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COMMUNICATION

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COMMUNICATION

Indigenous knowledge of ethnomedicinal plants by the Assamese community in Dibrugarh District, Assam, India

Pranati Gogoi [1] & Namita Nath [2]

[1,2] Department of Botany, Gauhati University, Guwahati, Kamrup, Assam 781014, India.
[1] pranatigogoi01@gmail.com (corresponding author), [2] nathnamita1@gauhati.ac.in

Abstract: The present investigation is an attempt to study the uses of ethnomedicinal plants in traditional knowledge system among the Assamese community of Dibrugarh District in Assam. All the relevant data were collected during 2017–2019 by following standard ethnobotanical methods through personal interviews as well as through focus group discussions with a total of 193 informants including 62 men and 131 women. The use value (UV) of the medicinal plants and informant consensus factors (F_{IC}) values were determined. In the study 174 ethnomedicinal plant species were documented belonging to 147 genera and 78 families. Except for three species, the 171 species are Angiosperms mostly collected from the wild. Among the 174 species of medicinal plants, 12 species are listed under various categories by IUCN and CITES. All these plants are used to treat various diseases that are grouped under 13 ICPC (International Classification of Primary Care) disease categories, with the highest use value (0.54) recorded in *Leucas aspera* followed by *Paederia scandens* with (0.5) use value. This confirms that these plants are important traditional herbs with potent medicinal uses. The highest informant consensus factor with the highest number of species (93) being used for the digestive system (F_{IC}= 0.76%), followed by oral and dentistry (F_{IC}= 0.73%) category. The ethnic communities in the district are rich in traditional knowledge which is evident from the use records and high degree of consensus among the informants.

Keywords: Indigenous knowledge, informants consensus factor, northeastern India, use value

Assamese Abstract: Oxomor Dibrugarh jilar axomiya xomproday lukxokolor paromporik bidhya pronalit gosthiouxodhiyo upokarita bur bortoman onuxondhan or joriyote ek odhoyon prosesta solua hoise. Xokolu praxonggik tothyo 2017-2019 ot xonggroh kora hoi pramanik gosthiboigyanik poddhotir joriyote, byoktigoto xakhyatkar duara logote obhikendro dologoto alosana. Muth 193 tothyodata, 62 purux aru 131 stri. Ouxodhi udbhid or byowohar man (UV) aru tothyodata xorboxonmoti upadan (F_{IC}) nirnoy kora hol. Ei odhoyonot, 174 gosthiouxodhiyo udbhid (147 genera aru 78 families) dostabej kora hoi. 3 ta projatir bade, 173 ta projati hoise guptobiji udbhid jikhini xorobhag bonor pora xongroh kora hoisil. 174 ta ouxodhiyo udbhid projatir majot 12 ta projati IUCN aru CITES or bibhinno prokarot xusito kora hoise. Ei xokolubur udbhid rog sikitsat byowohar hoi. Ei rog homoh 13 ta ICPC rog bibhagot rokha hoise. Ataitkoi xorbosso byowohar mulyo (0.54) nothibhukto kora hol Leucas aspera t aru Paederia scandens (0.5). Nissito kora hoi je ei udbhid hamuh xobol ouxodhi gun thoka gurutwopurno paromporik trino udbhid. Xorbosso tothyodata xorboxonmoti hetu (F_{IC}) logote xorbosso xongkhya projati (93) byowohar kora hoi hojomi pronalit (0.76%) aru moukhik aru donto pronalit (0.73%). Jilakhonor jatigoto xomproday paromporik bidhya hoise xompodxali jitu byowahar dostabej aru tothyodata xokolor usso matra xorboxonmoti pora pramanik hoi.

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Author details: Pranati Gogoi, a PhD Scholar has authored two research articles and a book chapter. Currently she is working on the floristic diversity of Dibrugarh District, Assam under Gauhati University. Dr. Namita Nath has authored more than 43 research articles, 21 books, five book chapters and edited three books. She is involved with four research projects, the ongoing one is "Inventorization of wild edible fruits of Assam with special reference to their sustainable utilization for livelihood generation".

Author contribution: PG carried out the whole field survey during the the year 2017-2019, data compilation, analysis and writing the whole manuscript. NN supervised the whole work from field survey upto the preparation of the report.

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INTRODUCTION

Indigenous knowledge plays a vital role in conservation of resources, particularly of indigenous plant species significant for indigenous communities (Cox 2000; Leonti 2002; Leonti 2011; Kayani et al. 2015). Since ancient times, the indigenous communities have been harvesting ethnomedicinal plants from the wild in different parts of the world (Malick & Cox 1996; Dhillion et al.2002; Matu & Staden 2003; Mall et al.2015; Pasquini et al.2018; Phumthum & Balslev 2018; Tomasini et al. 2019; Dixit & Tiwari 2020; Qamariah et al. 2020) and the knowledge is carried forward generation after generation (Tabuti et al. 2003). This knowledge needs to be conserved especially in countries facing high risk of threat to biodiversity due to urban developmental activities, migrations, deforestation, and natural calamities. India is one of such nations where indigenous knowledge is decreasing day by day due to the factors mentioned above. Northeastern India, a mega bio-diversity hot spot, is rich in endemic flora (Mao et al.2000; Sajeng et al. 2008; Barbhuiya et al. 2009; Mao et al. 2009; Panmei et al. 2019) and home to nearly 1,350 medicinal plants with high economic importance that are used in various ethnomedicinal preparations (Dutta & Dutta 2005). Besides being rich in floristic diversity, this region is also rich with a diversified and colorful culture and traditional knowledge system among 145 tribal communities (Ali & Das 2003). This region is considered one of the ecological hot spots of the world and has an abundance of medicinal plants known to the native people (Asati & Yadav 2004; Chauhan 2011; Dutta 2013; Salam 2013; Debbarma et al. 2017; Lanusunep et al. 2018; Panmei et al. 2019). Assam, a significant state of northeastern India falls in the Indo-Burma Global Biodiversity Hotspot (Mittermeier et al. 2011). "Assamese" is the largest indigenous community of Assam inhabiting throughout the valley of the Brahmaputra River. Studies on ethnomedicinal plants were carried out by different authors in different parts of Assam in the past by the ethnic communities; and comprehensive works have already been published (Borah et al. 2004; Saikia et al. 2006; Buragohain 2008; Talukdar et al. 2018). Dibrugarh is one of the diverse lands of northeastern India and is the largest tea producing zone in India. The land is occupied by the Assamese people who highly depend on medicinal plants for various traditional health-care practices. The Assamese community of Dibrugarh District of Assam, since time immemorial have been using medicinal plants to treat different ailments over many centuries through the traditional knowledge system that has been passed down from generation to generation (Dutta & Dutta 2005; Buragohain 2008; Sarma & Devi 2017; Talukdar et al. 2018). But due to certain factors like modern lifestyle and development in medical facilities, the utilization of these plants is rapidly decreasing. To overcome this issue, proper documentation and assessment of traditional knowledge of indigenous people is important (Teklehaymanot 2009). Due to the conversion of the forests and arable land into tea gardens for commercial purposes, there is every possibility of losing the useful medicinal plants from their natural habitat. Therefore, proper measures and conservation strategies of the available floristic wealth of this region is of utmost importance. Thus proper documentation and preservation of the ethnomedicinal knowledge has become the need of the hour before getting lost and supplanted by modern medical facilities. In the district of Dibrugarh, although some of the studies on ethnomedicinal plants have been carried out on Mishing tribe, Sonowal Kachari tribe and Ahom tribe (Boruah & Kalita 2007; Kalita & Phukan 2010; Sonowal 2013), no exhaustive work has been done on the traditional practices of the Assamese community. In addition, the tradition of using indigenous knowledge for the treatment of common ailments is neglected due to the availability of modern lifestyle and medical facilities. As a result, the traditional household practices are rapidly decreasing in this region. The traditional practices of various ethnic communities on the uses and management of medicinal plants is necessary in order to fill the gap of indigenous knowledge on ethnomedicinal plants. Thus the present survey was conducted with the objectives (1) to document the medicinal plants used by the Assamese community in Dibrugarh District, (2) proper assessment of traditional knowledge on the ethnomedicinal plants adopted by the people with regard to gender, age, and knowledge, and (3) to bring out the medicinal plants with highest ethnomedicinal importance for future value addition to their existence and preservation for long term purposes.

