CHAPTER 5: STUDY ON USES OF MEDICINAL PLANTS AMONG A FEW SELECTED TRIBES

5.1 Introduction

The holistic scope of plant and man relationship can be understood through ethnobotanical studies. The ethnobotanical importance and its applications can be trace back since time immemorial in the history of human civilization and it was found that without the medicinal plants the good health in the past was also not possible. Ethnobotanically important plants are derived from biodiversity of the world which is considered as natural irreplaceable resource fulfilling many of the basic and secondary needs of the rural and urban communities. Biodiversity and indigenous cultural diversity of ethnic people have an inextricable link of social and symbiotic relationship that operates as a sensitive approach for the protection and conservation of biodiversity since ancient times while fulfilling the requirements in terms of food, medicine, firewood, etc. for livelihood. India is a country of varied geographical area ranging from alpine snow covered mountain to dense tropical forest, desert to deep water bodies, and diverse ethnic groups having independent linguistic, culture, customs, ritual and beliefs. Over 53.8 million tribal people inhabited in Indian subcontinent in 5,000 forest dominated villages of tribal community and comprising 15% of the total geographical area of Indian landmasses, representing one of the greatest emporia of ethno-botanical wealth [1]. India has immense wealth due to rich in biodiversity, Ministry of Environment and Forest had recorded 45,000 plant species, out of which 9,500

species are ethnobotanically important species. Of these, 7500 species are medicinal plants used for indigenous health practices. About 3,900 plant species are used by tribals as food, 525 species are used for fibre, 400 species are used as fodder, 300 species are used in preparation and extraction of chemicals which are used as naturally occurring insecticides and pesticides, 300 species are used for extraction of gum, resins, dyes and perfume [2].

About 70% of Indian population dwells in rural areas and many of them reside in the neighbourhood of forest and use various plant parts as food, medicines, and for many other purposes in their daily livelihood [3]. In fact, the livelihoods of the tribal people or ethnic communities are not just depending on forest resources but their socio-cultural, indigenous practices and ethnobotanical knowledge are intrinsically fabricated with the forest as a whole. Vast ethnobotanical knowledge is rooted with traditions of various communities of our country and they generally are the guardian of ethno-conservation. Conservation of nature and its resources are also largely based on reciprocal aid and traditional experiences of indigenous peoples thorough their customary knowledge and natural management system.

Indigenous healing practices have been culturally accepted during all phases of human culture and socio-environmental evolution. Traditional medicine is widely used and accounts for about 40% of all health care delivered [4]. It has been estimated that about 85% of worldwide traditional medicines are obtained from plant derived compounds [5]. Almost every section of Indian population use plants as medicine and altogether about 7,500

species of plants are being used by several ethnic communities. Particularly, tribal people collect and preserve locally available wild and cultivated plant species and used in their herbal medicinal practices to treat a variety of ailments and disorders. With enormously diversified ethnic groups and rich biological resources, India represents one of the great emporia of ethnobotanical wealth [6]. In developing countries, there is an increasing attempt to incorporate traditional medicines, especially herbal preparations in the local health care systems and many modern researchers are involved today to explore the huge potential of ethnobotanical knowledge for treating various diseases [7, 8-10] However, the ethnomedicinal plants are under threat due to deforestation, overgrazing and their reckless utilization and their conservation is the need of the hour [11]. Another issue is several ethnobotanically important species are loss from their habitat before being systematically documented. This matter becomes a serious concern when the ethnobotanical knowledge is available in oral traditional form, from generation to generation in some indigenous communities.

Ethnobotanical studies with reference to uses on medicinal plants by different tribal communities were conducted from various places of Assam by different researchers [12-30]. Though there are observations that several communities used numbers of plants for preparation of herbal medicines but on record the report on ethnobotanical values in Sonitpur district is very limited. Therefore, an attempt has been made to study the ethnobotanical knowledge of Munda, Garo and Mishing communities of the Sonitpur district.

5.2 Study on Munda community

5.2.1 Study area

The ethnobotanical survey of medicinal plants for human was carried out in three selected large Munda villages of Sonitpur district of Assam (Figure 5.1) viz. Hokoma Mura Basti, Dikorai Tea Estate and Napaam. These three villages have been selected on the basis of the presence of Munda community. Hokoma Mura Basti (152 Households) and Dekorai Tea Estate (171 Households) is exclusively Munda village while Napaam (121 Households) has adequate inhabitants of Munda community.

5.2.2 About Munda Community

Munda is a less known tribal community from Southeast Asia and belongs to the Austro- Austric family. It probably had its origin in South China [31, 32]. There are evidences that they also were in the Pre- British times. Munda tribe mainly inhabit the region of Jharkhand, however they are populated in the various corners of the country like West Bengal, Chhattisgarh, Odisha, Bihar and Assam. The Munda word signifies generally as headman of the village. They have gained a lot of admiration between 1857 and 1928 by the anthropologists. Today Munda tribe has a population of around two million in the country and their mother language is Menderi. They are basically Hindu and some are Christian by religious. Mage, Phagu, Karam, Sarhul, and Sohrai are the few festivals celebrated among the Munda tribes. In India total population of Munda is about 19,18,218 [33].

5.2.3 Result

For the ethnomedicinal study a total of 87 individuals (53 male; 33 female) were interviewed using semi-structured questionnaire to document the knowledge available at different age groups viz. 32 - 45 years (5 individuals); 46 - 55 years (22 individuals); 56-65 years (39 individuals); 66-75 years (14 individuals) and 76- 84 years (7 individuals). The study records a total number of 27 plant species belonging to 27 genera under 26 families for the treatment of health problems of human (Table 5.1). This includes climbers (5 species, 5 genera and 5 families); herbs (8 species, 8 genera and 8 families); shrubs (6 species under 6 genera and 5 families) and trees (8 species, 8 genera and 8 families). Herbs and trees comprises of 30% each, 22% shrubs and 18% climbers. The percentage of total recorded species used against different ailments by this community is also recorded. It has been found that the species were used against about 13 different ailments. Majority of the species were used against stomach disorder (22%), followed by fever (15%) and joint pains (11%). About 7% of the species are used for the treatment of gynaecological problems, bleedings and cough each. About 4% of the species are used for the treatment of diabetes, anaemia, anti-inflammatory, fracture and neurological tonic (Figure 5.2). The different plant parts used for the treatment of various human ailments/diseases are also recorded during the study. Among the plant parts, leaves (29%) is extensively used for the preparation of medicines followed by fruit (17%), whole plant (15%), root (12%), bark (9%), rhizome (6%), stem(6%), flower(3%) and seed (3%) (Figure 5.3). Majority of the prepared medicine are administrated orally (72%) and about 18 % are used externally. Largely medicine are prepared as boiled decoctions of leaves and other parts as well and extracted with

muslin cloths then administered for treatment of ailments. For external uses fresh juice of used parts are administrated locally and pastes are also seen to use by the community.

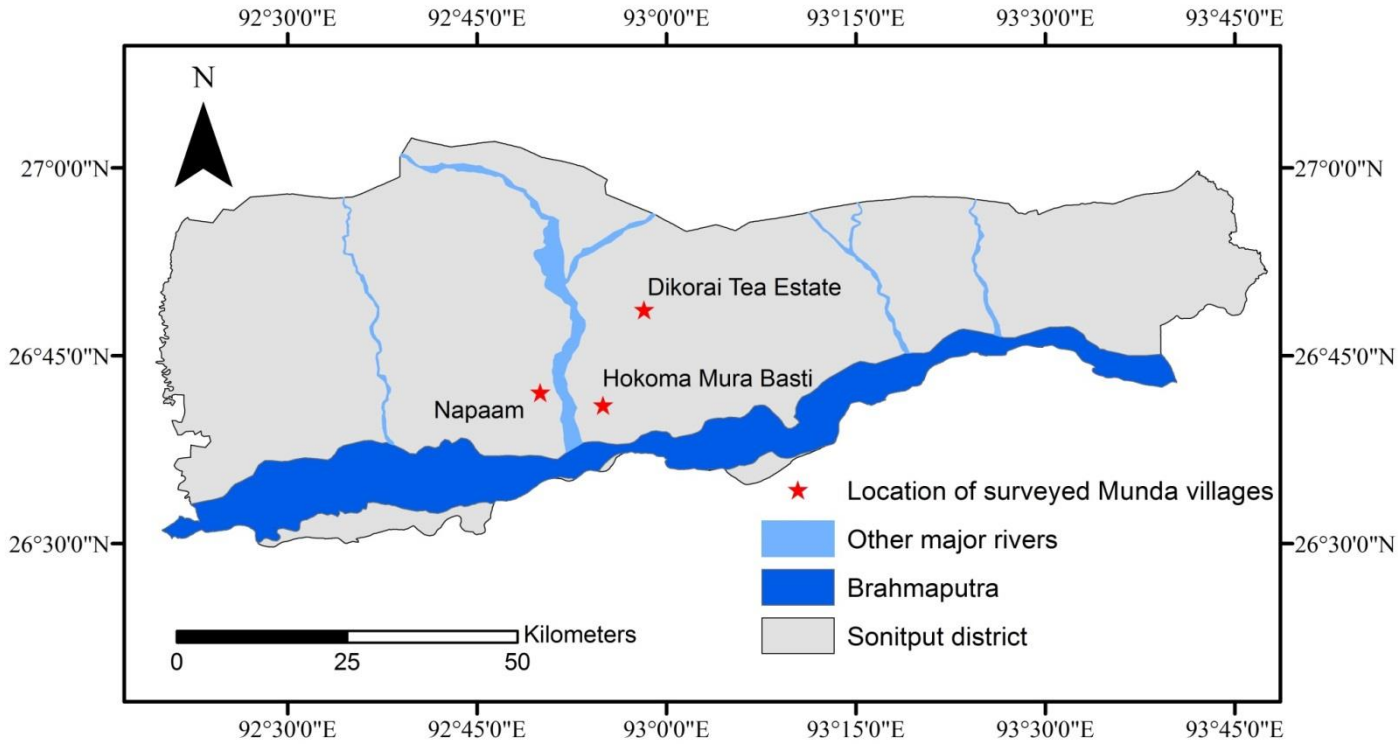

Figure 5.1: Location map of surveyed villages of Munda community.

