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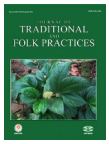

Journal of Traditional and Folk Practices

A survey on ethnomedicinal plants used by forest dependent communities of the south western part of West Bengal, India

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Abstract

The present communication deals with the observation and documentation on ethnomedicinal uses of wild plants by different socio-cultural groups of the south western part of Bengal. Information was recorded from interviewing different tribal healers by semi-structured open-ended questionnaire method. The vegetation index and location map were prepared by GIS technology. The collected data was analyzed by different statistical tools like Informant Consensus Factor (ICF), Fidelity Level (FL%), Use Value (UV), Consensus value for Plant Part (CPP), and Relative Frequency Citation (RFC). Total 119 numbers of species have been recorded which are used by tribal people for twelve large disease categories. Gastrointestinal (0.66) and respiratory (0.58) diseases are secure the highest ICF value. 84 species identified with 100% FL value and highest RFC value is recorded for *Calotropis gigantea* (L.) W.T Aiton and 55 species are noted as highest Use Value. This study enlightens the important species which is a primary step of any drug preparation.

Keywords: Ethnomedicine, NDVI, Quantitative tool, South west bengal, Tribes, Traditional knowledge

1. Introduction

'*Our country is a great Botanical garden of the world',* that gives us different herbal medicines from a very earlier time. There are approximately 47,513 numbers of plant species present in India (Singh and Dash, 2014). Among them, approximately 17,512 species are considered flowering plants (Karthikeyan, 2009) and according to the Botanical Survey of India about 8000 species are identified as medicinal plants. Medicinal plants play an important role in supporting the healthcare system from the very beginning (Van der Merwe *et al.*, 2001). The earlier "*Rig Veda*" (4500-600 B.C.) is the oldest repository of human knowledge regarding various herbal drugs. Indian eminent herbalist, 'Maharshi Charaka' worked on therapeutic uses of these different herbal drugs for different ailments of the human body. Later on, it is reported that healers use near about 2500 plant species as regular sources of medicine (Sheng-Ji, 2001). Additionally, World Health Organization (WHO) has explained that 80% of the rural populations in developing countries utilize traditional medicinal plants for their health care. In recent times, some immemorial plants are invented for medicinal use by some traditional herbalists like '*Vaidya*'. Medicinal plants have increased demand in the international market because they are cheap, easily available and no side effects. For that reason, some fraudulent businessmen can make their profits from the marketing of adulterated herbal drugs (Prakash *et al.*, 2013; Sagar, 2014). Throughout the previous century, allopathic treatments are used in India but if we consider remote areas of West Bengal most of the people are still now primarily dependent upon herbal

treatments. The recitation of previous literature it was found that documentation of ethnobotanical works has been done by different authors from these study areas (Ghosh, 2003, 2008; Datta *et al.*, 2014; Mandal *et al.*, 2014; Sannigrahi, 2014; Chaudhury *et al.*, 2018; Das Dutta and Bhakat, 2018; Manna and Mishra, 2018; Raj *et al.*, 2018). The quantitative study of ethnobotany is a new approach in this field to analyze the ethnobotanical data. Limited work with this approach was done in this region, where authors were mainly focused on particular community (Rahaman and Karmakar, 2015; Chaudhury *et al.*, 2017; Chaudhury *et al.*, 2018) and little international work was done (Chang *et al.*, 2017; Muhammad *et al.*, 2017; Faruque *et al.*, 2018). So, the exploration, documentation, utilization, restoration and conservation of these ethnobotanical resources are very much essential due to rapid civilization.

The present attempt was carried out in the south western part of West Bengal (Fig. 1) containing 5 districts *viz.* Purba Midnapore, Paschim Midnapore, Jhargram, Purulia and Bankura, in which Paschim Midnapore, Jhargram and Purulia districts are occupied by the maximum range of forest. The predominant species in this area is *Shorea robusta* Gaertn. The total area of Purulia district is about 6,259 sq. km out of this area 889 sq. km covered by forest. There are some scattered hills present in Purulia. Among them, Baghmundi and Ajodhya hill range are well known. The highest hill peak (677 meters from sea level) is present in Ajodhya, and it is the extension of the north-eastern part of the Chota Nagpur plateau. In the Baghmundi area, the average height of the hill is 300 meters and the hilly region is dissected by Kansaboti and Subarnarekha Rivers. Here, the temperature falls in winter up to 7^0C and rises to nearly about 45^0C in summer. The annual rainfall is 1701 mm approximately. Due to this unique geographical territory, the selected areas have a high level of species richness.