MATERIALS AND METHODS

Study area

The present study was carried out in the Dibrugarh District of Assam. The district lies at 108m and occupies an area of 3,381km^2. The district extends from 27.093–27.708 (latitude) & 94.562–95.485 (longitude) (Census 2011). The area stretches from the north bank of the Brahmaputra, which flows for a length of 95km through

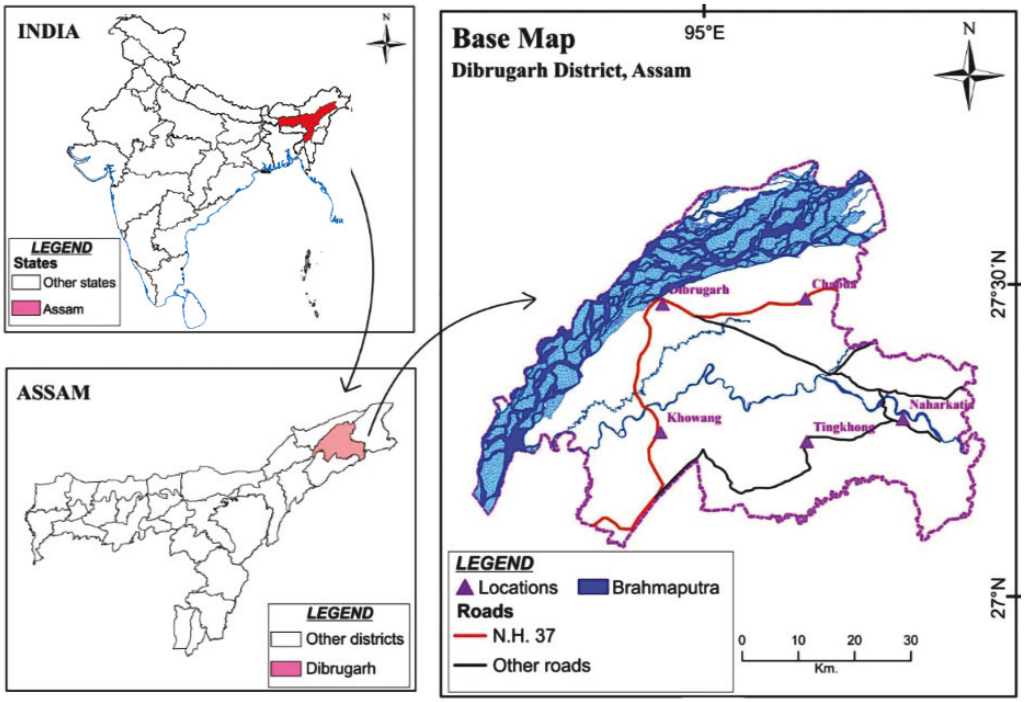

Figure 1. The study area in Dibrugarh District, Assam.

the northern margin of the district to the Patkai foothills on the south (Fig. 1). There is a large tract of tropical lowland rainforests in Dibrugarh often referred to as "The Amazon of the east" owing to its large area and thick forests. It is also home to Dibru-Saikhowa National Park, which has an area of 340km^2. It shares the park with Tinsukia District. The region lies on the bank of the Brahmaputra River and other environmental factors such as climate and topography of the region has been favorable for the growth of luxuriant vegetation. The climate of Dibrugarh is humid and sub-tropical with extremely wet summers and relatively dry winters. The climate is classified by the Koppen-Geiger system and average precipitation is 2,781mm annually (Climate data 2020). According to 2011 India census, the district has a population of 1,326,335; males constitute 51% of the population and females 49%. The sex ratio of the district is 961 per 1,000 males. The average literacy rate is 76.05%, which is higher than the national average literacy rate.

Field survey and collection of data

The study was conducted during 2017–2019 in various localities following standard ethnobotanical methods using a specially designed questionnaire (Jain 1987; Martin 1995). All the relevant data including those of traditional uses of the medicinal plants used by ethnic communities of Dibrugarh District were collected following the code of ethics (International Society of Ethnobiology 2006). Here using the specially designed questionnaire, we collected the data through personal interviews as well as through focused group discussions with a total of 193 informants. The study is significant in the sense that no such extensive work was done earlier in the district of Dibrugarh and this region has remained unexplored or under-explored in the field of floristic study also. Several visits were made to remote places namely Jokai, Madhupur, Naharkatiya, Tengakhat, Lezai, Moran, Lahowal, Borborua, Bogibeel, Khowang of the district at different time intervals for primary data collection. Based on the information obtained from the ethnic tribes (Ahom, Kachari, Mishing, Deori, Sonowal Kachari, Boro, and Chutiya) the identification of the key informants became possible. With their cooperation, the plants were collected from the forest and the local names of the given plants were recorded in a structured questionnaire, comprising of scientific name, family, local names of plants, part used, application, method of preparation and route of administration. In the present study a total of 193 informants with a strong traditional knowledge base were selected for data collection. During the process importance was given to collecting data with a detailed account of every informant including their identity, address, qualifications and tribal group. This was recorded prior to collection of traditional knowledge based information in the local language i.e.

Assamese. Before approaching the main steps of data collection, the aim and objectives of our study were explained briefly to the informants to generate their trust which was very helpful in getting accurate data. Based on the collected data it was found that out of 193 informants, 54 were above 69 years, of which 20 were males and 34 were females. In the age group of 50–59 years there were 47 informants of which 21 were males and 26 were females. In the age group of 40–49 years, there were 56 informants of which 16 were males and 40 were females. In the age group of 30–39 years, there were 36 informants of which five were males and 31 were females. Most of the informants were involved with other livelihood activities being farmers, social workers, teachers, shop keepers and house wives.

Plant collection, identification and preservation

The herbal practitioners of the Assamese community of the Dibrugarh District collected the plants during the mature stage for proper identification. For proper identification an effort was made to collect the voucher specimens related with ethnomedicinal information

Image 1. Some medicinal plants collected from Dibrugarh District, Assam: A—*Leucas aspera* | B—Informant with *Clerodendron colebrookianum* | C—Informant with *Cheilocostus speciosus* | D—Informant with *Impatiens tripetala* | E—Informant with *Paederia scandens*. Inset shows the flower | F—Informant with *Microsorum punctatum* | G—*Garcinia pedunculata* | H—*Curcuma zedoaria* | I—Informant with *Tabernaemontana divaricate*. © Pranati Gogoi.

during the flowering and fruiting periods. Collected plants were identified by the interviewers in their local language as well as correlating the plant in the field as shown by the informants (Image 1). For future record of the specimens as well as for proper taxonomic identification plant specimens were collected properly along with vivid photographs. The collected plants were made into herbarium specimens by following standard herbarium techniques (Jain & Rao 1977), and most of them were deposited at the GUBH (Gauhati University Botanical Herbarium, Assam). The specimens were identified consulting relevant literature like Flora of Assam (Kanjilal et al. 1934–1940); a checklist was made of angiosperms and gymnosperms (Barooah & Ahmed 2014); (Chowdhery et al. 2008, 2009). Online databases like The Plant Lists (www.theplantlist.org) and The International Plant Name Index (www.ipni.org) were referred.

Statistical analysis

The collected data is represented systematically in tabular form. Information such as scientific name, family, local name, use value, parts used, applications, method of preparation and route of administration were provided for each species. The collected data on the habits of plants used in Dibrugarh District of Assam was schematically recorded in a MS-Word file.

