Kordoitenga, Khwrdwi (A/B)	Fruits	Fruits are consumed raw	Dysentery, Diarrhea
Oxalis corniculata L. Coll no. 95	Oxalidaceae	Singrimwkhwi (B)	Leaf	Raw or cooked leaf extract	Dysentery, high blood pressure
Houttuynia cordata Thunb. Coll no. 75	Piperaceae	Machandari(A)	Whole plant	It is mixed with *Centella asiatica* and a little salt is given	Flatulence, dysentery
Piper betel L. Coll no. 81	Piperaceae	Pan, phathwi (A/B)	Leaf	The leaves are ground and juice obtained by it is applied on head	Head pediculosis
Bambusa balcooa Roxb. Coll no. 4	Poaceae	Bholuka bah (A)	Leaf, stem	The paste of stem and leaf are mixed with honey	Menstruation pain

Cynodon dactylon L. Coll no. 40	Poaceae	Dubori bon (A)	Whole plant	Whole plant is grounded and as a juice it is consumed	To stop excess bleeding during menstruation
Hedyotis corymbosa (L.) Lam. Coll no. 52	Rubiaceae	Bon-jaluk, deushriatheng (A/B)	Leaf	Leaf paste is directly applied on the infected portion	Boils
Paederia foetida L. Coll no. 90	Rubiaceae	Bhedali lota (A)	Leaf	Leaf extract	Diarrhea, dysentery
Aegle marmelos (L.) Cor Coll no. 18	Rutaceae	Bel (A)	Fruit	The leaves and few *Piper nigrum* fruits are mashed, and the mixture is put on the boils	Piles, boils, stomach problems
Citrus lemon L. Burm. Coll no. 10	Rutaceae	Golnemu (A/B)	Fruits	The juice extract is applied directly	Pimples
Murraya koenigii (L.) Spreng. Coll no. 91	Rutaceae	Narasingha/ Nwrsingh (A/B)	Leaf	Raw or cooked leaf	indigestion
Bacopa monnieri (L.) Wettst. Coll no. 23	Scrophulariaceae	Brahmi (A)	Leaf	Cooked and consumed	Memory enhancer
Datura metel L. Coll no. 41	Solanaceae	Dhatura (A)	Leaf, roots	Leaves are boiled and mixed with coconut oil	Pain and swelling, dandruff problem
Lycopersicon esculentum Mill. Coll no. 59	Solanaceae	Bilahi (A)	Fruits	The extracted juice is combined with coconut oil and applied	Scabies
Aquilaria agallocha Roxb. Coll no. 11	Thymelaeaceae	Agaru (A)	Whole plant	Plant oil extraction is used as ointment	Skin infection
Curcuma longa L. Coll no. 32	Zingiberaceae	Haladhi (A)	Roots	Crushed roots is applied to the infected portion	Ringworm infection
Zingiber officinale Roscoe Coll no. 51	Zingiberaceae	Aada (A/B)	Rhizomes	Rhizome juice mixed with honey	Cough

Abbreviations used: Assamese (A), Bodo (B)

Use Value (UV)

It is found that the use value ranges from 0.56 to 9.98 (Table 3). Use value (UV) is an index widely used to quantify the relative importance of useful plants (Zenderland *et al*. 2019)**.** Plants with low UVs suggest that the locals are unaware of their benefits (Amjad *et al*. 2020). A total of 34 medicinal plants viz. *Aegle marmelos* (L.) Cor, *Allium sativum* L., *Aloe barbadensis* Mill., *Amaranthus spinosus* L., *Azadirachta indica* A. Juss., *Bacopa monnieri* L., *Bryophyllum pinnatum* (Lam.) Oken., *Carica papaya* L., *Catharanthus roseus* L., *Centella asiatica* (L.) Urb., *Chenopodium album* L., *Cinnamomum tamala* (Buch.-Ham.), *Citrus limon* L. Burm., *Clitoria ternatea* L., *Curcuma longa* L., *Datura metel* L., *Daucus carota* L., *Dillenia pentagyna* Roxb., *Emblica officinalis* Gaertn., *Garcinia cowa* Roxb., *Hedyotis corymbosa* (L.) Lam., *Houttuynia cordata* Thunb., *Lycopersicon esculentum* Mill., *Mangifera indica* L., *Melastoma malabathricum* L., *Mentha viridis* L., *Momordica charantia* L., *Moringa oleifera* Lam., *Murraya koenigii* (L.) Spreng, *Nyctanthes arbor-tristis* L., *Ocimum sanctum* L., *Oxalis corniculata* L., *Paederia foetida* L., *Terminalia chebula* Retz., *Zingiber officinale* Roscoe., have high use value, greater than 0.90. The study proved that out of 60 medicinal plants, 5 plants have the lowest use value of <0.70 viz. *Aquilaria agallocha* Roxb., *Averrhoa carambola* L., *Bambusa balcoaa* Roxb., *Bombax ceiba* L., *Monoon longifolium* (Sonn.) B.Xue & R.M.K.Saunders and others have medium use values (Table 3). The UV of a species will may vary according on the usage, accessibility, and knowledge of the informant in a given area (Sukumaran *et al*. 2021). The low use value of some taxa could be related to their scarcity (Benz *et al*. 1994).