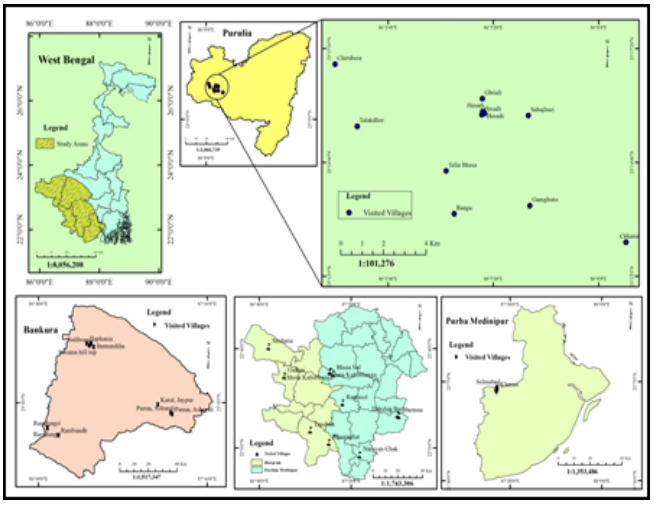

Fig. 1. Location map of study area

In Paschim Medinipur district, there are four forest divisions. Medinipur Forest Division has 50267.49 ha. of area divided into nine territorial ranges. Jhargram Forest Division comprising of 621 Sq. km areas and it is one of the oldest forest divisions of south west bengal. Kharagpur Forest Division is primarily a social forestry division constituted in 1982 with a view of implementing a social forestry scheme project throughout the Midnapore district. Rupnarayan Planning and Survey Division since November 1995 emerged as a territorial division and it is also implementing different schemes related to soil conservation and social forestry works. The forest under each Division is managed with the active cooperation of the Forest Protection Committees. Reserved forest and open scrub are largest in Medinipur Forest Division while protected forest which constitutes the highest percentage of total forest areas in Jhargram Forest Division and the un-classed forest area is largest in Kharagpur Division. Extremely rugged topography is seen in the western part of the district and rolling topography is seen in lateritic covered areas. Normal rainfall in the district is around 1400 - 1500 mm. The average temperature of the district varies widely across seasons, varying between the maximum of 39^0C and minimum 10^0C.

The total area of Bankura district is 6881.24 sq. km and out of these, 1404 sq. km areas are covered by forest. Biharinath and Susunia are two remarkable hills in this district and the average height is 439.5 m above sea level. It is mainly situated on the northwestern side of this district. Maximum temperature varies between 26ºC and 39ºC. Winter is generally dry and cold with an average winter temperature around 15º C. The annual average rainfall ranges between 130 cm and 140 cm.

Distribution of Tribal communities: As per the 2001 census in West Bengal scheduled tribes numbering 4,406,794 persons constituted 5.5 percent of the total population of the state. Santal constitutes more than half (51.8%) of the total ST populations of the state. Oraons (14%), Mundas (7.8%), Bhumij (7.6%) and Kora (3.2%) are the other major ST communities having considerable population. The Lodhas, Mahalis, Bhutias, Bedias, and Savars are the remaining STs, and having population of one percent or more as per 2001 census report. The concentration index of tribal community is more than 1.50 in Purulia, Bankura, west Midnapur districts of south Bengal and low (less than 0.75) in east Midnapore (Mandal and Chouhan, 2018). As per the census (2011), among the total tribal people, 16.12% live in paschim Medinipur. These tribal communities mainly depend on the forest for food, fodder, economy, medicine etc. Herbal medicine uses are very much common among the tribes due to the lack of modern medical facilities or poor socio-economic conditions. In this region, each tribe has its own culture, customs, languages and beliefs.

2. Materials and methods

The study was conducted from 2017 to 2020. According to the standard method (Jain, 1987; Jain and Mudgal, 1999) the ethnomedicinal data were collected from different informants (Fig. 2) *viz. ojhas, vaidays*, herbal practioner, tribal people and local herbal drug sellers. Areas and informants were selected with the strong recommendation of aged persons of the respective villages based on the availability of traditional healers. Pre-informed open-ended personal interviews were organized to understand the uses of medicinal plants, the important parts of those plants, disease therapy, local name etc. All this information was documented and presented here. During the interview, visiting the forest or freshly collected plants had been employed for the initial identification of medicinal taxa. Furthermore, the selected medicinal plants were properly identified with the help of an expert and some flora books (Prain, 1903; Sanyal, 1994; *Flora of West Bengal*, no date). The collected information through various interviews was cross-verified for testing authenticity of the uses with the help of some available literature (Rahaman and Karmakar, 2015; Muhammad, Muhammad and Mehmood Abbasi, 2017; Chaudhury, Singh and Rahaman, 2018; Faruque *et al.*, 2018). Total 37 informants of the rural communities were interviewed randomly and only those informants were considered here, who responded independently without any influences. The interviews were taken in the local Bengali language and the nomenclature of identified specimens was authenticated with the help of World Flora Online (worldfloraonline.org) website. Mainly the herbaceous specimens were processed for herbarium through proper procedures (Jain and Rao, 1977) and the rest of them took photographs. The herbarium was deposited to Vidyasagar University Herbarium, Dept. of Botany and Forestry, Midnapore. At the end location of the study sites (Fig. 1) and forest areas (Fig. 3) of five districts (NDVI calculation for vegetation study) were prepared with the help of GPS data by ArcGIS software version 10.5.