Determination of use value (uv)

The relative importance of each prescribed medicinal plant was calculated by determining the use value (Phillips et al. 1994; Zenderland et al. 2019), in order to measure the relative importance of plants used by local healers on quantitative basis:

$$UV = \Sigma Ui/n$$

Where Ui is the number of use-reports cited by each informant for a given species and n refers to the total number of informants. When there are many use-reports for a plant, the UV will be high, and when there are few reports for a plant, the UV will approach zero (0).

Determination of informants consensus factor (F_{IC})

Informants' consensus factor, i.e., F_{IC} is usually calculated using a formula. This is done in order to find out the homogeneity in the information given by the informants of the study area. The F_{IC} was calculated by the following formula (Trotter & Logan 1986; Henrich et al. 1998; Singh et al. 2012; Bhat et al. 2013).

$$F_{IC} = (N_{ur} - N_t)/ N_{ur - 1}$$

Here N_{ur} is the member of use report in a particular category of illness by informants and N_t is the number species of taxa that is used for the treatment of a particular disease category by informants of the study. The ICF values range from 0 to 1. When it is higher or close to 1, it indicates higher reports about a plant species used by the informants in a particular ailment. When the value is low or near 0, it indicates disagreement by the informants about a plant used for a certain ailment.

RESULTS AND DISCUSSION

Demography

In the Dibrugarh District, Assam a total of 193 informants of the age group ranging from 30–92 years of which 62 (32.12%) were male and 131 (67.87%) were female (Table 1). From the study it was found that the average age of the informants was 59 years. The illiteracy rate was found to be 14.5% whereas the literacy rate at the primary level was 17%, middle level was 13.9%, and secondary level was 27.4% (Table 2).

An overview of medicinal plants

In the present research work 174 plant species were used in various traditional health care practices which belong to 78 families and 147 genera. These were found to be used to cure several human diseases which were grouped under 13 ICPC (International Classification of Primary Care) disease categories. The information on traditional knowledge carried out by the tribal people of Dibrugarh District were arranged alphabetically by generic and specific names along with their families, local names, applications (Table 3). It was found that the most reported ethnomedicinal plants were herbs followed by trees, shrubs, and climbers (Figure 2). This could be due to availability of non-conventional herbs which are easy to cultivate in home gardens in comparison to trees and shrubs which take a longer time to grow. This could be due to the fact that the herbs possess potent medicinal properties and more therapeutic effects to resist illnesses (Abbas et al. 2017; Chekole 2017; Umair et al. 2017). Most of these ethnomedicinal plants are being used by the tribes in their day to day activities for their livelihood and also to get rid of severe/chronic health issues. In the present study, among the recorded species four species, viz., *Acorus calamus* L., *Clerodendrum colebrookianum* Walp. *Messua ferrea* Linn., *Sapindus mukorossi* Gaertn. are assessed as Vulnerable (VU) by IUCN Red List, three species—*Alstonia scholaris* R.Brown., *Terminalia chebula* (DC) W & A, and *Artocarpus lakoocha* Roxb.—are assessed as Near Threatened (NT), two species—*Cinnamomum tamala* Nees & Ebern and *Cissampelos*

Table 1. Distribution of ethnic informants based on age and sex.

Age group	Male	Female	No. of persons	Percentage
30–39	5	31	36	18.6
40–49	16	40	56	29
50–59	21	26	47	24.3
60–69	12	21	33	17
70–79+	8	13	21	10.8
TOTAL	**62**	**131**	**193**	

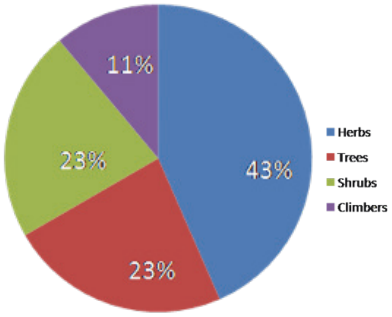

Figure 2. Diagram showing habits of documented plant species.

Table 2. Educational status of the informants.

Education level	No. of individuals	Percentage
Illiterate	28	14.5
Primary	33	17.0
Middle	27	13.9
Secondary	53	27.4
University	52	26.9
TOTAL	**193**	

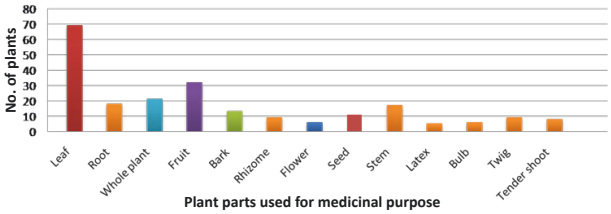

Figure 3. Parts wise use of various medicinal plant species used by Assamese community in Dibrugarh District.

pareira Linn.—are listed under Least Concern (LC) (Sajem et al. 2008; Molur & Walker 1998). *Curcuma caesia* Roxb. is listed under Critically Endangered (CR) category of IUCN while *Garcinia pedunculata* Roxb. is an Endangered (EN) and endemic species of the region (Mao et al. 2009). *Rhyncostylis retusa* (L.) Blume which is an epiphytic herb belonging to family Orchidaceae is also placed under the Endangered category (EN) appendix II (with strictly controlled international trade) of CITES (The Convention on International Trade in Endangered species of Wild Fauna and Flora) (Saxena 2020) (Table 4).

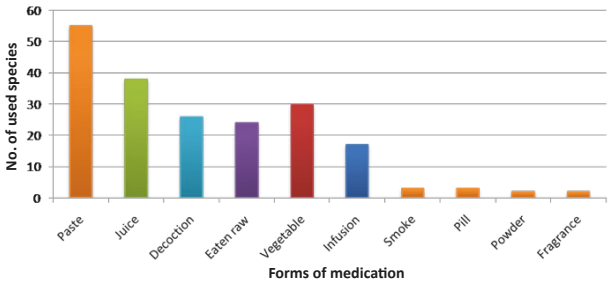

Figure 4. Various forms of medication practiced by Assamese community in Dibrugarh District.

Plant parts used and forms of medication

The tribal communities have a strong indigenous knowledge system of using various parts of a plant and the healing properties that each of the parts. The various information collected from the tribal communities helped us to establish the importance of the different uses of herbal remedies. The most commonly used plant parts were leaf, root, whole plant, fruit, bark, rhizome, flower, seed, stem, latex, bulb, twig, and tender shoots for various purposes in their day to day lives (Figure 3). In the study it was found that during the preparation of herbal recipes the healers use either a single medicinal plant or combination of several plants in the treatment of a particular disease. The most frequently used plant parts for medicinal remedies were leaves (69 species, 39.65%). The use of leaves in comparison to other plant parts causes less harm to the plant thus ensuring sustainability and its further conservation (Panmei et al. 2019). It was followed by fruit (32 species, 18.39%), whole plant (21 species, 12.06%), roots (18 species, 10.34%), stems (17 species, 9.77%), barks (13 species, 7.47 %), seeds (11 species, 6.3 %), rhizomes (nine species, 5.17%), twigs (nine species, 5.17%), tender shoots (eight species, 4.59%), flowers (six species, 3.44%), bulbs (six species, 3.44%) (Figure 3). Out of 78 families, Euphorbiaceae represented the highest number of medicinal plants (10 species, 5.74%), which was followed by Asteraceae (eight species, 4.59%), Araceae (seven species, 4.02%), and Rutaceae (seven species, 4.02%). Other research works (Singh et al. 2000; Teklehaymanot & Giday 2007; Mesfin et al. 2009; Bhattarai et al. 2010), however, reported

Table 3. Documentation of medicinal plants used by ethnic tribes of Dibrugarh District, Assam, India.