The medicinal plant species cited by most of the informants are shown in Table 3. From the result, it is denoted that 14 medicinal plant species have been cited by most of the informants. The mostly cited medicinal plants are *Allium sativum* L., *Aloe barbadensis* Mill., *Azadirachta indica* A. Juss., *Bacopa monnieri* L., *Bryophyllum pinnatum* (Lam.) Oken., *Carica papaya* L., *Centella asiatica* (L.) Urb., *Cinnamomum tamala* (Buch.-Ham.), *Citrus limon* L. Burm., *Curcuma longa* L., *Dillenia pentagyna* Roxb., *Mentha viridis* L., *Ocimum sanctum* L., *Terminalia chebula* Retz.

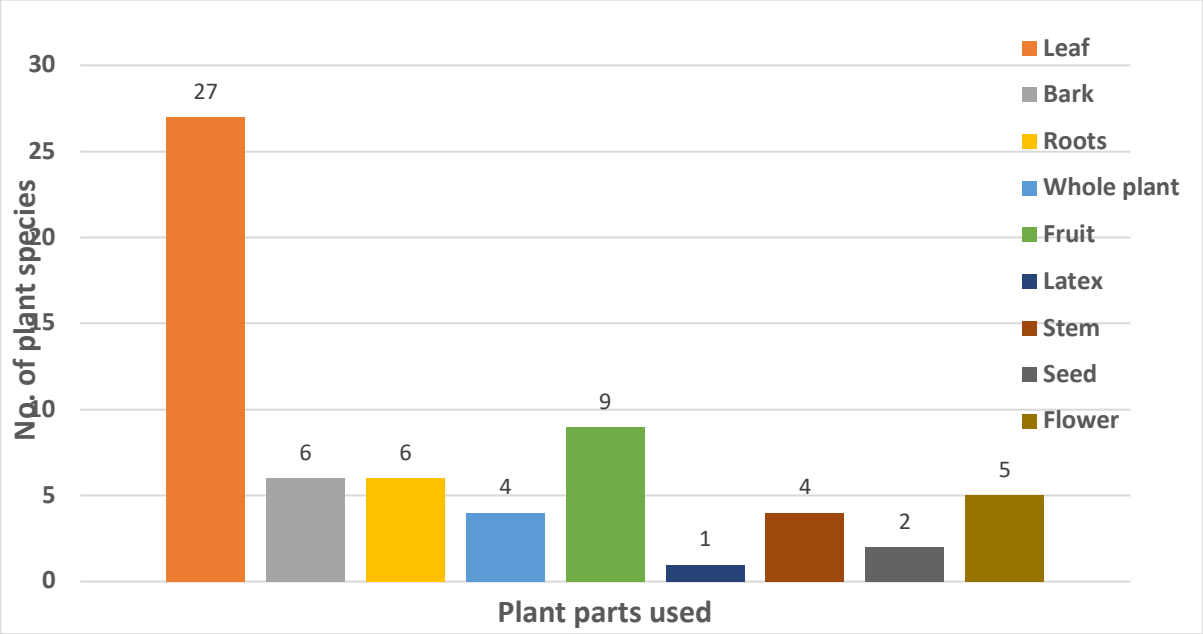

Figure 4. Number of plant species with their parts used

Table 3. Use value (UV) of the medicinal flora

Scientific name	No. of respondent (Ni)	Frequency of citation for species (Uvi)	Use value (UV)
Acorus calamus L.	26	23	0.88
Aegle marmelos (L.) Cor	17	16	0.94
Allium sativum L.	41	40	0.98
Aloe barbadensis Mill.	43	40	0.93
Amaranthus spinosus L.	35	32	0.91
Aquilaria malaccensis Roxb.	10	6	0.60
Artocarpus heterophyllus Lam.	15	11	0.73
Averrhoa carambola L.	9	5	0.56