Table 5.1. List of medicinal plants used by *Munda* community for human care [Abbreviations used: E = External; I = Internal; T: Tree; CL: Climber; H: Herb; SH: Shrub; WP: Whole Plant; FR: Fruit; BR: Bark; LF: Leaf; FL: Flower; RT: Root]

Sl. No	Botanical name	Vern name (Munderi)	Family	Ailments/ Diseases	Life form	Part used	Mode of preparation/ Dose/ Administration (E/I)
1.	*Abelmoschus moschatus* Medic.	Bonvendi	Malvaceae	Constipation	SH	FR	I: Fruit boiled for 5-10 mins. and used orally.
2.	*Aegle marmelos* (L.) Correa	Belidaru	Rutaceae	Diabetes	T	LF	I: Leafs and inner part of the fruits boiled in water and the juice after filtration used daily 2-3 times.
3.	*Albizia procera* (Roxb.) Benth.	Laimurghatdaru	Mimosaceae	Anti-inflammatory	T	BR	E: Small portion of bark boiled for ½ hour and applied locally.
4.	*Andrographis paniculata* (Burm. f)	Sirata	Acanthaceae	Various stomach	H	LF	I: Fresh green leaves boiled in water and the extract used in

	Nees			disorder			empty stomach.
5.	*Averrhoa carambola* L.	Kordoi	Averrhoaceae	Digestive, tonic, cough, and revitalizing	T	FR	I: Ripen fruits boiled in water with a little black salt and the juice used orally, fruits also roast in fire and applied directly for cough.
6.	*Azadirachta indica* A. Juss	Nimpata	Meliaceae	Fever	T	LF	E: Fresh tender leaf paste prepared and used in the forehead to control the fever.
7.	*Bacopa monnieri* (L.) Penn.	Brahmi	Scrophulariaceae	Nerve tonic	H	WP	I: Whole plant simply boiled for 10-15 mins. and after proper filtering used orally.
8.	*Calotropis gigantean* (L.) Dryand.	Aakanu/ Aakon	Apocynaceae	Muscle Pain/joint	SH	LF	E: Matured leafs are boiled with a little salt and after 5

				pain			mins. the particular portion of the body covered with the boiled leaves.
9.	*Centella asiatica* (L.) Urb.	Manimuni	Apiaceae	Stomach pain/dysentery	H	WP	I: Whole plant simply boiled for 10-15 mins. and after proper filtering used orally. Also juice of the whole plant used in the empty stomach.
10.	*Cissus quadrangularis* L.	Harjora lota	Vitaceae	Broken bones	CL	WP	E: The broken part of the body is tightly covered with the plant for a period of 7-12 days depending upon the fracture.
11.	*Clerodendron indicum* (L.)Kuntze	Mulgadaru	Verbenaceae	Jaundice, cough, skin disease	SH	BR	I: Small part of bark boiled and after filtration used orally.

12.	*Cucurbita maxima* Duch.	Ronga lau	Cucurbiraceae	Reduce Labour pain	CL	ST	I: Tender leaf and stem boiled with a little salt and used the juice.
13.	*Curculigo orchioides* Gaerten.	Talmuli	Hypoxidaceae	Joint pain	H	RT	I: Small amount of root 1-2 piece are boiled in ½ Litre of water and after cooling used orally.
14.	*Cuscuta reflexa* Roxb.	Amarbel	Cuscutaceae	Against blood pressure	CL	ST	I: Stems (50 gm) boiled in 1 Litre water and the refined juice drinks.
15.	*Dioscoria bulbifera* L.	Chalsanga	Dioscoriaceae	Viral fever	CL	RH	I: Rhizomes are boiled and after cooling it consumes directly or with rice.
16.	*Elephantopus scaber* L.	Bonpan	Asteraceae	Rheumatic pain	H	LF	I: Tender leaf boiled and used the juice.

17.	*Ficus racemosa* L.	Dumur	Moraceae	Anaemia	T	FR	I: Ripen fruit boiled with a little salt and used the juice.
18.	*Leucas aspera* (Willd.)Link	Dorun	Lamiaceae	Sinus, nose bleeding	H	LF	I: Green leaves are grind and the fresh juices are applied (2-3 drop) in the effected nose to open and relief from sinus.
19.	*Mangifera indica* L.	Aam	Anacardiaceae	Jaundice	T	BR	I: Bark boiled with a little black salt and black piper and the juice are consumed (1-2 spoon) daily twice.
20.	*Ocimum basilicum* L.	Kala Tulsi	Lamiaceae	Cough / Prevent bleeding	H	LF	I: Tender leaf and stem boiled and used the juice. Green leaf juice also used orally.
21.	*Oroxylum indicum* (L.) Kurz	Taklu goch	Bignoniaceae	Jaundice	T	FR	I: Tender fruit bark decoction is used in a very small amount.

22.	*Scoparia dulcis* L.	Mitha pat	Plantaginaceae	Diarrhoea	H	LF	I: Tender green leaves are consumed directly.
23.	*Solanum indicum* L.	Nagboll	Solanaceae	Fever	SH	RT	I: 1-2 piece of root are boiled in water and the refined juice are used.
24.	*Solanum melongena* L.	Bengun	Solanaceae	Labour pain	SH	FL	I: Eaten as raw and as vegetable.
25.	*Tagetes patula* L.	Gendai	Asteraceae	Prevent bleeding	SH	LF	E: The leaf juice is directly used to control bleeding and wounds healing.
26.	*Tamarindus indica* L.	Tintul	Caesalpiniaceae	Help in digestion	T	FR	I: Fruit used directly.
27.	*Tinospora cordifolia* (Willd.)Miers.	Gurach	Manispermaceae	Fever	CL	RT	I: Root at first dried in sunlight and then boiled in water to extract juice and used orally.

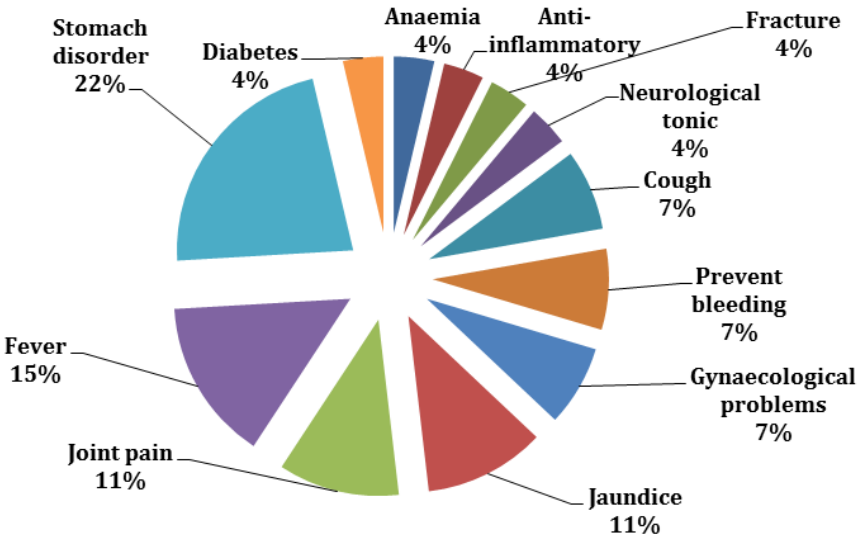

Figure 5.2: Percentage of species used for treatment of human health ailments.

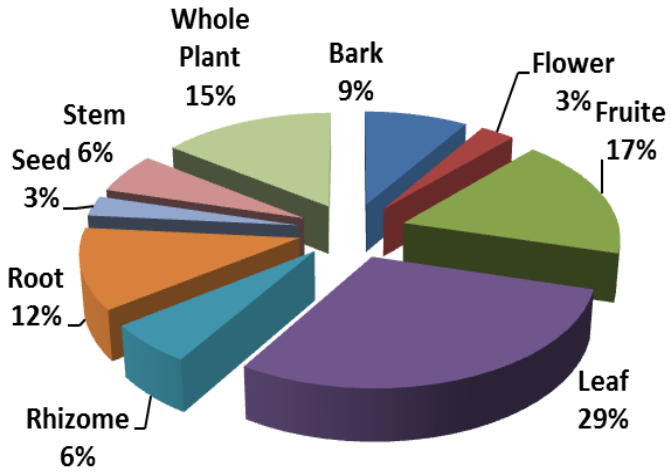

Figure 5.3: Percentage of different plant parts used for treatment of human health ailments.

5.2.4 FIC and FL values

The Information Consensus Factor (FIC) and Fidelity Level (FL) values are also calculated to understand the importance of the medicinal plants and their impacts on the Munda community.

For FIC a total 15 different major ailments are recorded based on survey and total number of 54 individuals was interviewed for the same. Among them maximum used report was counted for the treatment of diarrhoea which is 43. Followed by fracture (38) and cough (33), where lowest use report was recorded for labour pain (3) [Table 5.2].

To understand the Fidelity Level (FL) a special survey was conducted where 54 respondent's inputs were analysed. Eight different plant species that are used against eight different ailments are recorded. Highest used report (49) was recorded against *Cissus quadrangularis* L. for fracture and *Ocimum basilicum* L. for cough, while lowest used report (17) was recorded for *Oroxylum indicum* (L.) Kurz against jaundice [Table 5.3].

Table 5.2 : FIC values against some important health ailments/diseases.

Use categories	Number of Taxa *(N_t)*	Number of use report *(N_{ur})*	Information Consensus Factor (FIC)
Reduce labour pain	2	3	0.50
Body pain	4	18	0.82
Diarrhoea	6	43	0.88
Fever	4	27	0.88
Nerve tonic	2	16	0.93
Jaundice	3	32	0.94
Cough	2	33	0.97
Anaemia	1	23	1.00
Anti-inflammatory	1	12	1.00

Blood pressure	1	7	1.00
Constipation	1	25	1.00
Diabetes	1	21	1.00
Fracture	1	38	1.00
Nose bleeding	1	12	1.00
Snake bite	1	7	1.00

Table 5.3: Table showing FL values against some used reports on ailments/diseases.