Scientific name [Family]; Voucher No.	Common name	Use Value	Part Used	Application	Method of preparation	Route of administration
Abroma augusta L. [Sterculiaceae]; PG-367	Gorokhia korai	0.03	R	Breast cancer, internal wound healing, jaundice	Paste	Oral
Acacia farnesiana (L.) Wild [Mimosaceae]; PG-269	Torua kadam	0.03	St, B	Menstruation pain, stomachic, hypertension	Decoction	Oral
*Achyranthes aspera*L. [Amaranthaceae]; PG-167	Biyoni hakuta	0.02	L, R	Fever, cough, stomachic, bone fracture	Paste	Oral
Acorus calamus L. [Araceae]; PG-38	Bosh	0.06	Rh	Fever, gastritis	Pill	Oral, external
Aegle marmelos (L.) Correa [Rutaceae]; PG-399	Bel	0.01	Fr	Indigestion, detoxification	Water infusion	Oral
Ageratum conyzoides L. [Asteraceae]; PG-541	Gendheli bon	0.09	L	Cut	Paste	External
Alocasia indica (Roxb.) Schott [Araceae]; PG-42	Man kochu	0.14	Rh	High blood pressure, anemia, tonic	Decoction	Oral
Alocasia macrorrhiza (L.) [Araceae]; PG-43	Bor kochu	0.03	L, Rh	Anthelmintic, Toothache, Insect repellant	Paste	External
Aloe vera (L.) Burm.f. [Asphodelaceae]; PG-82	Sal kuwori	0.28	L	Fever, detoxification, skin problem	Paste	Oral, External
Alpinia nigra (Gaertn). B.L.Burtt [Zingiberaceae]; PG-134	Tora	0.01	Rh	Leucorrhea	Paste	Oral
Alstonia scholaris (L.) R. Br. [Apocynaceae]; PG-430	Chatiana	0.03	St, B	Toothache, Malaria	Paste	Oral
Alternanthera sessilis(L.) R.Br. Ex DC [Amaranthaceae]; PG-170	Mati-kanduri	0.08	TS	Gastritis, gastro-intestinal disease	Vegetable	Oral
Amaranthus spinosus L. [Amaranthaceae]; PG-171	Hati-khutura	0.03	R, TS	Diarrhoea, antidiabetic, galactogogue	Juice, vegetable	Oral
Amaranthus tricolor L. [Amaranthaceae]; PG-174	Bishalya karani	0.02	L	Stomachic	Juice	Oral
Amorphophalus paeoniifolius (Dennst.) Nicolson [Araceae]; PG-45	Ol-kochu	0.06	TS	Cancer, pinworm	Eaten raw	Oral
Ananas comosus (L.) Merr. [Bromeliaceae]; PG-98	Anaras	0.18	L, Fr	Abortive, stomachic, bleeding, pinworm	Raw	Oral
Andographis paniculata (Burm.f) Wall.ex. Nees. [Acanthaceae]; PG-463	Chirota	0.06	Wh	Stomach worm	Water infusion	Oral
Artocarpus heterophyllus Lamk. [Moraceae]; PG-302	Kothal	0.03	L	Antidiabetic	Juice	Oral
Artocarpus lacucha Buch.-Ham. [Moraceae]; PG-303	Bohot	0.09	B	Cough	Decoction	External
Averrhoa carambola L. [Averrhoaceae]; PG-582	Kordoi	0.12	Fr	Jaundice, stomachic, blood purifier	Raw	Oral
Azadirachta indica A. Juss. [Meliaceae]; PG-390	Mahaneem	0.25	L	Stomachic, toothache, anthelmintic,antidiabetic, stomachic	Decoction, vegetable, paste	Oral, External
Bacopa monnieri (L.) Pennell [Scrophulariaceae]; PG-502	Brahmi	0.1	Wh	Memory enhancer, apetizer	Vegetable	Oral
Bambusa balcooa Roxb. [Poaceae]; PG-106	Bholuka-banh	0.09	Cu, L	Insect bite	Paste	Oral, external
*Basella alba*L. [Basellaceae]; PG-69	Puroi sak	0.01	Wh	Anemia, tonic	Vegetable	Oral
Belamcanda chinensis (L.) DC. [Iridaceae]; PG-544	Surya kanti	0.01	R	Stomachic	Juice	Oral
Boerhavia repens L. [Nyctaginaceae]; PG-179	Pono nowa	0.02	L	Urinary infection	Juice	Oral
Caesalpinia bonduc(L.) Roxb. [Caesalpiniaceae]; PG-273	Letaguti	0.13	S	Pneumonia, cough	Decoction	Oral
Cajanus cajan (L.) Millsp. [Leguminosae]; PG-77	Rohar dal	0.05	T	Jaundice, urinary infection	Juice	Oral
Calamus rotang L. [Arecaceae]; PG-85	Bet gaj	0.03	Sh	Antidiabetic	Vegetable	Oral
Calamus tenuis Roxb. [Araceae]]; PG-86	Jati-bet	0.03	TS	Cough	Vegetable	Oral
Calotropis procera(Ait.) R.Br. [Asclepiadaceae]; PG-432	Akon	0.07	La, L	Rabies, bone fracture, piles	Pill, paste, infusion	Oral, external
Camellia sinensis (L.) Kuntze [Theaceae]; PG-427	Sahpat	0.02	L	Cut and wound, antioxidant, hair problem	Paste, decoction	Oral, external

Scientific name [Family]; Voucher No.	Common name	Use Value	Part Used	Application	Method of preparation	Route of administration
Capsicum frutescens L. [Solanaceae]; PG-96	Dhan jolokia	0.04	Fr	Gastritis, cough	Raw	Oral
*Carica papaya*L. [Caricaceae]; PG-47	Amita	0.14	Fr, La, S	Constipation, indigestion, galactogogue, pinworm	Raw	Oral
Cascabela thevetia(L.) Lipp. [Apocynaceae]; PG-81	Korobiphul	0.01	R	Rabies	Paste	Oral
Cassia fistula L. [Caesalpinaceae]; PG-275	Sonaru	0.01	S	Constipation	Paste	Oral
Catharanthus roseus (L.) G.Don [Apocynaceae]; PG-433	Nayantora	0.31	L	Antidiabetic, cancer, hypertension	Juice	Oral
Celtis tetrandra Roxb. [Ulmaceae]; PG-212	Sukuta	0.02	T	Stomachic, fever	Decoction	Oral
Centella asiatica(L.) Urban [Apiaceae]; PG-578	Bor-manimuni	0.19	Wh	Blood purifier, dysentery, memory enhancer, cut	Paste	Oral
Chromolina odorata (L.) King et Robin [Asteraceae]; PG-546	Jarmani bon	0.09	L	Cut and wound	Paste	External
Cinnamomum tamala (Buch.-Ham.) T.Nees & C.H.Eberm. [Lauraceae]; PG-19	Tezpat	0.02	L	Hypertension, antidiabetic	Paste, decoction	Oral
Cissampelos pareira L. [Menispermaceae]; PG-145	Tubuki lota	0.05	L, R	Fever, bone fracture	Paste	External
Cissus quadrangularis L. [Vitaceae]; PG-199	Harjura lota	0.04	St	Bone fracture	Paste	External
Citrus aurantifolia(Christn.) Swingle [Rutaceae]; PG-400	Gol-nemu	0.26	Fr, S	Diarrhea, chronic dysentery, cough, pinworm	Juice	Oral
Citrus chinensis(L.) Osbeck [Rutaceae]; PG-397	Mousumi tenga	0.08	F	Jaundice, blood purification	Juice	Oral
Citrus grandis (L.) Osb. [Rutaceae]; PG-398	Robab-tenga	0.17	Fr	Gastritis, pox, hypertension, cardiovascular disease	Juice	Oral
Citrus limon (L.) Burm. [Rutaceae]; PG-402	Kaji nemu	0.11	Fr	Antidiabetic, antidandruff, stomachic	Juice	Oral
Clerodendron colebrookianum Walp. [Verbenaceae]; PG-481	Nephaphu	0.43	L	Hypertension, menstruation pain	Decoction	Oral
Clerodendrum infortunatum L. [Lamiaceae]; PG-486	Dhopat tita	0.03	R	Pneumonia	Paste	Oral
Clitoria ternnatea L. [Papilionaceae]; PG-587	Boga aparajita	0.02	R	Abortive, stomachic, bleeding, pinworm, alzheimer	Raw,	External
Coccinia grandis (L.) Voigt. [Cucurbitaceae]; PG-258	Kunduli	0.02	Fl, Fr, L	Hypertension, antidiabetic, ear infection	Vegetable, paste	Oral, external
Colocasia esculenta (L.) Schott [Araceae]; PG-47	Kosu	0.03	L, St	Hypertension, anemia, tonic	Vegetable	Oral
Corchorus capsularis L. [Tiliaceae]; PG-121	Morapat	0.07	YT	Fever	Paste	External
Cheilocostus speciosus (Koen. ex.Retz.) J.E.Smith [Costaceae]; PG-127	Jom lakhuti	0.14	L	Ear pain	Juice	Oral, external
Croton joufra Roxb. [Euphorbiaceae]; PG-227	Goch-mahudi	0.15	B	Pneumonia, fever, dysentery, stomachic	Decoction	Oral
Cucurbita pepo L. [Cucurbitaceae]; PG-257	Ronga lao	0.01	Fr, T	Anemia	Vegetable	Oral
Curcuma aromatica Salisb. [Zingiberaceae]; PG-133	Bon-halodhi	0.2	Rh	Body pain, cough, internal healing, skin problem	Paste	Oral, external
Curcuma caesia Roxb. [Zingiberaceae]; PG-135	Kola-halodhi	0.07	Rh	Gastritis, menstruation pain, bone fracture	Paste	Oral, external
Curcuma zedoaria Rosc. [Zingiberaceae]; PG-136	Borahu	0.02	Rh	Piles, gastric	Pill	Oral
Cuscuta reflexa Roxb. [Cuscutaceae]; PG-518	Akashi-lota	0.08	St	Jaundice, tonsilitis, bone fracture, paralysis	Paste, decoction	External
Cynodon dactylon (L.) Pers. [Poaceae]; PG-111	Dubori bon	0.07	Wh	Menstruation pain, cough, tonic, eye problem	Juice	Oraal
Dactylotenium aegypticum (L.) P. Beauv. [Poaceae]; PG-104	Bobosa bon	0.03	Wh	Piles, skin infection	None	External
Datura metel L. [Solanaceae]; PG-530	Kola dhatura	0.01	L	Arthritis	Infusion	External