Azadirachta indica A. Juss.	43	42	0.98
Bacopa monnieri L.	42	41	0.98
Bambusa balcooa Roxb.	6	4	0.67
Bombax ceiba L.	7	4	0.57
Bryophyllum pinnatum (Lam.) Oken.	43	41	0.95
Caesalpinia bonducella (L.) Flem	12	10	0.83
Carica papaya L.	42	40	0.95
Cassia fistula L.	17	15	0.88
Catharanthus roseus L.	35	33	0.94
Centella asiatica (L.) Urb.	43	41	0.95
Chenopodium album L.	29	26	0.90
Cinnamomum tamala (Buch.-Ham.)	42	41	0.98
Citrus limon (L.) Burm.	43	40	0.93
Clerodendrum infortunatum L.	29	25	0.86
Clitoria ternatea L.	33	30	0.91
Colocasia esculenta (L.) Schott.	30	25	0.83
Curcuma longa L.	43	40	0.93
Cynodon dactylon L.	14	11	0.79
Datura metel L.	10	9	0.90
Daucus carota L.	41	38	0.93
Dillenia pentagyna Roxb.	42	41	0.98
Drymaria cordata (L.) Willd. ex Schult.	15	11	0.73
Emblica officinalis Gaertn.	37	35	0.95
Enydra fluctuans Lour.	33	27	0.82
Euphorbia milii var. *splendens*	13	11	0.85
Garcinia cowa Roxb.	23	21	0.91
Hedyotis corymbosa (L.) Lam.	39	36	0.92
Hibiscus rosa sinensis L.	31	27	0.87
Houttuynia cordata Thunb.	33	31	0.94
Hypericum japonicum Thunb.	23	18	0.78
Justicia adhatoda L.	22	18	0.82
Leucas aspera (willd.) Link	23	20	0.87
Lycopersicon esculentum Mill.	34	32	0.94
Mangifera indica L.	39	36	0.92
Melastoma malabathricum L.	29	27	0.93
Mentha arvensis L.	24	21	0.88
Mentha viridis L.	43	42	0.98
Momordica charantia L.	34	31	0.91
Monoon longifolium (Sonn.) B.Xue & R.M.K.Saunders	5	3	0.60
Moringa oleifera Lam.	38	35	0.92
Murraya koenigii (L.) Spreng	40	39	0.98
Nyctanthes arbor-tristis L.	37	35	0.95
Ocimum sanctum L.	43	42	0.98
Oxalis corniculata L.	39	36	0.92
Paederia foetida L.	40	36	0.90
Piper betel Blanco.	37	31	0.84
Spilanthes paniculata Wall. ex DC.	9	7	0.78
Terminalia arjuna (Roxb. ex DC.) Wight & Arn.	25	22	0.88
Terminalia chebula Retz.	43	42	0.98
Tinopora cordifolia (willd) Miers	22	17	0.77
Trigonella foenum-graecum Linn.	21	17	0.81
Zingiber officinale Roscoe.	42	39	0.93

ICF Value

During the current survey, 37 different disorders are reported, and 60 medicinal herbs are used to cure them (Table 4). Results showed that the informant consensus factor (ICF) values ranged from 0.9 to 0.95 for the disease categories (Table 4). Of the categorized diseases, anemia, body aches, body inflammation, headache, boils and burnt, chicken pox, skin disease and pimples, cold, cough and fever, common worm and stomach problem, cuts and wounds, dandruff problem, dysentery, diarrhea and typhoid, digestive problems, kidney stone and constipation, excess menstrual bleeding, irregular menstrual cycle and menstrual pain, eye disease, gastritis ulcers, high blood pressure and piles, insect bites, Jaundice and malaria, nose bleeding, pain and swelling, ringworm infection, tongue disease and toothache out of this boils and burnt, chicken pox, skin disease and pimples, dandruff problem, common worm and stomach problem, cold, cough and fever, body ache, body inflammation and headache has highest ICF value, 0.95, 0.92, 0.92, 0.89, 0.88, 0.84 respectively (Table 4).

Table 4. Informant Consensus Factor (ICF) value of medicinal plants used for treatment of various diseases.