Botanical name	Report against particular ailments	Use report (N_p)	No. of total respondents (N)	Fidelity level (FL) (%)
Cissus quadrangularis L.	Fracture	49	54	90.74
Ocimum basilicum L.	Cough	49	54	90.74
Cuscuta reflexa Roxb.	High Blood Pressure	47	54	87.04
Cynodon dactylon (L.) Pers.	Anti-Inflammatory	44	54	81.48
Aegle marmelos (L.) Correa	Diabetes	42	54	77.78
Centella asiatica (L.) Urb.	Diarrhoea	38	54	70.37
Leucas aspera (Willd.)Link	Sinus	22	54	40.74
Oroxylum indicum (L.) Kurz	Jaundice	17	54	31.48

5.2.5 Discussion

Results reveals that majority of the plant species used for treatment of human health problems are herbs and trees (30% each), followed by shrubs (22%) and

climbers (18%). During the field survey it has been recorded that majority of diseases are treated with medicine prepared from leaves (29%) where seed and flower shows lowest utilization (3%). From the present study it has been observed that numbers of plant species are associated with the healing of stomach problems like *Andrographis paniculata, Averrhoa carambola, Centella asiatica*. While, *Elephantopus scaber, Curculigo orchioides, Calotropis gigantea* etc. are used against the body pain. While analysis respondents information's it has been observed that male villagers have strong knowledge of herbal medicine and their utilization than females. It has also been noticed that the youths or younger generation did not inherent the indigenous knowledge preserved by their parents and forefathers and they are reluctant or lack of knowledge to share the information's.

From FIC values illness like, anaemia, anti-inflammatory, blood pressure (high), constipation, diabetes, fracture, nose bleeding and snake bite has maximum FIC values i.e. 1 while reduce labour pain shows lowest FIC value i.e. 0.50 (Table 5.2). *Cissus quadrangularis* L. and *Ocimum basilicum* L. showed maximum FL values (90.74 % each) for healing against fracture and cough, respectively (Table 5.3), exhibiting highest potential for the healing of the given diseases.

5.3 Study on Garo community

5.3.1 Study area

The present study was conducted in five selected Garo villages (locally known as *Garo Gaon*) viz. Senglimari [117 households], Doangbari [160 households], Phulaguri [110 households], Smarna [256 households] and Rongagora [120 households] (Figure 5.4).

5.3.2 About Garo community

Garo is one of the most prominent hilly tribe of North-eastern India with colourful traditional attire. The Garo form one of the important matrilineal tribe

inhabiting north-eastern regions of India. The individuals take their clan titles from their mothers. Traditionally, the youngest daughter (*Nokmechik*) inherits the property from her mother. Sons leave the parents' house at puberty and are trained in the village bachelor dormitory (*Nokpante*). After getting married, the man lives in his wife's house. Garo are also distinctly found in some places of Assam viz. Sonitpur, Kamrup, Goalpara and Khasi hill regions of Assam. As per census [33] the populations of Garo tribes in Assam is 1, 36,000. Garo's has a distinct language and has many dialects viz. A-beng or Am-beng, Matabeng, Atong, Me·gam, Matchi, Dual [Matchi-Dual], Ruga, Chibok, Chisak, Gara, Gan·ching [Gara-Gan·ching], A-we, etc. Many peoples tell that, the Garos first immigrated to Garo Hills from Tibet around 400 BC under the leadership of Jappa Jalimpa and finally settled down in Garo Hills (East-West Garo Hills). The major festivals of Garo's are *Wangala* and *Saljong*. Other festivals include *Gal·mak Goa*, *Agalmaka*, etc.

5.3.3 Results

Analysing the semi structured questionnaires and response sheets, a total of 50 medicinal plant species were documented systematically which belong to 47 genera under 33 families (Table 5.4). Trees contributed highest proportion with 43 % (23 species, 22 genera); herbs with 25 % (13 species, 13 genera); shrubs having 18 % (9 species, 8 genera) and climbers represented lowest with only 14 % (6 species, 6 genera). During the present survey a total number of 127 individuals (87 males and 40 females) belonging to different age groups (25 – 85 years) were questioned. As recorded, 32 respondents in the interview process were belonged to age group of 25 - 45 years; 27 individuals in 46 - 55 years; 22 individuals in 56-65 years; 34 individuals in 66-75 years and only 12 individuals in 76- 85 years. As per the interaction with different medicine men *(Bez, Kobiraz)* different plant parts have been used for the treatment of various health ailments by the community are also chronicled during the study. It was found that among the plant parts, leaves was extensively used for the

preparation of medicine contributing 41% followed by fruits (17%), roots (12%) whole plants and bark contributes 10% each, stem and flower 4% each and latex contributes 2% as given in Figure (5.5). It has been estimated that the recorded plants species are widely used for the treatment as many as 21 different health ailments. Among those, dyspepsia, body-ache and cough are commonly treated. About 6% of the total recorded plant species were used against jaundice and skin care. About 4% plant species were strongly used for the treatment of antiseptic, antibacterial and tonic, and also against constipation, fever, hair-health, headache, heart troubles, teeth problems, worm and urinary diseases. In the treatment of blood pressure, breast inflammation, diabetes, fracture, mouth and peptic ulcers about 2% recorded plant species (for each treatment) were used (Figure 5.6). Largely leaves or other parts of the plant species are boiled and the extracted boiled juice is refined with the help of clean muslin clothes and the extracts are used orally for treatment of different health ailments like dyspepsia, body-ache, cough, jaundice, constipation, heart treatment, worm and urinary diseases. From the study, it has been seen that the medicine men *(Kobiraz)* are very particular about the mode of administration of herbal medicine. It has been detected that majority of prepared medicine are administered orally (internal) in the form of decoction and few are administrated externally in the form of paste.

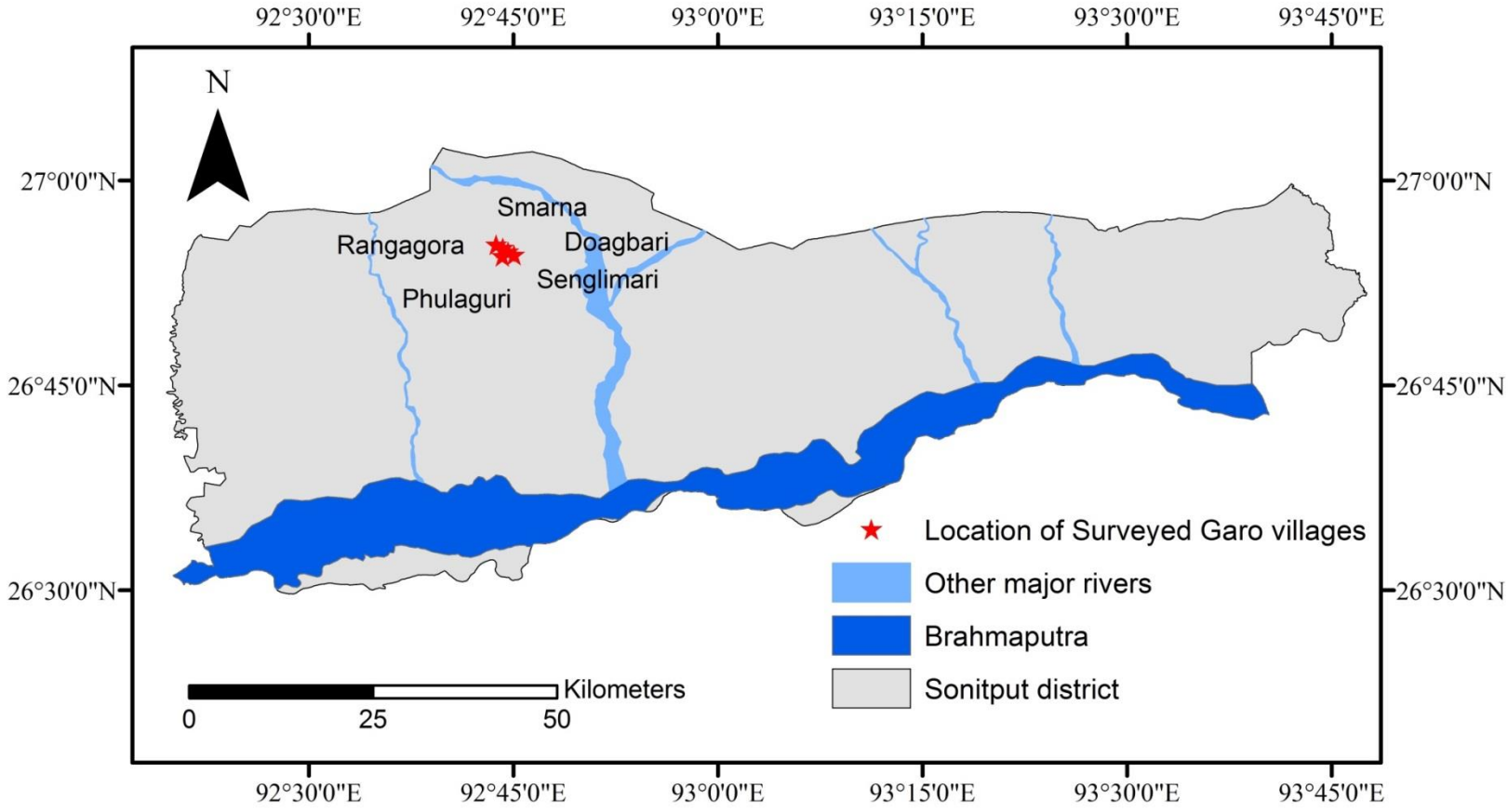

Figure 5.4: Location map of surveyed villages of Garo community.