Scientific name [Family]; Voucher No.	Common name	Use Value	Part Used	Application	Method of preparation	Route of administration
Dendrocnide sinuata (Bl.) Chew. [Urticaceae]; PG-326	Bor Surat	0.01	Fl	Allergies, skin infection	Vegetable	Oral
Delonix regia (Bojer) Rat. [Caesalpinaceae]; PG-589	Krishna chura	0.01	B	Cough	Decoction	Oral
Dillenia indica L. [Dilleniaceae]; PG-160	Ow-tenga	0.14	Fr	Antidiabetic, hypertension, pox	Decoction	Oral
Dracena angustifolia Roxb. [Agavaceae]; PG-590	Hati-kuhiar	0.09	St	Jaundice	Juice	Oral
Drymeria cordata (L.) Wild.ex Roem.et.Schult. [Caryophyllaceae]; PG-176	Lai-jabori	0.23	Wh	Urinary infection, leucorrhoea, piles, sinusitis, skin irritation	Juice, paste, fragrance	External
Dryopteris filix-mas (L.) Schott [Dryopteridaceae]; PG-591	Bihlogoni	0.13	L	Pneumonia, fever, recovery(female after giving birth),anthelmintic	Decoction	Oral
Eclipta prostrata (L.) L. [Asteraceae]; PG-549	Keheraj	0.02	Wh	Bleeding, leucorrhea, hairfall	Paste	Oral, external
Elaeocarpus floribundus Bl. [Elaeocarpaceae]; PG-205	Jolphai	0.02	Fr	Antidiabetic	Raw	Oral
Enhydra fluctuens Lour. [Asteraceae]; PG-552	Helos	0.01	S	Antidiabetic, hypertension	Raw	Oral
Eryngium foetidum L. [Apiaceae]; PG-577	Man dhania	0.02	L	Purgative, diuretic, wound healing	Juice	Oral
Erythrina stricta Roxb [Fabaceae]; PG-288	Ronga modar	0.02	L	Jaundice	Juice	Oral
Euphorbia hirta L. [Euphorbiaceae]; PG-228	Gakhiroti bon	0.03	TS	Galactogogue to nursing mother	Vegetable	Oral
Euphorbia ligularia Roxb. [Euphorbiaceae]; PG-229	Siju	0.03	L, Ex	Stomachic, cough, finger swelling	Decoction	Oral, external
Ficus auriculata L. [Moraceae]; PG-304	Dimoru	0.06	L	Diarrhea, stomachic, tonic	Decoction	Oral
Ficus racemosa L. [Moraceae]; PG-309	Maudimoru	0.06	L	Fever, recovery(female after giving birth), detoxification	Decoction	Oral
Flacourtia jangomas (Lour) Rauesch.[Flacourtiaceae]; PG-211	Poniyol	0.03	Fr	Antidiabetic, anemia	Raw	Oral
Garcinia morella Roxb.ex.DC [Clusiaceae]; PG-218	Kuji thekera	0.38	Fr	Chronic dysentery, diarrhea, tonic	Smoke, infusion	Oral
Garcinia pedunculata Roxb. [Clusiaceae]; PG-219	Bor thekera	0.03	Fr	Stomachic	Smoke, infusion	Oral
Garcinia xanthochymus Hook.f. [Clusiaceae]; PG-220	Tepor tenga	0.07	Fr	Dysentery, pinworm	Juice	Oral
Grewia serrulata DC [Tiliaceae]; PG-371	Kukurhuta	0.02	L	Cut and wound	Paste	External
Gomphrena celosioides Mart. [Amaranthaceae]; PG-166	Leheti	0.02	TS	Antidiabetic	Vegetable	Oral
Stenoclaena palustris(Burm.f.) Bedd [Blechnaceae]; PG-592	Bonjaluk	0.04	TS	Menstruation pain	Decoction	Oral
Hibiscus rosa-sinensis L. [Malvaceae]; PG-366	Jobaphul	0.21	Fl, L	Fever, menstruation pain, leucorrhoea, hair problem	Paste	Oral, external
Hibiscus sabdariffa L. [Malvaceae]; PG-372	Tengamora	0.08	L	Dysentery, Stomachic, Anemia	Vegetable	Oral
Houttuynia cordata Thunb. [Saururaceae]; PG-13	Mosondori	0.43	YT	Dysentery, diarrhea, stomachic	Paste	Oral
Hydrocotyle sibthorpioides Lam. [Araliaceae]; PG-580	Soru manimuni	0.33	Wh	Strengthens muscles, Dysentery, Stomachic, Hypertonic, Leucorrhoea	Paste	Oral, external
Ichnocarpus frutescens R.Br. [Apocynaceae]; PG-437	Dudhkori lota	0.02	Wh	Galactogogue	Vegetable	Oral
Impatiens tripetala L. [Balsaminaceae]; PG-414	Damdeuka	0.1	R, St, L	Menstruation, leucorrhea, jaundice, skin burn, irritation	Paste	Oral, external
Ipomoea aquatica Forsk. [Convolvulaceae]; PG-520	Pani-kolmow	0.03	T	Anemia	Vegetable	Oral
Jatropha curcus L. [Euphorbiaceae]; PG-231	Bongali era	0.12	St, Ex	Toothache, skin problem	Raw	Oral, external
Justicia adhatoda L. [Acanthaceae]; PG-465	Boga-bahok	0.09	L	Cough	Decoction	Oral