Fig. 2. Some pictures of tribal informants at the time of interview. a. Gour Hansda, Gamghutu b. Jadupati Rajak, Hesadi c. Srikanta Tudu, Ramdongry d. Nigru Kalindi, Hesadi e. Bulu Kalindi, Hesadi

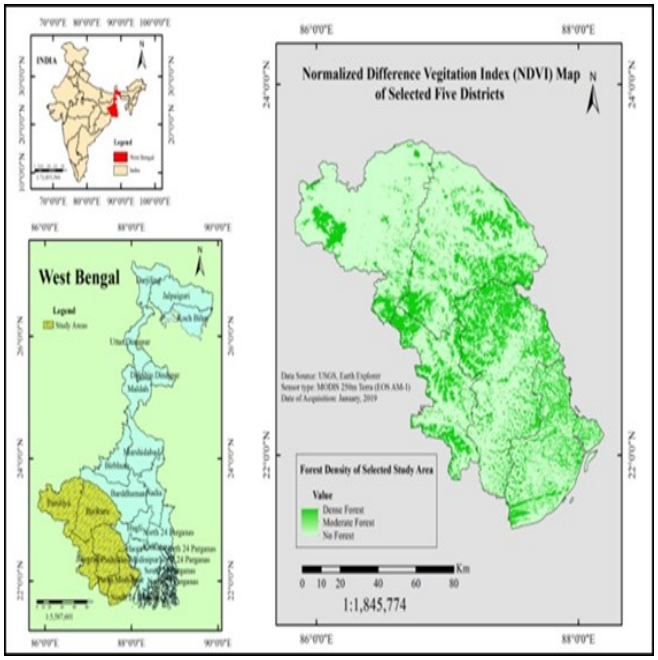

Fig. 3. Vegetation map of selected five districts by NDVI method

2.1. Quantitative analysis

The collected data from the informants were analyzed with various quantitative tools like ICF (Trotter and Logan, 1986), FL (Friedman *et al.*, 1986), UVs (Phillips and Gentry, 1993), CPP (Monteiro *et al.*, 2006), RFC (Tardío and Pardo-de-Santayana, 2008) for understanding in details the diversity of uses plant parts, administration process in different communities. The significant methods used here for calculating the different quantitative indexes are describing below.

2.1.1. Informant Consensus Factors (ICF): One of the most widely used tools is the factor of informant consensus (ICF). This concept was first described by Trotter and Logan (1986) and its current form is proposed by Heinrich, *et al*. (1998 & 2009) after some modification. The ICF was calculated as the total number of use reports from informants for a particular disease category (*Nur*) minus the number of species used for that disease category (*Nt*), divided by the total number of use reports from informants for a particular disease category (*Nur*) minus one.

It is express by a formula: $\boldsymbol{ICF} = \frac{\boldsymbol{Nur-Nt}}{\boldsymbol{Nur-1}}$

2.1.2. The Fidelity Level (FL%): Fidelity level is proposed Friedman *et al*. (1986) and used to determine the percentage of informants who claiming the use of a certain plant for a particular disease. FL was defined as the ratio between the number of informants who independently suggested that the use of a species for a particular ailment and the total number of informants who mentioned that species are used for other ailments.

It is expressed by the formula: **FL** = $\frac{Np}{N} \times 100$

Where Np = number of informants who cited the species for a particular disease.

N = total number of informants that cited the species is used to treat any other disease.

2.1.2. Use Value (UVs): It measures the proportion of informants who consider a species as most important. This idea was proposed by Phillips and Gentry (1993 a, b) and Philips *et al*. (1994).

It is calculated by the formula: $UV_s = \frac{\sum U}{N}$

Where, U is the number of uses mentioned by the informants for a given species.

N is the total number of informants interviewed.

2.1.3. Consensus value for Plant Part (CPP): Consensus value for Plant Part (CPP) defines the most important plant part, that is used by informants much more than other parts of the plant (Monteiro et al., 2006). It measures the percentage of agreement among informants who concerning the plant parts are used and is calculated as

CPP = (P / Pt) ×100.