Table 5.4**.** List of recorded plant species used by Garo peoples for treatment of different health ailments [Abbreviations used: E = External; I = Internal; T: Tree; CL: Climber; H: Herb; SH: Shrub; WP: Whole Plant; FR: Fruit; BR: Bark; ST: Stem; LF: Leaf; FL: Flower; SD: Seed]

Sl. No.	Botanical name	Vern. name (Garo)	Family	Ailment/ Diseases	Habit	Part Used	Mode of preparation/ Dose/ Administration (E/I)
1.	*Abrus precatorius* L.	Mengo Micron	Papilionaceae	Worms	T	RT, SD	I: 2 teaspoon decoction of root and seeds used regularly two times after food.
2.	*Abutilon indicum* (L.) Sweet	Bibal Jacksona	Malvaceae	Swelling, pain	SH	LF, RT	E: A gentle paste is used on pain-full swelling
3.	*Achyranthes aspera* L.	Samsengi / Memang	Amaranthaceae	Headache / worms	H	RT, WP	E: A gentle paste is used on forehead against headache I: Purified root-juice is used against worms, mainly children .
4.	*Aegle marmelos* (L.) Corrêa	Belethi	Rutaceae	Dysentery, heart and	T	FR, LF, BR	I: Ripe fruit juice used directly as heart and liver

				liver tonic			tonic. Decoction of tender leaf and bark taken regularly against dysentery (1-2 teaspoon twice daily)
5.	*Ageratum conyzoides* (L.) L.	Fulkuri	Asteraceae	Wound	H	LF	E: Leaf juice used on the wounds
6.	*Albizia procera* (Roxb.) Benth.	Khereri	Mimosaceae	Muscle pain	T	BR	E: A gentle paste is used as poultice
7.	*Alstonia scholaris* (L.) R.Br.	Soksen	Apocynaceae	Fever	T	BR	I: Dried bark power is taken orally with boiled water
8.	*Alternanthera sessilis* (L.) R.Br. ex DC.	Adaurak	Amaranthaceae	Dysentery, diarrhoea	H	LF	I: Tender leaf extract taken orally
9.	*Amaranthus spinosus* L.	Khutura	Amaranthaceae	Skin sore	H	LF, ST	E: Paste of leaf and steam used on infected portions for immediate relief
10.	*Ananas comosus* (L.) Merr.	Anara	Bromeliaceae	Vomiting, worms	H	LF	I: Juice of tender leaf taken orally

11.	*Andrographis paniculata* (Burm.f.) Nees	Kal tita	Acanthaceae	Worms	H	LF	I: Juice of tender leaf taken orally
12.	*Aristolochia indica* L.	Nirkumt	Aristolochiaceae	Muscle pain, tonic	CL	RT, LF	I: Root decoction taken orally against pain; Juice of tender leaf mixed with honey taken orally as tonic
13.	*Asparagus racemosus* Willd.	Sathobari bondu	Asparagaceae	Urinary trouble, tonic	CL	RT	I: Root juice taken orally against blood in urine; as tonic and in other urinary problems
14.	*Averrhoa carambola* L.	Khanrenga	Oxalidaceae	Prolonged cough	T	FR	I: Juice of burnt ripe fruit taken orally
15.	*Azadirachta indica* A.Juss.	Nim bijok	Meliaceae	Antiseptic, pox, worms, diabetes	T	LF	E: Boiled leaf water administrated. I: The fry leaf is taken to control worms and diabetes.
16.	*Bacopa monnieri* (L.) Wettst.	Brami	Scrophulariaceae	Tonic	H	LF	I: Leaf juice is taken .

17.	*Bauhinia purpurea* L.	Migong	Caesalpiniaceae	Jaundice	T	FL	I: Purified flower juice eaten.
18.	*Bixa orellana* L.	Bol – rong	Bixaceae	Hair fall	T	FR	E: The paste of ripen fruit used.
19.	*Bombax ceiba* L.	Roathi	Malvaceae	Jaundice	T	BR	E: The refined decoction of bark used orally (1 teaspoon daily once).
20.	*Calotropis gigantea* (L.) Dryand.	Akanda	Apocynaceae	Scabies, Muscle pain	SH	LF	E: The leaf paste is used. The mature leaf is heated in the fire and wrapped in the pained portions.
21.	*Carica papaya* L.	Modu	Caricaceae	Dyspepsia	H	LATEX	I: Leaf latex is taken.
22.	*Centella asiatica* (L.) Urb.	Manamuni	Apiaceae	Headach, dysentery, boil	H	WP	I: The refined juice is taken. The boil is covered with the leaf to prevent infections.
23.	*Cissus quadrangularis* L.	Bol-merang	Vitaceae	Fracture	CL	WP	E: The stem is used to bind the fractured.
24.	*Dillenia indica* L.	Oksi	Dilleniaceae	Hair	T	FR , SD	E: The seeds were grind and

				conditioner, appetizer			used. I: The fruit is boiled and juice is taken.
25.	*Erythrina variegata* L.	Modar phang	Papilionaceae	Toothache	T	FL	I: Leaf juice used to wash mouth.
26.	*Euphorbia hirta* L.	Khatri phang	Euphorbiaceae	Peptic ulcer	H	WP	I: Paste of whole plant is used.
27.	*Hibiscus rosa-sinensis* L.	Gitsak – jaba bibal	Malvaceae	Diarrhoe, hair fall treatment	T	FL	I: Flower juice is taken. E: Flower paste is used in hair.
28.	*Houttuynia cordata* Thunb.	Musanderi	Saururaceae	Joint pain, muscle pain, blood dysentery	H	WP	I: Plant juice is administrated.
29.	*Melastoma malabathricum* L.	Kakku phang	Melastomataceae	Mouth ulcer	SH	LF	I: Leaf juice is used (1 tea spoon daily twice).
30.	*Mimosa pudica* L.	Ambi misum	Mimosaceae	Brest inflammati	H	RT	E: The root paste with *Aloe vera* is prepared and used.

				on			
31.	*Moringa oleifera* Lam.	Bol sojona	Moringaceae	Blood pressure [high]	T	LF	I: Leaf juice is taken orally.
32.	*Murraya koenigii* (L.) Spreng.	Sam khatsi	Rutaceae	Fever	T	LF	I: Leaf juice is taken orally. 1-2 teaspoonful daily once.
33.	*Neolamarckia cadamba* (Roxb.) Bosser	Mi- bol	Rubiaceae	Antibacterial	T	FR	E: Paste of fruit used over infected areas
34.	*Nyctanthes arbor-tristis* L.	Sephalika	Oleaceae	Cough	T	LF,FL	I: Decoction of leaf and flower are used orally.
35.	*Ocimum tenuiflorum* L.	Tulsi	Lamiaceae	Cough, asthama, wounds	SH	LF	I: Leaf juice with honey is administrated orally (2 teaspoon daily). E: Leaf paste is used over the wounds/cuts.
36.	*Oroxylum indicum* (L.) Kurz	Khiring	Bignoniaceae	Jaundice	T	BR	I: Decoction of bark is prepared and refined to use

							orally (1 teaspoon daily twice).
37.	*Paederia foetida* L.	Veda lota	Rubiaceae	Vomiting, dysentery	CL	LF	I: The tender leaf juice is taken.
38.	*Phlogacanthus thyrsiflorus* Nees	Ellok	Acanthaceae	Asthma	SH	LF	I: Leaf juice is taken orally.
39.	*Physalis minima* L.	Gogipa - bodu	Solanaceae	Muscle pain	SH	FR	I: Fruit juice is taken against body pain and muscle pain.
40.	*Piper nigrum* L.	Jaluk	Piperaceae	Cough	CL	FR	I: Fruit is used against cough.
41.	*Psidium guajava* L.	Kamperum	Myrtaceae	Dysentery	T	LF	I: Leaf juice is used orally.
42.	*Ricinus communis* L.	Khoronda	Euphorbiaceae	Muscle pain	SH	LF	E: Gentle paste of tender leaf is used.
43.	*Scoparia dulcis* L.	Sak kusuk	Plantaginaceae	Diabetes	H	LF	I: The leaf juice is taken orally.
44.	*Senna alata* (L.) Roxb.	Dadi - mildang	Caesalpiniaceae	Scabis	SH	ST, LF	E: Leaf and stem paste is used.
45.	*Senna tora* (L.) Roxb.	Jejhe	Caesalpiniaceae	Urine problem	SH	LF	I: The diluted refined leaf juice is taken orally.

46.	*Streblus asper* Lour.	Bol - Kharaansi	Moraceae	Teeth bleeding	T	ST	E: The stems are used as tooth brushes.
47.	*Terminalia arjuna* (Roxb. ex DC.) Wight and Arn.	Arjun bol	Combretaceae	Heart tonic	T	BR	I: Bark powder juice is taken daily (2 tea spoons daily twice).
48.	*Terminalia bellirica* (Gaertn.) Roxb.	Bol badak	Combretaceae	Constipation	T	FR	I: Dry fruit powder taken with water during night time.
49.	*Terminalia chebula* Retz.	Artak	Combretaceae	Digestive / jaundice	T	FR	I: Dry fruit powder taken with water.
50.	*Tinospora cordifolia* (Willd.) Miers	Padma galancha	Menispermaceae	Constipation	CL	WP	I: Stem juice is taken orally.

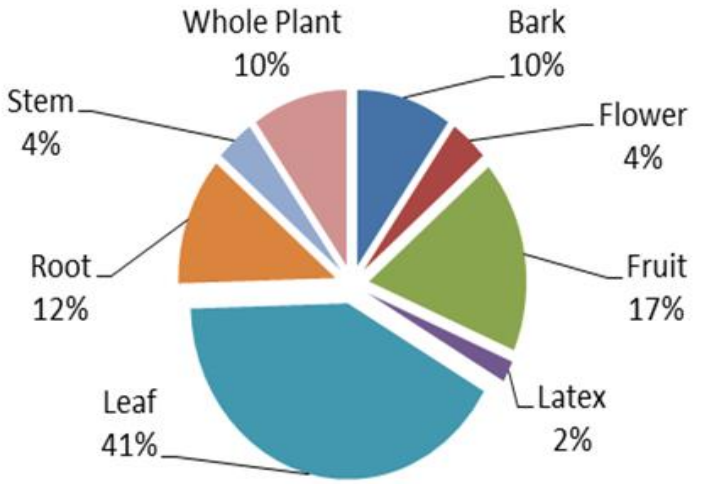

Figure 5.5: Percentage of plant parts used in treatment of various health ailments.

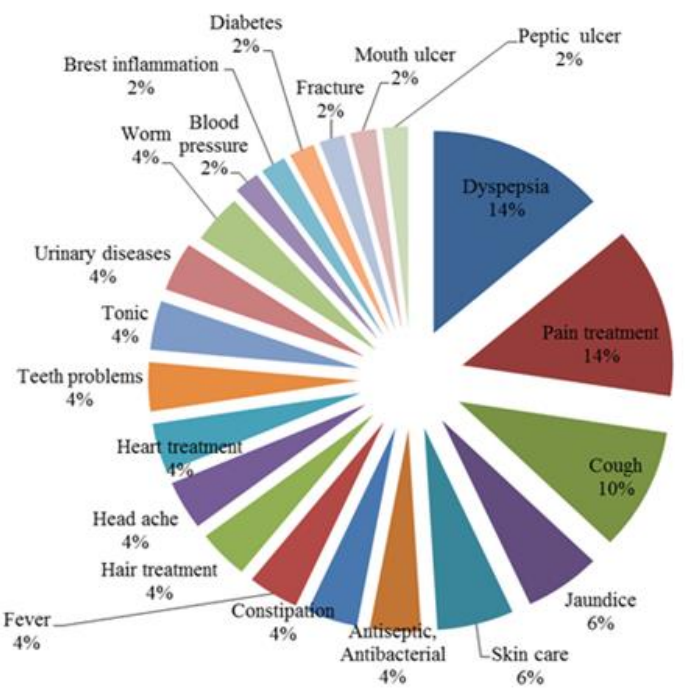

Figure 5.6: Percentage of species used against treatment of different ailments/diseases.