Scientific name [Family]; Voucher No.	Common name	Use Value	Part Used	Application	Method of preparation	Route of administration
Kalanchoe pinnata (Lam.) Pers. [Crassulaceae]; PG-163	Dupor tenga	0.37	L	Urethral stone, fever	Raw, paste	Oral, external
Lagenaria siceraria (Molina) Standl. [Cucurbitaceae]; PG-262	Jati-lao	0.04	T	Piles, hypertension	Juice	Oral
Lasia spinosa (L.) Thw. [Araceae]; PG-49	Chengmora	0.04	Bu, R	Recovery after child birth, cough, pneumonia	Vegetable	Oral
Lawsonia inermis L. [Lythraceae]; PG-330	Jetuka	0.05	L	Skin infection	Paste	External
Lepisanthes erecta (Thw.) Leenh. [Sapindaceae]; PG-409	Tulutha	0.02	R	Urinary infection	Paste	Oral
Leucas aspera (Willd.) Link [Lamiaceae]; PG-491	Durun	0.54	L	Sinusitis, apetizer, cough, bleeding, pox, gastritis	Juice, fragrance	Oral/Nostril
Lindernia pusilla (Willd.) Bold. [Scrophulariaceae]; PG-497	Gakhiroti bon	0.08	Wh	Lactating agent	Vegetable	Oral
Lindernia ruellioides (Colsm.) Pennell [Linderniaceae]; PG-498	Kachidoria bon	0.01	Wh	Ear pain	Juice	External
Litsea salicifolia (Roxb. ex Nees) Hook.f. [Lauraceae]; PG-24	Dighloti	0.02	L	Dysentery, flatulence	Decoction	Oral
Luffa acutangula (L.) Roxb. [Cucurbitaceae]; PG-259	Jika	0.01	S	Sinusitis	Juice	Oral
Lygodium flexuosum (L.) Sw. [Lygodiaceae]; PG-594	Kopou dhekia	0.01	L	Anthelmintic, insect repellant	Raw	External
Macrosolen cochinchinensis (Lour.) Tiegh. [Loranthaceae]; PG-165	Roghumola	0.02	L	Jaundice, menstruation pain	Juice	Oral
Magnifera indica L. [Anarcardiaceae]; PG-385	Aam	0.01	L	Antidiabetic, stomachic	Decoction	Oral
Manihat esculenta Crantz. [Euphorbiaceae]; PG-222	Himolu alu	0.04	B, Ex	Cancer, leucorrhea, eye problem	Paste	Oral, external
Mentha arvensis L. [Lamiaceae]; PG-479	Pudina	0.07	L	Urinary infection, stomachic, anti-germicidal, toothache	Paste, infusion	Oral
Messua ferrea L. [Clusiaceae]; PG-221	Nahor	0.01	B	Piles	Infusion	Oral
Microsorum punctatum (L.) Copel. [Polypodiaceae]; PG-595	Kollong	0.01	L	Purgative, diuretic, wound healing	Juice	Oral
Mikania micrantha Kunth. [Asteraceae]; PG-558	Premlota	0.14	L	Chronic dysentery, diarrhea, cut and wound	Juice	Oral
Mimosa pudica L. [Mimosaceae]; PG-292	Lajuki lota	0.12	L, R	Menstruation pain, cut, cancer, dysentery	Juice	Oral
Mimosops elengi Roxb. [Sapotaceae]; PG-425	Bokul	0.01	L	Pyrrohoea	Paste	Oral
Momordica charantia L. [Cucurbitaceae]; PG-260	Tita-kerela	0.06	T, Fr	Stomachic, antidiabetic	Vegetable	Oral
Moringa oleifera Lamk. [Moringaceae]; PG-596	Sojina	0.04	L, B	Tonic, blood purification, anthelmintic	Vegetable	Oral
Morus alba L. [Moraceae]; PG-313	Nuni	0.02	Fr	Menstruation pain	Raw	Oral
Murraya koenigii (L.) Spreng [Rutaceae]; PG-404	Narasingha	0.22	L	Anemia, stomachic, arthritis, piles	Paste	Oral
Musa balbiciana Colla [Musaceae]; PG-131	Athia kol	0.37	Rh, St, L, Fr, Fl	Toothache, stomachic, anemia, blood dysentery, pinworm, tonic	Raw	Oral
Musa sapientum L. [Musaceae]; PG-132	Kach kol	0.07	Fr	Constipation, dysentery, stomachic	Vegetable	Oral
Myrica esculenta Buch.-Ham. Ex D. Don [Myricaceae]; PG- 297	Noga tenga	0.01	B	Pyrrhoea, toothache	Powder	Oral
Nyctanthes arbor-tristis L. [Oleaceae]; PG-527	Sewali phul	0.23	Fl, L	Hypertension, detoxification, cough, fever, stonachic	Raw, juice	Oral
Ocimum tenuiflorum L. [Lamiaceae]; PG- 493	Tulsi	0.31	L	Cough, stomachic, anthelmintic	Raw, juice	Oral
Oxalis corniculata L. [Oxalidaceae]; PG-208	Tengeshi	0.07	Wh	Stomachic	Paste	Oral
Oxalis corymbosa DC. [Oxalidaceae]; PG-209	Bor tengeshi	0.07	Wh	Stomachic	Vegetable	Oral