Disease categories	Nt (Number of species used for the ailment)	Nur (Number of use citations for each ailment)	ICF (Informant Consensus Factor)
Anaemia	5	7	0.33
Body ache, body inflammation and headache	9	53	0.84
Boils and burnt	4	61	0.95
chicken pox, skin disease and pimples	6	71	0.92
Cold, cough and fever	6	44	0.88
Common worm and stomach problem	8	66	0.89
Cuts and wounds	5	33	0.75
Dandruff problem	3	29	0.92
Dysentery, diarrhea and typhoid	11	19	0.44
Digestive problems, kidney stone and constipation	2	11	0.9
Excess menstrual bleeding, Irregular menstrual cycle and menstrual pain	7	27	0.75
Eye disease	2	8	0.14
Gastritis ulcers	3	11	0.8
High blood pressure and piles	3	17	0.75
Insect bites	2	31	0.66
Jaundice and malaria	4	39	0.57
Nose bleeding, pain and swelling	2	25	0.33
Ringworm infection	3	23	0.9
Tongue disease and toothache	3	18	0.17

FIV Value

The maximum FIV value is recorded for the family Lamiaceae followed by Zingiberaceae, Araceae, Crassulaceae, Liliaceae, Euphorbiaceae, Cucurbitaceae, and Solanaceae as shown in Table 5 and Figure 5 respectively.

Table 5. Family importance value (FIV) of the medicinal flora

Family name	No. of species	FC (family)	FIV (Family Importance Value)
Acanthaceae	1	7	16.28
Amaranthaceae	1	26	60.47
Anacardiaceae	1	40	93.02
Acoraceae	1	22	51.16
Annonaceae	1	10	23.26
Apiaceae	2	38	88.37
Apocynaceae	1	37	86.05
Araceae	1	42	97.67
Asteraceae	2	39	90.70
Bombacaceae	1	21	48.84

Fabaceae	1	13	30.23
Caricaceae	1	36	83.72
Caryophyllaceae	1	35	81.40
Chenopodiaceae	1	40	93.02
Clusiaceae	1	26	60.47
Combretaceae	2	4	9.30
Crassulaceae	1	42	97.67
Cucurbitaceae	1	41	95.35
Dilleniaceae	1	33	76.74
Euphorbiaceae	2	41	95.35
Fabaceae	2	24	55.81
Hypericaceae	1	21	48.84
Lamiaceae	6	43	100.00
Lauraceae	1	40	93.02
Fabaceae	1	11	25.58
Liliaceae	2	42	97.67
Malvaceae	1	34	79.07
Melastomataceae	1	6	13.95
Meliaceae	1	37	86.05
Menispermaceae	1	16	37.21
Moraceae	1	39	90.70
Moringaceae	1	36	83.72
Oleaceae	1	29	67.44
Oxalidaceae	2	33	76.74
Piperaceae	2	35	81.40
Poaceae	2	27	62.79
Rubiaceae	3	40	93.02
Rutaceae	3	39	90.70
Scrophulariaceae	1	37	86.05
Solanaceae	2	41	95.35
Thymelaeaceae	1	22	51.16
Zingiberaceae	2	43	100.00

Similar medicinal plants are used elsewhere

The literature review of other ethnomedicinal studies revealed that some of the reported medicinal plants (MPs) in this study were also reported in other countries. For instance, *Amaranthus sativum* L. (Hedidi *et al*. 2024) is used by the indigenous people of Algeria for dry hair, eczema, and influenza, respectively. Similarly, *Chenopodium album* L. (Chenopodiaceae) is used as a laxative (Massoudi *et al*. 2018) and *A. spinosus is* used as a woman's menstrual disorder in Iran (Massoudi *et al*. 2018). Other MPs used as anti-constipation in other countries include *Tamarindus indica* L. (Fabaceae) used in Nigeria (Lockett & Grivetti 2000), India (Bhadoriya *et al*. 2011), and Madagascar (Norscia & Borgognini-Tarli 2006), *Zanthoxylum chalybeum* Engl. (Rutaceae) in Nigeria (Okagu *et al*. 2021), and *Solanum incanum* L. (Solanaceae) in Kenya (Mathiu *et al*. 2005). Likewise, *Melastoma malabathricum* (L.) Smith (Melastomataceae) is used in Bangladesh. A fresh leaf juice is used for the ulceration of the mouth reported in Punjab, Pakistan (Ali *et al*. 2020) to manage constipation. Leaves are eaten by hilly people in Assam and Meghalaya (Baruah *et al*. 2013).