5.3.4 FIC and FL values

For the Garo community also the FIC and FL values are calculated to understand the information consensus and fidelity level.

For FIC a total 23 different major ailments are recorded based on survey and total number of 71 individuals was interviewed for the same. Among them maximum used report was counted for dyspepsia which is 54. Followed by fracture (41) and cough (41), where lowest use report was recorded for breast inflammation (4) [Table 5.5].

Reports of 71 respondents were recorded to understand the Fidelity Level (FL) in particular ailments with particular species. Twelve different plant species that are used against different ailments are recorded. Highest used reports are recorded for *Centella asiatica* (L.) Urb. for dysentery (69) and *Ocimum tenuiflorum* L. for cough, asthma and wounds (67), while lowest used report (27) was recorded for *Oroxylum indicum* (L.) Kurz against jaundice [Table 5.6].

Table 5.5: Table showing FIC values for Garo community against some important diseases.

Use categories	Number of Taxa *(N_t)*	Number of use report *(N_{ur})*	Information Consensus Factor (FIC)
Blood pressure	1	7	1.00

Brest inflammation	1	4	1.00
Diabetes	1	11	1.00
Fracture	1	41	1.00
Hair treatment	2	27	0.96
Teeth problems	2	26	0.96
Worm	2	28	0.96
Ulcer	2	22	0.95
Tonic	2	17	0.94
Antiseptic, Antibacterial	2	15	0.93
Heart treatment	2	16	0.93
Urinary diseases	2	16	0.93
Skin care	3	21	0.90
Head ache	2	11	0.90
Dyspepsia	7	54	0.89
Jaundice	3	15	0.86
Muscle Pain	7	41	0.85
Constipation	2	7	0.83
Fever	2	7	0.83
Cough	5	23	0.82

Table 5.6 : Table showing FL values for Garo community against some important diseases and respective plant species.

Botanical name	Report against particular ailments	Use report (N_p)	*No. of total respondents (N)*	Fidelity Level (FL) (%)

Centella asiatica (L.) Urb.	Dysentery	69	71	97.18
Ocimum tenuiflorum L.	Cough, asthama , wounds	67	71	94.37
Azadirachta indica A.Juss.	Antiseptic	65	71	91.55
Paederia foetida L.	Vomiting	64	71	90.14
Cissus quadrangularis L.	Fracture	61	71	85.92
Dillenia indica L.	Hair conditioner	49	71	69.01
Andrographis paniculata (Burm.f.) Nees	Worm	48	71	67.61
Scoparia dulcis L.	Diabetes	47	71	66.20
Terminalia bellirica (Gaertn.) Roxb.	Constipation	46	71	64.79
Streblus asper Lour.	Teeth bleeding	41	71	57.75
Ricinus communis L.	Muscle pain	39	71	54.93
Oroxylum indicum (L.) Kurz	Jaundice	23	71	32.39

5.3.5 Discussion

The outcome of the study revealed that the majority of the plant species used for human health care are trees (43%) followed by herbs (25%), shrubs (18%) and climbers (14%). It was recorded that different parts of plant are used for the treatment of various health disorders where majority of diseases are treated with leaves (41%) while latex shows lowest uses (2%). Some major species associated with the healing of stomach problems are *Hibiscus rosa-sinensis*, *Terminalia chebula*, *Psidium guajava*, *Aegle marmelos*, *Alternanthera sessilis*, *Carica papaya*, *Centella asiatica*, *Houttuynia cordata*, *Paederia foetida*, etc. Species such as *Albizia procera*, *Ricinus communis*, *Physalis minima*, *Smilax glabra*, *Houttuynia cordata*, *Aristolochia indica*, *Calotropis gigantea* and *Abutilon indicum* are extensively used against body pains, while *Dillenia indica* and *Bixa orellana* are used as hair conditioner. *Nyctanthes arbor-tristis*, *Piper nigrum*, *Averrhoa carambola* and *Ocimum tenuiflorum* are used for the treatment of coughs. The leaf juice of *Scoparia dulcis* is taken orally against diabetes (daily twice after meal), and respondent found very useful. The refined decoction of barks of *Bombax ceiba* and *Oroxylum indicum*, and the juice of flower of *Bauhinia purpurea* is reported to be highly beneficial to control Jaundice. It was also observed that herbal medicine men *(Kobiraz)*, specially elders (above 60 years) possess strong background of medicinal plants and their uses for the treatment of relevant diseases. Females are reluctant to interact with the other peoples, therefore ethnobotanical information's are mainly collected from male villagers. Another observation was that the individuals of lower age groups (25-45 years) are less aware about the uses of medicinal plants for different health treatments, and the knowledge they have is not adequate to apply

against any disorder. Therefore, the transmissible ethnomedicinal wisdom of the community is eroding day by day.

The highest FIC value 1 was found against blood pressure, breast inflammation, diabetes and fracture (Table 5.5). *Centella asiatica* was scored highest FL values 97.18 % for dysentery followed by *Ocimum tenuiflorum* and *Azadirachta indica* (Table 5.6) which means these three plants species has highest potentials for curing the given diseases.

5.4 Study on Mishing community

5.4.1 Study area

Extensive field survey was carried out in different villages viz. Dharikati, No.1 Miri Pothar, Sonai Miri gaon, Khonamukh, Kathani, Kekokoli, Rangajan, Rongajan miri, Baligaon, Sotaimiri, Toupamiri, Bamunipam, Bordikorai, Sikomgaon, Silenighat, Morikhuti, Bokagaon, Tinighoria and Gudamghat (Figure 5.7). During this field works several villagers (149 male and 45 female) were interviewed. 55 respondents in the interview process belong to age group of 32 - 45 years; 70 individuals in the range of 46 - 55 years; 33 individuals of 56-65 years; 24 individuals in 66-75 years and only 12 individuals in between 76- 85 years.

5.4.2 About Mishing community

The Mishing, an Indo-Mongoloid group formerly referred to as Miris, are the second largest ethnic group in Assam. With a population about 5,87,310 [33] and are scattered over eight districts *viz.* Sonitpur, Tinsukia, Dibrugarh, Dhemaji, Lakhimpur, Sibsagar, Jorhat and Golaghat of the state. A typical traditional

Mishing house is stilted with a thatched roof on a bamboo frame and has bamboo flooring supported by woods. It is built on stilts to avoid floods during the monsoon. The main source of livelihood for the Mishing is agriculture. Villagers typically grow different varieties of rice, some they sow in spring for harvesting in the summer and others they transplant during the rainy season to harvest in the autumn. The Mishing peoples are highly dependent on the resources of forest for their livelihood and have rich traditional and ethnobotanical knowledge which need to be explore and documented. Pork (*Egadin*), dry fish (*Namshing*), ethnic alcoholic beverage (*Aapong*) are some of the traditional foods of Mishing community. For preparing these foods they always used different plant species which have medicinal value and are good for health.

5.4.3 Results

During this study a total of 62 ethnomedicinal plant species belonging to 56 genera under 42 families are recorded those are used by the Mishing community for human health care (Table 5.7). These includes climbers (8 species, 8 genera and 8 families); herbs (11 species, 10 genera and 9 families); shrubs (19 species under 17 genera and 14 families) and trees (23 species, 20 genera and 15 families) which comprises of 36% trees, 32% shrubs, 18% herbs and 13% climbers. Different plants parts are used for the different treatment of human diseases are also recorded during the study. Among the plant parts, leaves (54%) is extensively used as medicines followed by fruit (16%), whole plant, root and stem (6%), bark and gum/resin (3%), flower, tuber and seed consists (2%), as given in Figure 5.8. The result shows as 17% of the

recorded plant species are utilised for the preparation of Aapong, 12% of recorded species were utilised curing stomach problems, 10% utilised for dysentery, 8% hair therapy and skin problems, 7% used for cough, gynaecological problems and worms, 3 % of the plant species were used for liver diseases, tonics and all kind of infections and 2% of recorded species were used for diabetes, dog-bite, pains and fractures (Figure 5.9). Majority of the herbal medicine are prepared from the leaves. Where, the leaves are cleaned with water and then boiled until the leaf juice come out. Then the boiled decoctions are filtered with muslin cloths and left for cooling. After proper cooling it is preserved in glass bottles and is administrated orally till one week as per requirements. During the interview it has also been observed that the majority of the species are used internally (orally 84%) and some species are administrated externally (16%). Another most important traditional practice of Mishing community is the preparation of *Nogin* or *Nogjin Apong*, a traditional rice alcoholic beverage of Mishing Community. For the preparations of the *Nogin Apong* they use many plants species (both dicots and monocots). During the preparations of the *Apong* first they prepare *Epop* (yeast starter). *Epop* is the tablet or ball shaped cake prepared with the dry powder of plant materials mixing with the rice powder and is used for the preparation of *Nogin* or *Nogjin Apong and Po: ro Apong* (Saimod). During the study a total of 10 dicot plant species *(Clerodendrum infortunatum, Coriandrum sativum, Cuscuta reflexa, Flemingia strobilifera, Hibiscus rosa-sinensis, Lippia javanica, Polygonum hydropiper, P. microcephalum, Tinospora cordifolia* and *Zanthoxylum nitidum*) under 10 genera and 9 families were found to be used exclusively used for the preparation of *Epop.* It has been

reported that the *Apong* is a highly nutritional traditional alcoholic beverage with a huge ethnobotanical values [34, 35]. *Apong* has a strong place in the socio-cultural life of the Mishing community.