Scientific name [Family]; Voucher No.	Common name	Use Value	Part Used	Application	Method of preparation	Route of administration
Paederia scandens(Lour) [Rubiaceae]; PG-459	Bhedailota	0.5	L	Anemia, stomachic, arthritis, piles,post maternity treatment, bleeding	Vegetable	Oral
Peperomia pellucida L. [Peperomiaceae]; PG-11	Ponow-nowa	0.02	Wh	Tonic, blood purification, antioxidant	Juice	Oral
Phlogacanthus thyrsiformis(Hardw.) Mabb. [Acanthaceae]; PG-469	Tita phul	0.02	Fl, L	Stomachic, gastritis, detoxfication, anemia, skin infection	Decoction	Oral
Phyllanthus emblica L. [Euphorbiaceae]; PG-228	Amlakhi	0.1	Fr	Antidiabetic, tonic, hair problem	Raw	Oral
Phyllanthus fraternus G.L.Webster [Phyllanthaceae]; PG-229	Bhui amlakhi	0.09	Wh, L, T	Menstruation pain, Urinary infection	Juice	Oral
Phyllanthus virgatus G. Forst. [Phyllanthaceae]; PG-230	Pani amlakhi	0.02	Fr	anti-cancer, anti-oxidant	Juice	Oral
*Physalis minima*L. [Solanaceae]; PG-533	Pokmo	0.02	Wh, R	Menstruation pain, Urinary infection	Paste	Oral
Piper betle L. [Piperaceae]; PG-7	Pan	0.09	L	Cough	Infusion	Oral
Piper longum L. [Piperaceae]; PG-8	Peepoli	0.09	S	Asthma, cough	Paste	Oral
Piper nigrum L. [Piperaceae]; PG-9	Jaluk	0.18	Fr	Anti-cancer, Fever, Pneumonia	Paste, decoction	Oral
Plumbago zeylanica L. [Plumbaginaceae]; PG-182	Agiasit	0.02	R	Tonsilities, skin cancer	Milk infusion	Oral
Pogostemon benghalensis (Burm.f.) Kuntze [Lamiaceae]; PG-492	Sukloti	0.31	L	Bleeding, hypertension, indigestion	Vegetable	Oral
Polygonum chinense L. [Polygonaceae]; PG-188	Modhu-solang	0.02	L	Stomachic, tonic	Vegetable	Oral
Polygonum glabrum Wild. [Polygonaceae]; PG-190	Bihlogoni	0.13	L	Anthelmintic, insect repellant	Raw	External
Pouzolzia zeylanica (L.) Benn. & R. Br. [Urticaceae]; PG-329	Borali bukua	0.13	Wh	Sprain, cut and wounnds	Paste	External
Psidium guajava L. [Myrtaceae]; PG-345	Modhuri am	0.49	L	Chronic dysentery, Diarrhoea, Pyrrohoea	Raw	Oral
Punica granatum L. [Punicaceae]; PG-336	Dalim	0.15	Bu	Chronic dysentery, anemia,blood purifier	Raw, smoke	Oral
Rhynchostylis retusa (L.) Bl. [Orchidaceae]; PG-79	Kopou-phul	0.02	L	Ear pain	Juice	External
Ricinus communis L. [Euphorbiaceae]; PG-233	Era gos	0.02	S	Arthritis, hair problem	Oil infusion	External
Rubus alceifolius Poir [Rubiaceae]; PG-321	Jetuli-poka	0.02	R	Pneumonia, cough	Paste	Oral
Saccharum officinarum L. [Poaceae]; PG-120	Kuhiya	0.09	St	Jaundice, tonic	Juice	Oral
Sapindus mukorossi Gaertn. [Sapindaceae]; PG-408	Moni-chal	0.03	S	Pharyngitis, cough, hair problems	Decoction	Oral, external
Sarcochlamys pulcherrima (Roxb.) Gaud [Urticaceae]; PG-330	Mechaki	0.05	L	Stomachic, galactogogue, dysentery, hypolipidemic	Decoction	Oral
Sauropus androgynus (L.) Merr. [Euphorbiaceae]; PG-249	Bari-sundari	0.05	L	Antidiabetic	Vegetable	Oral
Schumannianthus dichotomus (Roxb.) Gagnep [Marantaceae]; PG-129	Patidoi	0.01	Bu	Leucorrhea	Paste	Oral
Scoparia dulcis L. [Scrophulariaceae]; PG-500	Cheni-bon	0.08	L	Leucorrhea, cough, pneumonia, piles	Juice	Oral
Selaginella kraussiana (Kunze) A. Braun [Selaginellaceae]; PG-597		0.02	L	Leucorrhea, Jaundice	Juice	Oral
Sida acuta Burm.f. [Malvaceae]; PG-376	Sonborial	0.02	L	Jaundice	Juice	*Oral*
Smilax perfoliata Lour. [Smilaceae]; PG-66	Tikoni-borua	0.03	St	Antidiabetic, blood purifier	Vegetable	Oral
Solanum esculentum Mill. [Solanaceae]; PG-533	Soru bilahi	0.03	Wh	Burning, irritation	Juice	External
*Solanum indicum*L. [Solanaceae]; PG-534	Tita bhekuri	0.03	Fr	Blood purifier, stomachic	Vegetable	Oral

Scientific name [Family]; Voucher No.	Common name	Use Value	Part Used	Application	Method of preparation	Route of administration
Spilanthes acmella (auct.nonL.) Merr. [Asteraceae]; PG-564	Bonoria malkathi	0.23	Fr	Tuberculosis, tongue infection, internal wound healing	Infusion	Oral
Spondias pinnata (L.f.) Kurz. [Anacardiaceae]; PG-387	Amora	0.18	St, B, L, Fr	Dysentery, stomachic, Anemia, Piles	Paste, raw	Oral
Stenoclaena palustris(Burm.f.) Bedd [Blechnaceae]; PG-598	Ronga lota	0.03	L	Pneumonia, bodyache	Powder	
Syzygium cumini (L.) Skeels [Myrtaceae]; PG-344	Kola jamuk	0.28	Fr, S, B	Antidiabetic, piles	Raw, paste, infusion	Oral
Tabernaemontana divaricata (L.) R.Br. Ex Roem.et Schult. [Apocynaceae]; PG-443	Kothona phul	0.08	R	Fever, Cough, Pneumonia	Paste	Oral
Tagetes erecta L. [Asteraceae]; PG-566	Narji	0.08	L	Cut and wound	Paste	External
Tamarindus indica L. [Caesalpinaceae]; PG-599	Teteli	0.08	Fr, L	Hypertension, fever, bone fracture	Water infusion, paste	Oral, external
Terminalia arjuna (Roxb ex DC) Wight & Arn. [Combretaceae]; PG-51	Arjun	0.29	B	Cardiovascular disease, piles	Infusion	Oral
Terminalia chebula Retz. [Combretaceae]; PG-55	Hilikha	0.12	Fr	Pinworm, stomachic, anemia, constipation	Eaten raw	Oral
Thunbergia coccinea Wall. [Thunbergiaceae]; PG-473	Sunga lota	0.01	Bu	Stomachic	Paste	Oral
Tinospora cordifolia (Willd.) Hook.f. & Th. [Menispermaceae]; PG-149	Amarlota	0.12	St	Antidiabetic, bone fracture	Water infusion	Oral, external
Trachyspermum ammi (L.) Sprague [Apiaceae]; PG-581	Ajwain	0.01	S	Indigestion, gastritis	Infusion	Oral
Trigonella foenum-graecum L. [Fabaceae]; PG-266	Methi	0.07	L, S	Antidiabetic	Vegetable	Oral
Vitex negundo L. [Verbenaceae]; PG-495	Pochotia	0.16	L	Cough, insect repellant, stomachic, bone fracture, internal healing	Decoction, paste	Oral
Xanthium strumarium L. [Asteraceae]; PG-570	Agoru	0.05	S, R	Internal wound healing	Juice	Oral
Zanthoxylum nitidum (Roxb.) DC [Rutaceae]; PG-403	Tezmuri	0.35	R, St, B	Pneumonia, Fever, Cough, Toothache	Paste, decoction	Oral
Zingiber officinale Rosc. [Zingiberaceae]; PG-139	Moran ada	0.14	Rh	Whooping cough	Paste	Oral
Zizyphus mauritiana Lamk. [Rhamnaceae]; PG-316	Bogori	0.05	Fr	Pneumonia, fever, cough, Toothache, piles	Raw	Oral

L—Leaf | Wh—Whole plant | Sh—Shoot | Ex—Exudate | St—Stem | B—Bark | Fr—Fruit | Fl—Flower | R—Root | Bu—Bulb | S—Seed | Rh—Rhizome | La—Latex

Table 4. List of threatened species used by ethnic tribes in Dibrugarh District.

Taxon	Red List
1. *Acorus calamus* L.	VU
2. *Clerodendrum colebrookianum* Walp.	VU
3. *Messua ferrea* Linn.	VU
4. *Sapindus mukorossi* Gaertn.	VU
5. *Alstonia scholaris* R.Brown.	NT
6. *Terminalia chebula* (DC) W & A	NT
7. *Artocarpus lakoocha* Roxb.	NT
8. *Cinnamomum tamala* Nees & Ebern	LC
9. *Cissampelos pareira* Linn.	LC
10. *Curcuma caesia* Roxb.	CR
11. *Garcinia pedunculata* Roxb.	EN
12. *Rhyncostylis retusa* (L.)	EN

Asteraceae to be the leading family with the highest number of medicinal plants. Similarly, family Lamiaceae, Apocynnaceae, Cucurbitaceae, Amaranthaceae, Zingiberaceae, Moraceae were represented by five species each, family Apiaceae, Poaceae by four species each and family Acanthaceae, Urticaceae, Rubiaceae, Scrophulariaceae, Piperaceae were represented by three species each. The remaining 59 families contributing (82 species, 48.94%) have one or two species (Table 5). The medicinal plants that were used in various forms to cure different human ailments were plant paste (55 species, 31.6%) which was the most commonly used followed by juice (38 species, 21.83%), vegetable (30 species, 17.24%), decoction (26 species, 14.94%), eaten raw (24 species, 13.79%), infusion (17 species, 9.77%), smoke (3 species, 1.72%), pill (three species, 1.72%) and powder

Table 5. Category wise distribution of various medicinal plant taxa in Dibrugarh District.