Where, P = number of times a given plant part was cited.

Pt = total number of citations of all parts.

2.1.4. Frequency of Citation (FC) and Relative Frequency of Citation (RFC):

The FC was calculated as follows:

FC = (Number of times a particular species was mentioned)/ (total number of times that all species were mentioned) × 100.

The RFC index (Tardío and Pardo-De-Santayana, 2008) was evaluated by dividing the number of informants who mentioned the use of the species (FC) by the total number of informants participating in the survey (N). The RFC index ranges from "0" when nobody referred to a plant as useful to "1" when all informants referred to a plant as useful.

RFC = FC/N.

3. Results and discussion

Demographic features of the informants: In our investigation, total 321 user reports were noted from 37 informants belonging to different socio-cultural groups like General, SC, OBC-B, ST, *Santal, Bhumij, Kurmi, Munda, Lodha, Dhopa* and *Teli*. All the informants are male and they were classified into different categories *viz.* informant types, professions, age, education, experience as given in Fig. 4. In this demographic feature, 1st category was set based on the type of informant *viz.* THP, IP. 23 numbers of THP and 14 numbers of IP were recorded out of total informants. The informants were farmers, *vaidya*, tailors, plant sellers, and small businessman (Table 1) by profession. The 11 informants have primary school level education, 22 informants have secondary school level education and only 4 informants have high secondary education. Regarding age group, 30 or above 30 years old informants were independently participating in this program. The age of all informants was classified into 8 categories at ten years intervals. Category- 5 (61-70 years old) has the highest informant numbers (17). Besides that based on experience, informants were further classified into five categories on ten years interval, 15 or less than 15 years' experience (1st category), 16-25 years' experience (2nd category), 26-35 & 36-45 years' experience (3rd & 4th category). The last category (5th) possesses 10 informants having more than 45 years' of experience.

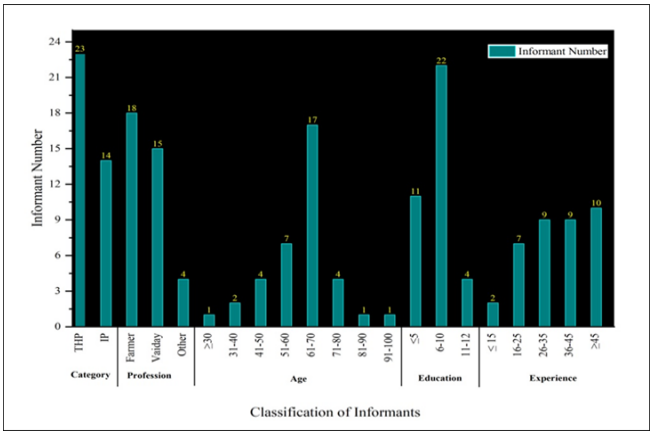

Fig. 4. Demographic information of all informants (THP- Traditional health practitioners, IP- Informative person)

3.1. Taxonomic classification

In the present work, I had found 119 species belong to 51 families and total 113 genera were documented which is used for the treatment of the different types of diseases in various tribal people. Most of the documented families belong to the angiosperm group but Peteridophyte and Gymnosperm represent only one species each. Out of the total angiosperm families, 4 families belong to

Monocotyledons and 45 families belong to Dicotyledons. Apocynaceae is represented as the most dominated plant family which possess 18 taxa, followed by Fabaceae (12 taxa), Euphorbiaceae (8 taxa), Combretaceae and Acanthaceae (5 taxa each), Asteraceae (4 taxa), Liliaceae, Malvaceae, Solanaceae, Verbenaceae, Rubiaceae (3 taxa each) and Amaranthaceae, Annonaceae, Nyctaginaceae, Menispermiaceae, Amaryllidaceae, Convolvulaceae, Myrtaceae (2 taxa each), whereas other families were represented only one taxa (Fig. 5).

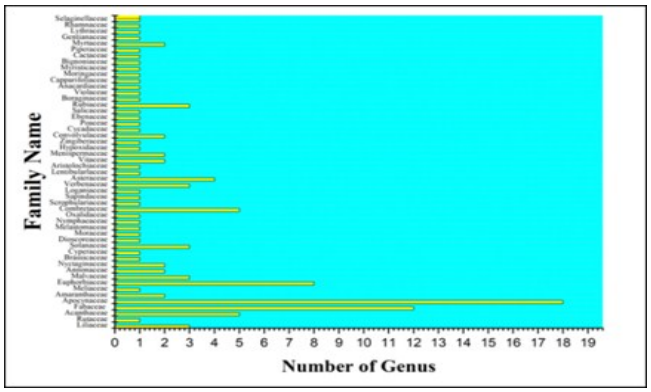

Fig. 5. Number of plant species in their representative family

It is also found that the maximum uses of medicinal plant species belonging to Apocynaceae and Fabaceae families for their wide range of distribution in this study area. The recorded species are categorized into four groups based on their habit *viz.* herb, shrub, climber and tree (Fig. 6). The herbaceous flora constitutes the highest contribution (35%), then tree (26.67%), a climber (20%) and shrub (18.33%) of the recorded plant species.