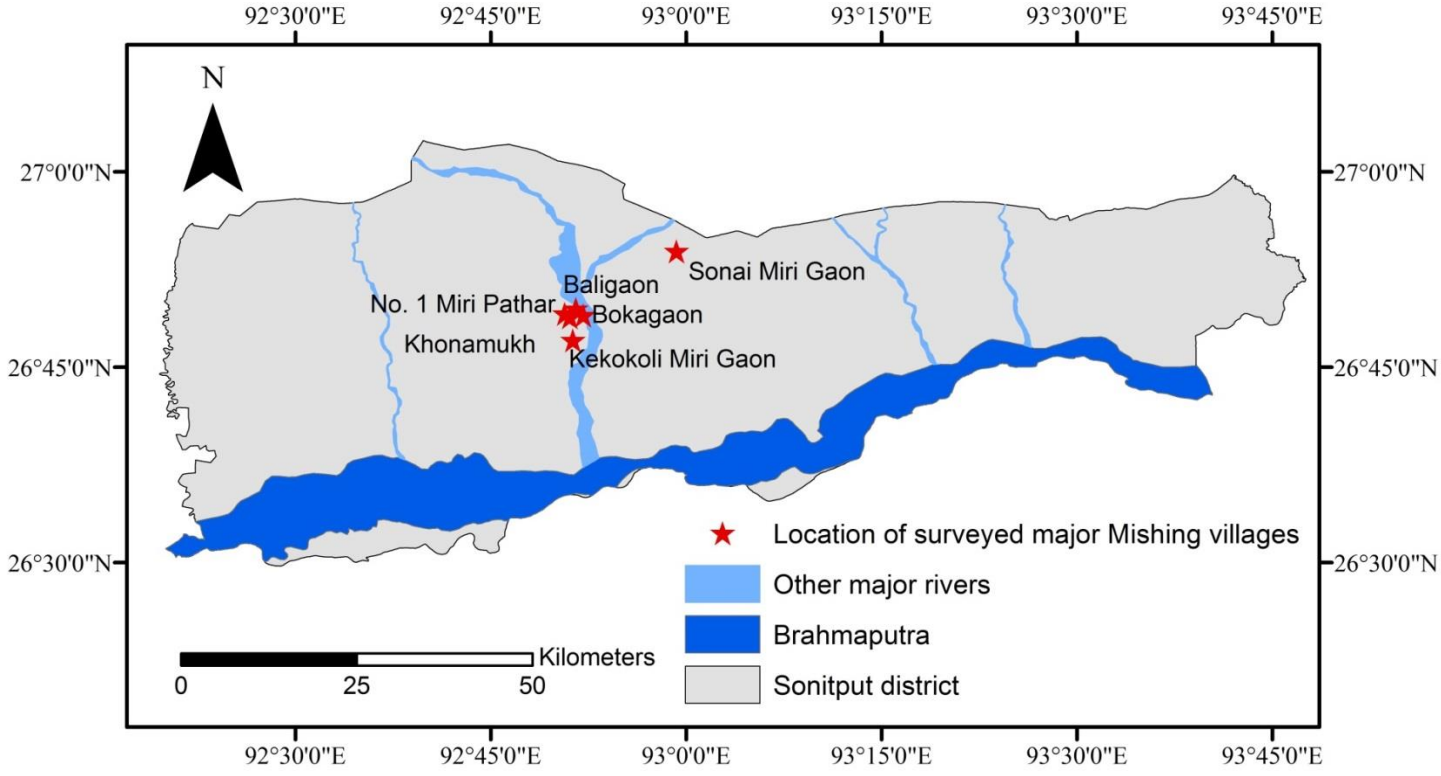

Figure 5.7 Location map of major surveyed villages of Mishing community.

Table 5.7: Data showing the different medicinal plants used against different ailments/diseases by Mishing community. [Abbreviations used: E = External; I = Internal; T: Tree; CL: Climber; H: Herb; SH: Shrub; WP: Whole Plant; FR: Fruit; BR: Bark; ST: Stem; LF: Leaf; FL: Flower; SD: Seed; GU: Gum]

Sl. No.	Botanical name of plant	Vern name (Mishing)	Family	Ailments /Diseases	Life form	Part used	Mode of preparation/ Dose/ Administration (E/I)
1.	*Acacia nilotica* (L.) Delile	Babul	Mimosacea e	Dry cough , kidney trouble	T	LF	I: Decoction of leaf used after meal and also bark .
2.	*Aegle marmelos* (L.) Corréa	Bel	Rutaceae	Small pox	T	LF	E: Pest of young leaf used in the small pox.
3.	*Amaranthus spinosus* L.	Geang	Amarantha ceae	Blood tonic	SH	WP	I: Cooked with pork for blood tonic.
4.	*Ananas comosus* (L.) Merr.	Matikothal	Bromeliace ae	Vomiting , indigestion	SH	LF	I: 2/3 young leaf taken and grind then the juice is directly taken with a small

							salt.
5.	*Andrographis paniculata* (Burm. f.) Nees	Kalmegh	Acanthaceae	Liver problem	SH	LF	I: Young leaf smashed and the distilled juice is taken daily for liver problem.
6.	*Asparagus racemosus* Willd.	Satmul	Asperagaceae	Dyspepsia, constipation	CL	RT	I: Root boiled with water or dried first and then powder boiled in water and taken for stomach problems.
7.	*Averrhoa carambola* L.	Kordoi	Oxalidaceae	Cough	T	FR	I: ripen fruit roasted in wood fire and eaten: juice eaten directly.
8.	*Azadirachta indica* A.Juss.	Mohaneem	Meliaceae	Skin infection /measles	T	LF	E: mature leaves boiled with water and the water used to bath.
9.	*Bacopa monnieri* (L.)	Brahmi	Scrophulari	Brain tonic	H	WP	I: whole plant grind and the

	Wettst.		aceae				juice drink.
10.	*Bryophyllum pinnatum* (Lam.) Oken	Duportenga	Crassulaceae	Urinal infection	H	LF	I: Young leaf consumed directly.
11.	*Butea monosperma* (Lamk.) Taub	Palas	Papilionaceae	Diarrhoea	T	GU	I: Used directly.
12.	*Calotropis gigantea* (L.) Dryand.	Aah: Kam	Apocynaceae	Pain	SH	LF	E: Mature leaves kept over fire and then with mastered oil and wrapped the pained area.
13.	*Capsicum annuum* L.	Surging mirsi	Solanaceae	Stomach problem/ gastric	SH	FR	I: Eaten directly.
14.	*Centella asiatica* (L.)Urban.	Manimuni	Apiaceae	Vomiting / indigestion	H	WP	I: Leaf juice with water or chewed the whole plant.

15.	*Cissus quadrangularis* L.	Harjora	vitaceae	Bone fracture	CL	WP	E: The plant used as bandage or plastering for bone fracture.
16.	*Citrus maxima* (Burm.) Merr.	Singliang	Rutaceae	Skin	T	FR	I: fruit eaten directly.
17.	*Clerodendron colebrokianum* L.	Pakkom	Verbenaceae	Weight loss/fever	SH	LF	I: Young leaf consumed as vegetable
18.	*Clerodendrum infortunatum* L.	Pakkom	Verbenaceae	Aapong	SH	LF	I: Leaf dried and powder used in Apong (Ethnic alcoholic beverage)
19.	*Corchorus capsularis* L.	Mura	Tiliaceae	Stomach problem /vomiting	SH	LF	I: tender Leaf dried with smoke and then boiled and eaten.
20.	*Coriandrum sativum* L.	Dhania	Apiaceae	Aapong	H	ST	I: Stem/leaf dried and powder used in Apong (Ethnic alcoholic beverage)

21.	*Costus speciosus* (J.Koenig) Sm.	Jomlakhuti	Costaceae	Aapong	SH	LF	I: Leaf dried and powder used in Apong (Ethnic alcoholic beverage)
22.	*Cuscuta reflexa* Roxb.	Rabonlota	Convolvulaceae	Aapong	CL	RT	I: Root dried and powder used in Apong .
23.	*Datura stramonium* L.	Dhatura	Solanaceae	Bite by mad dog	SH	RT	I: Root decoction.
24.	*Dillenia indica* L.	Champa	Dilleniaceae	Hair therapy	T	FR	E: The seeds are grind and the then seeds are used over hair for smooth and to reduce hair fall.
25.	*Dioscorea alata* L.	Alé	Dioscoriaceae	Vegetable	CL	TU	I: Demanding vegetable with pork
26.	*Drymaria cordata* (L.) Willd. ex Schult.	Laijabori	Caryophyllaceae	Dermatitis	H	LF	I: Leaf consumed directly.
27.	*Eupatorium odoratum* L.	Ayapan	Asteraceae	High blood	SH	LF	I: Leaf decoction.

				pressure			
28.	*Ficus glomerata* Roxb.	Tejing /taksek	Moraceae	Vegetable specially with Pork	T	LF	I: Young leaf used as vegetable with pork.
29.	*Ficus hirta* Vahl	Taksek	Moraceae	Urine problem	T	FR	I: Ripen fruit used directly or cooked for urine problem.
30.	*Flemingia strobilifera* (L.) W.T.Aiton	Makhioti	Papilionaceae	Aapong	SH	LF	I: Leaf dried and powder used in *Apong* .
31.	*Gurcinia cowa* L.	Kuji Thekera	Cluciaceae	Digestive / vegetable with fish and pork	T	FR	I: Fruit dried in the sunlight and after few years the fruit pulp soaked with water and the juice used as drink during summer and for digestion; also boiled and cooked.

32.	*Hedyotis diffusa* Willd.	Sarpajiva	Rubiaceae	Stomach pain/ nerve tonic	H	LF	I: Juice or cooked vegetable.
33.	*Hibiscus rosa-sinensis* L.	Leunaapum	Malvaceae	Aapong	T	LF	I: Leaf dried and powder used in Apong (Ethnic alcoholic beverage)
34.	*Jatropha curcas* L.	Votera	Euphorbiaceae	Abortion	T	RE	I: Resin with milk consumed for 2/3 days.
35.	*Justicia adhatoda* L.	Bahaka	Acanthaceae	Cough	SH	LF	I: Leaf juice used for dry cough.
36.	*Lawsonia inermis* L.	Jetuka	Lythraceae	Skin and hair diseases	SH	LF	E: Leaf paste used in hair and skin.
37.	*Leucas aspera* (Willd.) Link	Dorun	Lamiaceae	Sinus	H	LF	I: 2/3 drop of leaf juice used per nose.
38.	*Lippia javanica* (Burm.f.)		Verbenacea	Aapong	H	LF	I: Leaf /Flower dried and

	Spreng.		e				powder used in Apong .
39.	*Mangifera indica* L.	Ke: di milong	Anacardiaceae	Dysentery	T	BR	I: Decoction of bark taken in empty stomach; twice daily before meal till complete relief. The seeds are eaten raw or roasted.
40.	*Melia azadirachta* L.	Ghoraneem	Meliaceae	Skin infection	T	LF	E: Leaf boiled and water used to bath.
41.	*Moringa oleifera* Lam.	Munga	Moringaceae	Stomach problem	T	FR/ FL	I: Cooked as vegetable
42.	*Murraya koenigii* (L.) Spreng.	Norhing	Rutaceae	Dysentery	T	LF	I: Cooked as vegetable
43.	*Nyctenthis arbor-tristis* L.	Sewali	Oleaceae	Worm	T	FL	I: Flower fry eaten.
44.	*Ocimum basilicum* L.	Tulsi	Lamiaceae	Cough	SH	LF	I: Leaf juice with honey taken for cough.