Family	Number of genera	Percentage of genera	Number of species	Percentage of species
Euphorbiaceae	7	4.02	10	5.74
Asteraceae	8	4.59	8	4.59
Araceae	6	3.44	7	4.02
Rutaceae	4	2.29	7	4.02
Lamiaceae	5	2.87	5	2.87
Apocynaceae	5	2.87	5	2.87
Cucurbitaceae	5	2.87	5	2.87
Amaranthaceae	4	2.29	5	2.87
Zingiberaceae	3	1.72	5	2.87
Moraceae	3	1.72	5	2.87
Apiaceae	4	2.29	4	2.29
Poaceae	4	2.29	4	2.29
Solanaceae	3	1.72	4	2.29
Acanthaceae	3	1.72	3	1.72
Urticaceae	3	1.72	3	1.72
Rubiaceae	3	1.72	3	1.72
Scrophulariaceae	3	1.72	3	1.72
Piperaceae	1	0.57	3	1.72
Other 59 families	71	57.57	82	48.94
78	**147**	**100%**	**174**	**100%**

and fragrance (two species, 1.14%) each (Figure 4). For improving the palatability, honey is used as an additive by the healer which is also used for enhancing the taste of local medicines (Debbarma et al. 2017). It was found that most of the herbal preparations were given orally to cure human ailments except dermatological problems. No standardized measure for dosage consumption of medicines was prescribed by the healers in the study area. They were recommended with specific guidelines and care so that the medicine worked effectively without causing any internal problems. Examples were also cited by the healers where excessive dosage of *Cheilocostus speciosus* may lead to deafness and excessive consumption of *Clerodendrum colebrookianum* may cause low blood pressure in patients.

Use value (uv)

The most commonly used species were *Leucas aspera* (Roth) Spr with 0.54 use value and *Paederia scandens* (Lour) with 0.5 use value; they were followed by *Psidium guajava* L. with 0.49 use value, *Hottuynia cordata* Thunb. and *Clerodenndron colebrookianum* Walp. with a use value of 0.43 each, *Garcinia Morella* Roxb. ex. DC with 0.38 use value, *Kalanchoe pinnatum* (Lam.) Pers. with 0.37 use value, *Zanthoxylum nitidum* (Roxb.) DC with 0.35 use value and *Hydrocotyl sibthorpioides* Lam. with 0.33 use value. The most rarely used medicinal plants were *Phyllanthus fraternus* Webst, *Phlogacanthus thyrsiformis* (Hardw.) Mabb., *Scoparia dulcis* L., and *Lepisanthes erecta* (Thw.) Leenh., which had use values from 0.09 to 0.02. Some medicinal plants used by the ethnic communities for treating basic ailments have received many reports about their medicinal uses. The relative importance is reflected in the use values of these medicinal plants. *Leucas aspera* (Roth.) Spr. is a useful tropical plant which is harvested from the wild for local use, primarily as a medicine, but also as a food and insect repellant. It is sometimes cultivated in home gardens for local uses and as a pot herb. The plant is used traditionally as an antipyretic and insecticide (Prajapati et al. 2010). The root decoction of *Paederia scandens* (Lour.) is used to cure diarrhea and dysentery (Sen & Behera 2008). All parts of the plant have been used for different purposes: hepatoprotection, antioxidant, anti-inflammatory, anti-spasmodic, anti-cancer, anti-microbial, anti-hyperglycemic, analgesic, endothelial progenitor cells, anti-stomachic, and anti-diarrhea (Barbalho et al. 2012). The extract of *Hottuynia cordata*

Table 6. Informant consensus factor (F_{IC}) of the diseases reported by the informants.

Disease category	Use reports (N_{ur})	No. of taxa (N_t)	F_{IC}
Digestive system	176	93	0.76
Oral and dentistry	24	7	0.73
Heart and vascular system	88	26	0.72
External injuries	105	30	0.72
Hematology	88	26	0.71
Respiratory system	104	33	0.68
Infection and immunization	59	19	0.68
Pulmonary disease	60	20	0.67
Dermatological	76	27	0.65
Musculoskeletal and nervous system	20	8	0.63
Urinogenital and venereal	181	79	0.57
Endocrinology	82	36	0.56
Other (fever, cold, cough)	122	55	0.56

Thunb. is given for stomach ache (Kagyung et al. 2009). Most of the medicinal plants used by the Assamese community in Dibrugarh District were also reported in the previous studies on ethnobotany of medicinal plants used by Assamese people for various skin ailments and cosmetics (Saikia et al. 2006), ethnomedicine used by Mishing tribes of Dibrugarh District (Baruah & Kalita 2007), and some ethnomedicine used by the Tai Ahom of Dibrugarh District (Kalita & Baruah 2010). The application of each medicinal plant which was presented in our study, however, was found to be much more than what was presented in the earlier literatures. This may be due to the different number of informants interviewed during the survey. There is no report of some plants in the previous studies (Saikia et al. 2006; Talukdar et al. 2017) but have high use value such as *Leucas aspera* (Roth) Spr, *Paederia scandens* (Lour.), *Houttuynia cordata* Thunb., *Clerodendron colebrookianum* Walp. This may be due to different traditional knowledge practices that have been passed from generation to generation within the family circle.

Informants consensus factor (f_{ic})

Informants consensus analysis provides a measure of availability for the given evidence of data collection in the ethnomedicinal studies (Malla & Chhetri 2012). In this present investigation, the medicinal plants used to treat different ailments in the Dibrugarh District of Assam were classified into 13 ICPC (International Classification of Primary Care) disease categories (https://www.who.int/classifications/icd/adaptations/icpc2/en/) and the F_{IC} value of each and every disease category was calculated and depicted (Table 6). In the study, the digestive system disorder category showed the greatest agreement with an F_{IC} of 0.76%. It was followed by oral and dentistry category (0.73%), heart and vascular system (0.72%), external injuries (0.72%), hematology (0.71%), respiratory system (0.68%), infection and Immunization (0.68%), pulmonary disease (0.67%), dermatological (0.65%), musculoskeletal & nervous system (0.63%), and urinogenital & venereal (0.57%). The least agreement between the informants was recorded in the responses related to endocrinology and others (fever, cold, cough) both representing 0.56%. Previously various authors followed this F_{IC} value as a significant tool to carry out respective ethnobotanical work (Inta et al. 2013; Singh et al. 2014; Mall et al. 2015; Hosseini et al. 2017). These works show a high level of agreement among the various ethnic communities of the state of Assam having a rich traditional knowledge with diversified flora as well as fauna along with colourful culture and tradition.

CONCLUSIONS

The present investigation represents an array of information about the rich indigenous knowledge of traditional medicine and ethnobotanical potential of the various plants used by the tribal people of Dibrugarh District. A contribution of total 174 plants against 13 different disease categories has been listed. Most of these plant species belong to different families of angiosperms except three from Pteridophyta. The traditional healers and elderly villagers had given high indication scores (use value) for the plants, viz., *Leucas aspera*, *Paederia foetida*, *Psidium guajava*, *Houttuynia cordata*, *Clerodendron colebrookianum*, *Garcinia morella*, *Zanthoxylum nitidum*, *Kalanchoe pinnatum*, *Musa balbiciana*, and *Pogostemon benghalensis* have been accepted by the people as highly useful in traditional health-care practices in Dibrugarh District. Further, statistical analysis of the ethnomedicinal plants carried out by calculating their use value and informant consensus factor, have confirmed their relative importance and efficiency towards curing various ailments in Dibrugarh District. So, the plants with ethnomedicinal properties must be chemically tested for correct identification of bioactive compounds which can be further used for drug designing. This will be a great contribution to pharmaceutical and herbal industries for betterment of mankind. From the conservation

point of view, the present work will be a new insight in creating awareness and setting management strategies for the ethnomedicinal plants and the floristic diversity of Dibrugarh District.

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