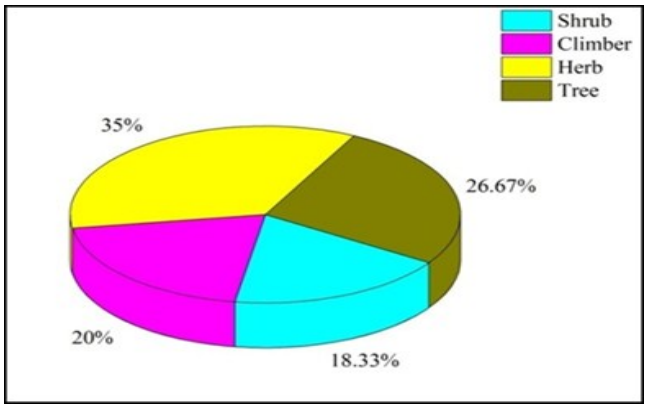

Fig. 6. Habit percentage of collected plants

3.2. Consensus value for Plant Part (CPP)

The various plant parts like root, leaf, fruit, flower, bark, even whole plant are frequently used for the treatment of diseases. Although all plant parts are significant for the treatment of different ailments in the present investigation roots (24%) and leaves are maximum (22%) CPP value (Fig. 7). Apart from that, the uses of whole plant (14.1%), bark (11.2%), fruit (7.3%), seed (6.8%), latex, flower (4.5% each), stem (3.9%) and tuber or rhizome (0.56%). Different methods are applied for remedy preparation of different ailments by local healers *viz.* juice, paste and decoction. But the paste method was the most common for drug preparation because it is easy to make followed by decoction and juice (Fig. 8). The local informants were prepared a remedy not only by mixing different herbal ingredients but also some additives like turmeric, coconut oil, black salt, etc. The entire herbal ingredient was collected from the forest in the study area and non-herbal ingredients were collected from the commercial market.

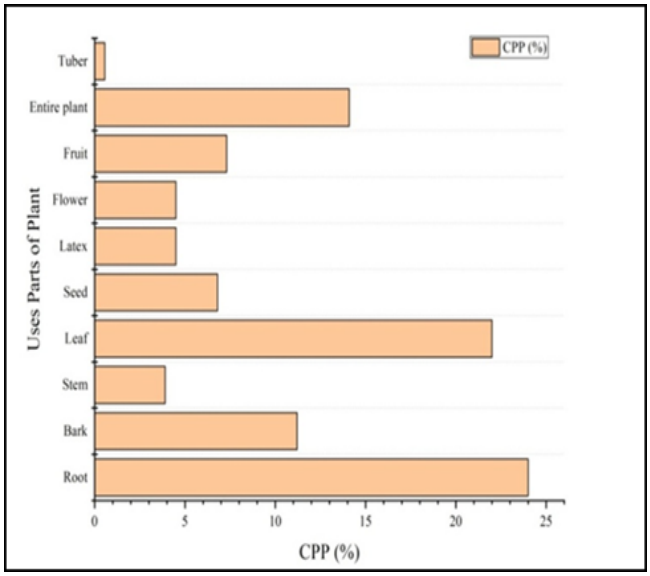

Fig. 7. Contribution of plant parts for remedy preparation

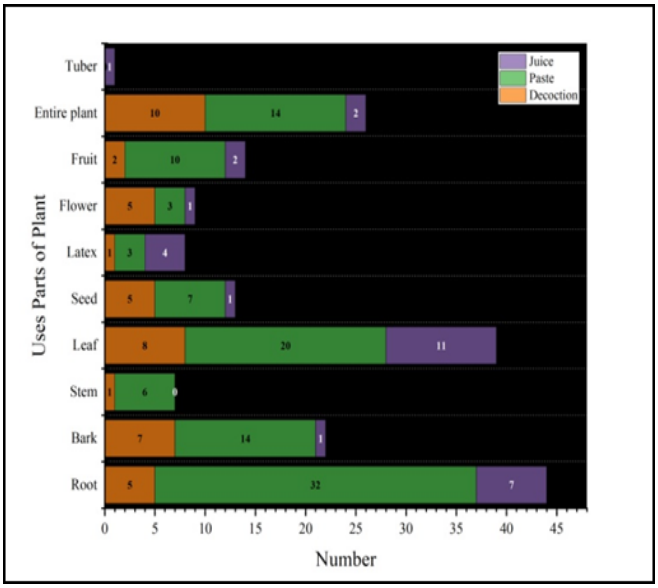

Fig. 8. Contribution of plant parts for remedy preparation

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Table 1. Demographic features of the selected informants