45.	*Paederia foetida* L.	Vedeli	Rubiaceae	Indigestion	CL	LF	I: Leaf juice used directly or cooked with fish.
46.	*Phyllanthus acidus* Skeel	Pora amlokhi	Euphorbiaceae	White discharge of women	T	LF	I: Leaf juice with sugar. Daily in empty stomach for 15 days to 3 months.
47.	*Piper betel* Blanco.	Paan	Piperaceae	Boil/cut injury	CL	ST	E: Stem is taken and dipped in the boiled master oil and then touched the boil or cut injury leads for relief of pain and quick recovery.
48.	*Polygonum hydropiper* L.	Leubo	Polygonaceae	Aapong/ vegetable	H	LF	I: Leaf/stem dried and powder used in Apong .
49.	*Polygonum microcephalum* D. Don	Nekungkune	Polygonaceae	Aapong/ vegetable	H	LF	I: Leaf dried and powder used in Apong .
50.	*Psidium guajava* L.	Madhuri	Myrtaceae	Stomach pain	T	LF	I: 2/3 young leaf grind and ½ spoon juice taken.

51.	*Punica granatum L.*	Anar	Lythraceae	Diarrhoea/ anaemia	SH	LF	I: Fruit eaten directly; flower and leaf cooked; leaf juice used
52.	*Scoparia dulcis* L.	Tisilkosa	Plantaginaceae	Diabetes	SH	LF	I: Eaten directly.
53.	*Sesamum orientalae* L.	Tanam	Padaliaceae	Hair fall	SH	SD	I: Seed cooked.
54.	*Solanum indicum* L.	banko	Solanaceae	Worm/veg.	SH	LF	I: Leaf cooked with pork.
55.	*Solanum torvum* Sw.	Sitabanko	Solanaceae	Worm/veg.	SH	FR	I: Fruit cooked.
56.	*Streblus asper* Lour.	Namhoi	Moraceae	Teeth problem	T	ST	E: Stem used as tooth brush.
57.	*Swertia chirata Buds*-Ham.	Sirata	Gentinaceae	Worm /allergy /vegetable /	H	ST	I: 2/3 stem soaked for some hours or overnight and the soaked water is taken (2 spoon) for two days.
58.	*Terminali chebula* Retz.	Silika	Combretac	Hair	T	FR	I: Fruit dried and grind and

			eae	growth /constipation /heart problem			the powder used directly; or wholly eaten.
59.	*Terminalia arjuna* (Roxb. ex DC.) Wight and Arn.	Arjun	Combretaceae	Heart/liver tonic	T	BR/ RT	I: Decoction of root and bark used; powder of bark mixed with hot water for heart diseases.
60.	*Terminalia bellirica* (Gaertn.) Roxb.	Bhomora	Combretaceae	Hair growth /constipation	T	FR	I: Fruit dried and the inner part grind and the powder used directly.
61.	*Tinospora cordifolia* (Willd.) Miers	Amrita	Menispermaceae	Aapong/ Blood sugar	CL	LF	I: Leaf cooked as vegetable
62.	*Tylophora indica*	Anantamul	Asclepiada	Liver	CL	RT	I: Root eaten directly

	(Burm,f.)Merr.	ceae	Tonic/Jaun dice

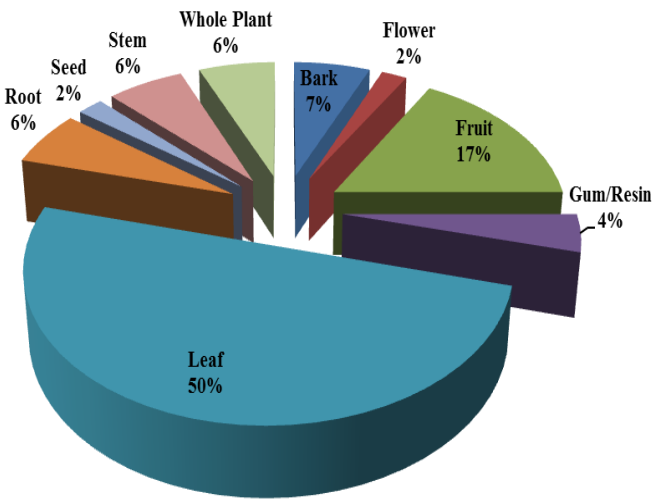

Figure 5.8: Percentage contribution of plant parts used in preparation of herbal medicine.

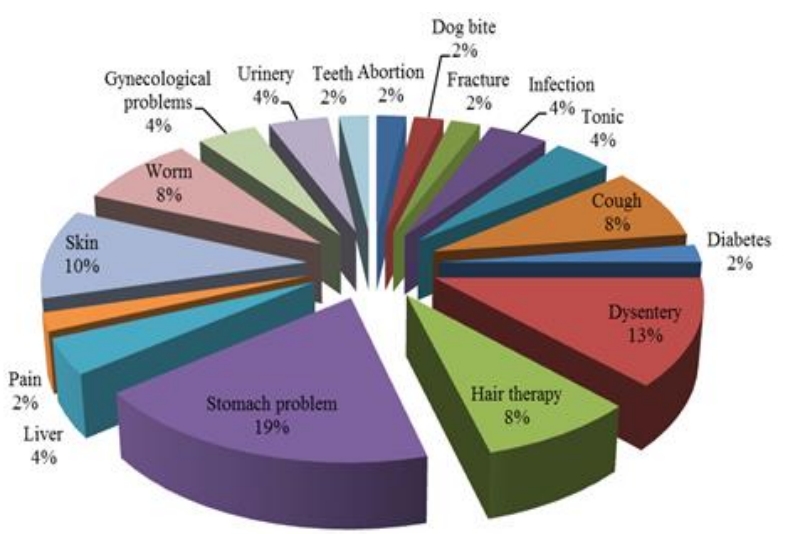

Figure 5.9: Percentage contribution of plant species used for treatment of health ailments/diseases

5.4.4 FIC and FL values

For FIC a total 15 different major ailments are recorded based on survey and 79 individuals were interviewed for the same. Among them maximum used report was counted for fracture which is 58 followed by cough (41) while lowest use report was recorded for gynaecological problems (8) [Table 5.8].

The same 79 respondents were recorded to understand the Fidelity Level (FL) in particular ailments with particular species. Thirteen different plant species that are used against different ailments are recorded. Highest used reports are recorded for *Paederia foetida* L. used for dysentery (77) followed by *Lawsonia inermis* L. hair fall and *Azadirachta indica* A.Juss (76 each) while lowest used report (65) was recorded for *Bryophyllum pinnatum* (Lam.) Oken for urinal infection [Table 5.9].

Table 5.8: FIC values for Garo community against some important diseases.

Use categories	Number of Taxa (N_t)	Number of use report (N_{ur})	Information Consensus Factor (FIC)
Abortion	1	22	1.00
Dog bite	1	11	1.00
Fracture	1	58	1.00
Diabetes	1	17	1.00
Pain	1	38	1.00
Teeth	1	37	1.00
Infection	2	28	0.96
Tonic	2	25	0.96
Cough	4	41	0.93

Worm	4	27	0.88
Hair therapy	4	26	0.88
Skin	5	32	0.87
Dysentery	6	38	0.86
Gynaecological problems	2	8	0.86

Table 5.9: Table showing FL values for Garo community against some important diseases.

Botanical name	Report against particular ailments	Use report (N_p)	No. of total respondents (N)	Fidelity level (FL) (%)
Paederia foetida L.	Dysentery	77	79	97.47
Lawsonia inermis L.	Hair fall	76	79	96.20
Azadirachta indica A.Juss.	Measles	76	79	96.20
Leucas aspera (Willd.) Link	Sinus	75	79	94.94
Swertia chirata Buds-Ham.	Worm	75	79	94.94
Centella asiatica (L.)Urban.	Vomiting	74	79	93.67
Scoparia dulcis L.	Diabetes	73	79	92.41
Averrhoa carambola L.	Cough	72	79	91.14
Streblus asper Lour.	Teeth problem	69	79	87.34
Dillenia indica L.	Hair therapy	68	79	86.08
Murraya koenigii (L.)	Dysentery	65	79	82.28

Spreng.				
Andrographis paniculata (Burm. f.) Nees	Liver tonic	65	79	82.28
Bryophyllum pinnatum (Lam.) Oken	Urinal infection	65	79	82.28

5.4.5 Discussion

It has been observed that the majority of the plant species used mainly for medicinal purpose are trees (36%) followed by shrubs (32%), herbs (19%) and climbers (13%). During the field survey it has been recorded that the majority of health ailments/ diseases are treated with leaves (54%) whereas seed and flower shows lowest uses (2%). A total of 10 plant species were exclusively used for the fermentation process of the *Apong* preparation. The *Rogjin Apong* and *Po:ro Apong* are the high nutritional valued ethnic alcoholic beverages that are prepared by this community from rice.

After analysing questionnaire, it has been observed that the ethnobotanical knowledge among the youths is eroding day by day. Youths, particularly below 30 years show least interest to their hereditary vast ethnobotanical knowledge and very reluctant to share. It has been observed that a number of major health ailments are treated by herbal medicine by this community. Some are common ailments/diseases are dysentery, hair fall, measles, sinus, worm, vomiting etc.

After analysis FIC and FL values it was found that the Mishing community has highest consensus into some particular treatment viz. abortion, dog bite, fracture, diabetes, pain and teeth with highest FIC value 1 (Table 5.8). At the same time, FL values show highest fidelity in *Paederia foetida* L., *Lawsonia inermis* L., *Azadirachta indica* A.Juss., *Leucas aspera* (Willd.) Link and *Swertia chirata* Buds-Ham against dysentery, hair fall, measles, sinus and worm, respectively (Table 5.9).