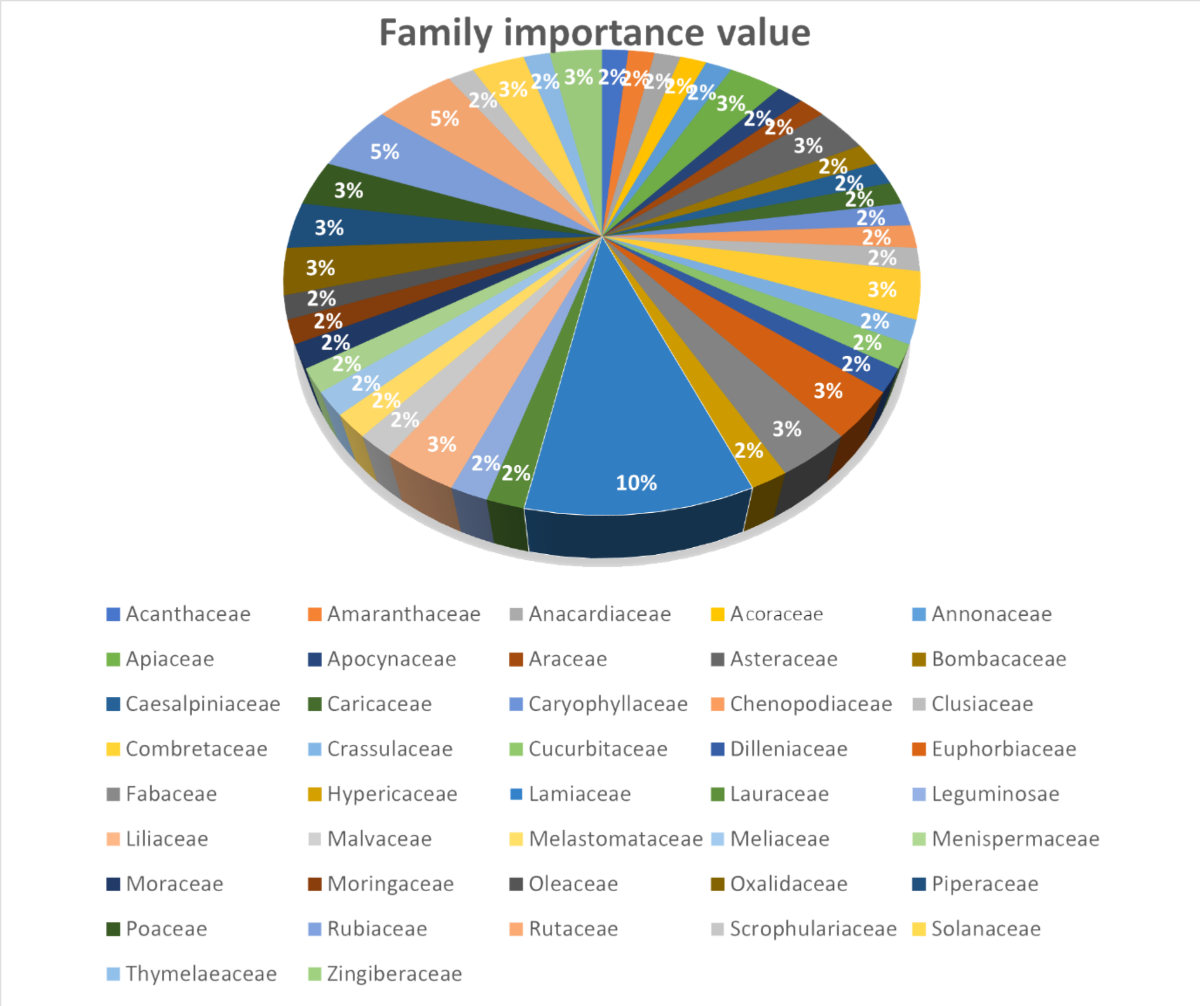

Figure 5. Pie chart representation of FIV (Family Importance Value)

Conclusion

The investigation of the traditional knowledge of ethnic groups using various plants to heal ailments is crucial and relevant at this time for society's long-term welfare. Protection, preservation and production of priceless medicinal plants are now opening up new opportunities in agriculture as well as in the field of ethnobotany. This is the first quantitative approach to the ethnomedicinal study of the ethnic communities of Rangia sub-division, Kamrup, Assam. The present study showed that 60 plant species belonging to 42 families are used to treat various diseases by the local inhabitants in the selected study area. People of that area still rely on medicinal herbs due to their low cost and accessibility. Further research into the ethnobotanical elements of the region will give valuable avenues for the promotion of traditional herbal therapeutic practices as well as scientific confirmation. Furthermore, species with high use values, (UV) may provide useful leads for future pharmaceutical research. This will assure income production, improved livelihoods, and ultimately the conservation of these species.

Declarations

Ethics approval and consent to participate: No informants from either local or indigenous communities were forced to respond without their free consent. All informants who voluntarily refused to participate in the study were excluded.

Consent for publication: All people shown in images gave their prior informed consent to have those images published.

Availability of data and materials: Not applicable

Competing interests: Not applicable

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Author contributions: **SB**, **PB** designed this study; **DB**, **SB** collected and analysed data and wrote the initial draft of the manuscript. **SB** and **PB** revised and edited the manuscript.

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