Informant No.	Name	Sex	Community name	Village	Age	Education	Profession	Experience	Category
1	Lulen Mahata	M	OBC-B	Bhutasole, Paschim Medinipur	66	VIII	Farmer	40	THP
2	Indragit Mahata	M	OBC-B	Bara Kalsi Bhanga, Paschim Medinipur	65	V	Farmer	50	THP
3	Khirat Mahata	M	OBC-B	Chhota Kalsibhanga, Paschim Medinipur	48	VIII	Farmer	20	THP
4	Sankar pal	M	Sc	Narayanchak, Keshpur, Paschim Medinipur	52	XII	Farmer	30	THP
5	Atul Das	M	ST	Dakhinbar, Paschim Medinipur	82	V	Vaidya	60	THP
6	Manik Das	M	ST	Barbhemua, Paschim Medinipur	75	VI	Vaidya	55	THP
7	Jayananda Mahata	M	*Kurmi*	Kharagpur Gramin, Paschim Medinipur	57	XII	Business man	30	THP
8	Mantu Santra	M	General	Selmabad, Purba Medinipur	63		Farmer	30	THP
9	Sri Narayan Saw	M	*Teli*	Kharan, Purba Medinipur	62	VIII	Vaidya	30	IP
10	Aviram Sing	M	*Munda*	Sinduria, Belpahari, Jhargram	65	VII	Vaidya	42	IP
11	Sisir Bhakta	M	*Lodha*	Bhasraghat, Nayagram,Jhargram	62	IX	Farmer	45	IP
12	Narayan Mahata	M	*Kurmi*	Gidhni, Jamboni, Jhargram	55	X	Vaidya	40	IP
13	Anil Pramanik	M	*Lodha*	Tapoban, Jhargram	70	VI	Farmer	50	IP
14	Raghu Sabar	M	*Lodha*	Ranibandh, Bankura	55	VII	Vaidya	37	THP
15	Bikash Tudu	M	*Santal*	Ramdongry, Bankura	30	IX	Vaidya	10	THP
16	Purnachandra Sardar	M	*Bhumij*	Ramdongry, Bankura	68	XII	Farmer	14	THP

17	Santrughna Sardar	M	*Bhumij*	Ramdongry, Bankura	45	VIII	Vaidya	22	IP
18	Sikanta Tudu	M	*Santal*	Ramdongry, Bankura	65	V	Vaidya	45	IP
19	Ramachandra Hansda	M	*Santal*	Haphania, Bankura	80	VI	Vaidya	60	IP
20	Abinash Sardar	M	*Bhumij*	Bankajura Adibasipara, Bankura	40	VIII	Vaidya	25	IP
21	Kartik Soren	M	*Santal*	Bamundiha , Bankura	60	VII	Farmer	35	THP
22	Narayan Murmu	M	*Santal*	Sulibona , Bankura	80	V	Farmer	60	THP
23	Sankar Sarkar	M	*Santal*	Panua, Ashurali , Bankura	36	VIII	Tailor	18	THP
24	Santinath Dey	M	SC	Panua, Ashurali , Bankura	47	XI	Farmer	25	THP
25	Pankar Acharya	M	General	Katul, Jaypur , Bankura	44	X	Farmer	20	THP
26	Lalsing Murai	M	*Bhumij*	Hesadi, Ajodhya, Purulia	70	V	Farmer	50	THP
27	Gour Hansda	M	*Santal*	Gamghutu, Ajodhya, Purulia	95	VI	Farmer	70	THP

28	Sitaram Murmu	M	*Santal*	Ranga, Ajodhya, Purulia	67	V	Vaidya	25	IP
29	Nigru Kalindi	M	*Santal*	Hesadi, Ajodhya, Purulia	66	V	Farmer	50	THP
30	Chunilal Keshav	M	*Santal*	Saharjhuri, Ajodhya, Purulia	65	III	Vaidya	45	IP
31	Sikanta Besra	M	*Santal*	Chhatni jamdi, Ajodhya, Purulia	70	IV	Farmer	35	THP
32	Nitai Murmu	M	*Santal*	Talakdhor, Ajodhya, Purulia	72	IV	Vaidya	52	IP
33	Chottui Murmu,	M	*Santal*	Chirubera, Ajodhya, Purulia	66	VIII	Farmer	35	THP
34	Kesto Hansda	M	*Santal*	Telia Bhasa, Ajodhya, Purulia	70	VI	Vaidya	45	IP
35	Bulu Kalindi	M	*Santal*	Hesadi, Ajodhya, Purulia	65	V	Farmer	40	THP
36	Ramanath Singmura	M	*Bhumij*	Ghatiali, Ajodhya, Purulia	55	VII	Vaidya	35	THP
37	Judupati Rajak	M	SC, *Dhopa*	Hesadi, Ajodhya, Purulia	56	VI	Businessman	30	IP