5.5 Comparison of all three communities in term of recorded ethnomedicinal species

To understand the importance of recorded plant species, a comparison has been made from all recorded ethnobotanically important plant species. It has been observed that a total of 98 species under 85 genera and 51 families are used by these communities. Out of that, 35 are trees, 28 are shrubs, 24 are herbs and 11 are climbers. Among them, 9 species viz. *Aegle marmelos* (L.) Correa, *Andrographis paniculata* (Burm. f) Nees, *Averrhoa carambola* L., *Azadirachta indica* A. Juss, *Bacopa monnieri* (L.) Penn., *Calotropis gigantea* (L.) Dryand. *Centella asiatica* (L.) Urb., *Cissus quadrangularis* L. and *Scoparia dulcis* L. are commonly used by all the three communities (Table 5.10).

Table 5.10: List of recorded plant species used by *Munda, Garo* and *Mishing* communities for different ailments/ diseases.

SL. No.	Scientific name	Munda	Garo	Mishing
1.	*Abelmoschus moschatus* Medic.	Constipation	---------	---------
2.	*Abrus precatorius* L.	---------	Worms	---------
3.	*Abutilon indicum* (L.) Sweet	---------	Swelling, pain	---------
4.	*Acacia nilotica* (L.) Delile	---------	---------	Dry cough , kidney trouble
5.	*Achyranthes aspera* L.	---------	Headache / worms	---------
6.	*Aegle marmelos* (L.) Correa	Diabetes	Dysentery, heart and liver tonic	Small pox
7.	*Ageratum conyzoides* (L.) L.	---------	Wound	---------
8.	*Albizia procera* (Roxb.) Benth.	Anti-inflammatory	Muscle pain	---------
9.	*Alstonia scholaris* (L.) R.Br.	---------	Fever	---------
10.	*Alternanthera sessilis* (L.) R.Br. ex DC.	---------	Dysentery, diarrhoea	---------
11.	*Amaranthus spinosus* L.	---------	Skin sore	Blood tonic
12.	*Ananas comosus* (L.) Merr.	---------	Vomiting, worms	Vomiting , indigestion

13.	*Andrographis paniculata* (Burm. f) Nees	Various stomach disorder	Worms	Liver problem
14.	*Aristolochia indica* L.	---------	Muscle pain, tonic	---------
15.	*Asparagus racemosus* Willd.	---------	Urinary trouble, tonic	Dyspepsia, constipation
16.	*Averrhoa carambola* L.	used as digestive, tonic, cough	Prolonged cough	Cough
17.	*Azadirachta indica* A. Juss	Fever	Antiseptic, pox, worms, diabetes	Skin infection /measles
18.	*Bacopa monnieri* (L.) Penn.	Nerve tonic	Tonic	Brain tonic
19.	*Bauhinia purpurea* L.	---------	Jaundice	---------
20.	*Bixa orellana* L.	---------	Hair fall	---------
21.	*Bombax ceiba* L.	---------	Jaundice	---------
22.	*Bryophyllum pinnatum* (Lam.) Oken	---------	---------	Urinal infection
23.	*Butea monosperma* (Lamk.) Taub	---------	---------	Diarrhoea
24.	*Calotropis gigantea* (L.) Dryand.	Muscle Pain/joint pain	Scabies, Muscle pain	Pain
25.	*Capsicum annuum* L.	---------	---------	Stomach problem, gastric

26.	*Carica papaya* L.	---------	Dyspepsia	---------
27.	*Centella asiatica* (L.) Urb.	Stomach pain/dysentery	Headach, dysentery, boil	Vomiting / indigestion
28.	*Cissus quadrangularis* L.	Fracture	Fracture	Fracture
29.	*Citrus maxima* (Burm.) Merr.	---------	---------	Skin treatment
30.	*Clerodendron colebrokianum* L.	---------	---------	Weight loss/fever
31.	*Clerodendron indicum* (L.)Kuntze	Jaundice, cough, skin disease	---------	
32.	*Clerodendrum infortunatum* L.	---------	---------	Aapong
33.	*Corchorus capsularis* L.	---------	---------	Stomach problem /vomiting
34.	*Coriandrum sativum* L.	---------	---------	Aapong
35.	*Costus speciosus* (J.Koenig) Sm.	---------	---------	Aapong
36.	*Cucurbita maxima* Duch.	Reduce Labour pain	---------	---------
37.	*Curculigo orchioides* Gaerten.	Joint pain	---------	---------
38.	*Cuscuta reflexa* Roxb.	Against blood pressure	Aapong	---------
39.	*Datura stramonium* L.	---------	---------	Bite by mad dog

40.	*Dillenia indica* L.	---------	Hair conditioner, appetizer	Hair therapy
41.	*Dioscoria bulbifera* L.	Viral fever	---------	---------
42.	*Drymaria cordata* (L.) Willd. ex Schult.	---------	---------	Dermatitis
43.	*Elephantopus scaber* L.	Rheumatic pain	---------	---------
44.	*Erythrina variegata* L.	---------	Toothache	---------
45.	*Eupatorium odoratum* L.	---------	---------	High blood pressure
46.	*Euphorbia hirta* L.	---------	Peptic ulcer	
47.	*Ficus glomerata* Roxb.	---------	---------	Vegetable specially with Pork
48.	*Ficus hirta* Vahl	---------	---------	Urine problem
49.	*Ficus racemosa* L.	Anaemia	---------	
50.	*Flemingia strobilifera* (L.) W.T.Aiton	---------	---------	Aapong
51.	*Gurcinia cowa* L.	---------	---------	Digestive / vegetable with fish and pork
52.	*Hedyotis diffusa* Willd.	---------	---------	Stomach pain/ nerve tonic
53.	*Hibiscus rosa-sinensis* L.	---------	Diarrhoe, hair fall	Aapong

			treatment	
54.	*Houttuynia cordata* Thunb.	---------	Joint pain, muscle pain, blood dysentery	---------
55.	*Jatropha curcas* L.	---------	---------	Abortion
56.	*Justicia adhatoda* L.	---------	---------	Cough
57.	*Lawsonia inermis* L.	---------	---------	Skin and hair diseases
58.	*Leucas aspera* (Willd.) Link	Sinus, nose bleeding	---------	Sinus
59.	*Lippia javanica* (Burm.f.) Spreng.	---------	---------	Aapong
60.	*Mangifera indica* L.	Jaundice	---------	Dysentery
61.	*Melastoma malabathricum* L.	---------	Mouth ulcer	---------
62.	*Melia azadirachta* L.	---------		Skin infection
63.	*Mimosa pudica* L.	---------	Brest inflammation	---------
64.	*Moringa oleifera* Lam.	---------	Blood pressure [high]	Stomach problem
65.	*Murraya koenigii* (L.) Spreng.	---------	Fever	Dysentery
66.	*Neolamarckia cadamba* (Roxb.) Bosser	---------	Antibacterial	---------

67.	*Nyctanthes arbor-tristis* L.	---------	Cough	Worm
68.	*Ocimum basilicum* L.	Cough / Prevent bleeding	---------	Cough
69.	*Ocimum tenuiflorum* L.	wounds	Cough, asthama,	---------
70.	*Oroxylum indicum* (L.) Kurz	Jaundice	Jaundice	
71.	*Paederia foetida* L.	---------	Vomiting, dysentery	Indigestion
72.	*Phlogacanthus thyrsiflorus* Nees	---------	Asthma	
73.	*Phyllanthus acidus* Skeel	---------	---------	White discharge of women
74.	*Physalis minima* L.	---------	Muscle pain	---------
75.	*Piper betel* Blanco.	---------	---------	Boil/cut injury
76.	*Piper nigrum* L.	---------	Cough	---------
77.	*Polygonum hydropiper* L.	---------	---------	Aapong/ vegetable
78.	*Polygonum microcephalum* D. Don	---------	---------	Aapong/ vegetable
79.	*Psidium guajava* L.	---------	Dysentery	Stomach pain
80.	*Punica granatum L.*	---------		Diarrhoea/ anaemia

81.	*Ricinus communis* L.	---------	Muscle pain	
82.	*Scoparia dulcis* L.	Diarrhoea	Diabetes	Diabetes
83.	*Senna alata* (L.) Roxb.	---------	Scabis	---------
84.	*Senna tora* (L.) Roxb.	---------	Urine problem	---------
85.	*Sesamum orientalae* L.	---------	Hair fall	---------
86.	*Solanum indicum* L.	Fever	Worm/veg.	---------
87.	*Solanum melongena* L.	Reduce Labour pain	---------	---------
88.	*Solanum torvum* Sw.	---------	---------	Worm/veg.
89.	*Streblus asper* Lour.	---------	Teeth bleeding	Teeth problem
90.	*Streblus asper* Lour.	---------	---------	---------
91.	*Swertia chirata Buds*-Ham.	---------	---------	Worm /allergy /vegetable /
92.	*Tagetes patula* L.	Prevent bleeding	---------	---------
93.	*Tamarindus indica* L.	Help in digestion	---------	---------
94.	*Terminalia arjuna* (Roxb. ex DC.) Wight and Arn.	---------	Heart tonic	Heart/liver tonic
95.	*Terminalia bellirica* (Gaertn.) Roxb.	---------	Constipation	Hair growth /constipation

96.	*Terminalia chebula* Retz.	---------	Digestive / jaundice	Hair growth /constipation /heart problem
97.	*Tinospora cordifolia* (Willd.) Miers	Fever	Constipation	Aapong/ Blood sugar
98.	*Tylophora indica* (Burm,f.)Merr.	---------	---------	Liver Tonic/Jaundice

5.6 Conclusion

Assam is a vibrant state with a considerable numbers of tribal communities. The tribal communities inhibiting in Assam has a vast socio cultural practises and strong ethnobotanical wisdoms. The present study with three prominent tribal communities (Munda, Garo and Mishing) inhibiting in erstwhile Sonitpur also reveals their strong holds in the field of ethnobotany. As a result, 98 plant species are recorded from the study which is used by these communities as medicine [Table 5.10]. among them, 27 plant species belonging to 27 genera under 26 families are recorded for Munda community; a total of 50 plant species were documented systematically which belong to 47 genera under 33 families that are used by Garo community and 62 ethnomedicinal plant species belonging to 56 genera under 42 families are recorded for Mishing community. Apart from this, 10 species are recorded that are used for the preparation of *Apong* by Mishing community. The results exhibit the rich ethnomedicinal wisdoms of these communities, but at the same time it was also realised that the traditional practises are eroding day by day among these communities due to lack of awareness and information's transmitted to younger generation. So, it is the urge of the time to understand the years old traditional practices of the communities and to record this information's systematically by the scientific community, by which the communities' rich traditional herbal knowledge may be preserved with the conservation of biodiversity and cultural heritage.

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