3.3. Use Value (UVs)

The Use value (UVs) index is explaining the importance of plant species in a particular population for the treatment of a disease. In my investigation, the use-value of the reported plant species varied from 0.02 -0.37. Based on UVs data, I had found eight plant species that have the highest UV value. These important medicinal plants are *Alstonia scholaris* [0.37] (Fig 9.a), *Justicia adhatoda* [0.32], *Calotropis gigantea, Strychnosnux-vomica* [0.30 for each], *Calotropis procera*, *Diospyros melanoxylon, Evolvulus alsinoides*, *Terminalia chebula* [0.27 for each]. These findings elucidated that, the extensive uses of the above -mentioned plant species by local healers for treatment of various diseases and it is also defined that these are the first choice of tribal healers to treat a disease. 34 numbers of plant species had been noted for the lowest UV value; it may be their abundance of low ethnobotanical uses.

3.4. Relative Frequency of Citation (RFC)

Frequency of citation (FC) indicates those plants that are mentioned many times by the informants out of the total numbers of times that all species were mentioned. In the present study, FC values varied from 0.31-4.98. The highest FC values are found on *Calotropis gigantea* (4.98), *Calotropis procera*, *Piper longum* [for each 3.11], *Gymnema sylvestre* [2.18]. Similarly relative frequency citation (RFC) values varied from 0.008-0.13. Among the total 119 species recorded, 86 species with RFC value equal to or higher than 0.016 are given in Table 4. The highest RFC value was recorded for *Calotropis gigantea* (0.13), *Calotropis procera*, *Piper longum* (for each 0.08), *Achyranthes aspera* [0.06]. The ethnomedicinal plant species having high RFC values indicated the abundant use and widespread knowledge among the tribal communities.

3.5.Fidelity Level (FL%)

The fidelity level of the recorded 119 important plant species ranged from 50-100% (Table 2). The high FL value of a particular species indicates the importance and considerable species for treating of his corresponding diseases. It may also be targeted, the investigation of bioactive compounds which are mainly responsible for the high healing potentiality of that species in my study area. 83 numbers of plant species have been noted with a high fidelity level (100%). These species are commonly growing in my selected areas but due to their high uses, it may be a chance of declining the population shortly.

3.6. Informant Consensus Factors (ICF)

To calculate the ICF, at first all the reported ailments were categorized into 12 different disease categories (Table 3). After that count the number of use reports (Nur) and the number of used taxa of each disease category (Nt). Now with the above mention formula, the ICF value (Table 4) was calculated. The ICF value of different disease categories was ranged from 0.66 to 0.28 and the average ICF value of all categories was 0.47. My study was revealed that there is a moderate ICF value among the informants regarding disease cure and medicinal plant uses. Gastrointestinal, respiratory, animal bite and neurological disorders secured the highest ICF value. This indicates that the medicines against these disease categories are very efficient and frequently used by the local healers. On the other side, among the four major disease categories gastrointestinal disorder was dominated with 203 number of use reports, followed by category others, pain and respiratory (86, 75 and 69 use reports, respectively). It is also found that the disease category gastrointestinal was used the highest percentage of plant species (57.98%) followed by category others, pain, ENEM, sexual disorder, respiratory, cardiovascular disorder, renal disorder, animal bites, parasitic disorder, neurological disorder and birth (38.65. 32.77, 32.77, 24.36, 21.84, 16.80, 15.96, 14.28, 10.92, 10.08 and 7.56, respectively). These findings also signify that gastrointestinal disorders are prevalent in the selected study area.

Thirty-one species are noted here for polyherbal remedy. Tribal people are used different plants for preparing remedies along with some supplements like resin of *Shorea robusta* (*dhuna*), sour yogurt, seeds of *Foeniculum vulgare* (*mouri*), seeds of *Nigella sativa* (*kalo jeera*), crystal sugar (*michri*), black cardamom, green cardamom, poppy seeds, ginger, *Sesamum* seeds, honey, rice water etc. Fabaceae is the most dominant plant family reported by (Rahaman and Karmakar, 2015; Chaudhury *et al.*, 2018; Manna and Mishra, 2018) in respect of ethnomedicinal uses by tribal practitioners. But from our investigation, it is noted that Apocynaceae is the most dominated plant family followed by Fabaceae (secure 2nd position), Euphorbiaceae (3rd position). In respect of habit structure of the used species by different socio-cultural groups, herbaceous species are found the maximum uses (35%) thereafter tree species. This habit ranking supports the previous work (Rahaman and Karmakar, 2015) from Bankura whereas (Manna and Mishra, 2018) shows that the tree species are the maximum uses species from the lalgarh forest range, Paschim Medinipur district.

Table 2. Different types of medicinal plant species are used by the Traditional healers of the study area

Sl. No	Scientific name of the plant	Local name	Family	Habitat *	Parts uses	Mode of uses*	Medicinal uses	NP	Major ailment	N	FC	RFC	FL %	UV
1	*Abutilon indicum* L. (Plate 1.a)	*Potari*	Malvaceae	S	Roots, leaves, seeds	D	Leaves are used in bronchitis, gonorrhea, inflammation of the bladder and fever. Root is useful in leprosy and fever. Mucilaginous seeds act as a tonic. They are good for chest troubles, bronchitis and piles.	2	Bronchitis	2	0.62	0.016	100	0.21
2	*Abrus precatorius* L. (Plate 1.b)	*Kunch, Kawet*	Fabaceae	C	Roots, leave,seeds	P	Plant is used for Night blindness, contraceptive, leucoderma, snake bite, Muscle pain and fever.	4	Muscle pain	3	1.24	0.03	75	0.16
3	*Acanthus ilicifolius* L. (Plate 1.c)	*Hargoza*	Acanthaceae	H	Entire plant	P	Used for asthma, dyspepsia, snake bite, diabetes, stomach pains, leucorrhoea and leukemia.	1	Asthma	1	0.31	0.008	100	0.19
4	*Acacia catechu* Willd. (Plate 1.d)	*Khayir*	Fabaceae	T	Entire plant	D	Plant extract are used for fever, leucorrhoea, piles and gonorrhea.	2	Leucorrhoea	2	0.62	0.016	100	0.1
5	*Acalypha indica* L. (Plate 1.e)	*Muktojhuri*	Euphorbiaceae	H	Leaves, Roots	P	Leaves are used in scabies. Roots are useful in pneumonia and asthma.	1	Pneumonia	1	0.31	0.008	100	0.08
6	*Achyranthes aspera* L. (Plate 1.f)	*Apang, Chirchitt*	Amaranthaceae	H	Roots	D	Used in Jaundice, heart bit controlling, wound.	8	Jaundice	5	2.49	0.06	65	0.08
7	*Adhatoda vasica* Nees. (Plate 1.g)	*Basak*	Acanthaceae	S	Entire plant	P or D	Used to treat asthma, diarrhea, piles, rheumatism, chronic-bronchitis, cold- cough, dysentery, leucoderma. Useful in acidity, indigestion and heart disease.	4	Chronic-bronchitis	4	1.24	0.03	100	0.32

8	*Aegle marmelos* (l.) Corr. (Plate 2.a)	*Bel*	Rutaceae	T	Roots, bark, leaves, fruits	P	Roots are used in abdominal pain, urinary trouble, fever, snake bites. Leaves are used in ophthalmic. Fruits are used to treat dysentery, piles, diarrhea, Gastrointestinal and pregnancy.	4	Dysentery	3	1.24	0.03	75	0.27
9	*Aloe vera* (L.) Burn.f. (Plate 2.b)	*Gritakumari*	Liliaceae	H	Flashy part of leaves	J	Use in piles, diarrhea, dyspepsia, dysentery. Leaves juice applied on head, use in facilitating abortion.	3	Dyspepsia	2	0.93	0.02	66	0.16
10	*Alstonia scholaris* R. Br. (Plate 2.c)	*Chattim*	Apocynaceae	T	Bark, leaves, roots, latex	J	Used as a tonic, febrifuge. Bark paste with water applied on wounds to cure snake bites. Also used in asthma, cardiac disease, chronic diarrhea, ulcer, tumors. Leaves used in beriberi, dropsy. Root paste applied to cure tumorous and cancerous wounds. Latex used to chest pain.	2	Asthma	1	0.62	0.016	50	0.37
11	*Amaranthus viridis* L. (Plate 2.d)	*Banotya*	Amaranthaceae	H	Entire plant	P	Use in diarrhea, colic, piles, bronchitis, gonorrhea and leucorrhoea.	1	Diarrhea	1	0.31	0.008	100	0.16
12	*Andrographis paniculata* Nees (Plate 2.e)	*Kalmegh*	Acanthaceae	H	Entire plant	P	Used in diabetes, dysentery, dyspepsia, fever, general debility, leprosy and whooping cough. Improves liver function.	3	Diabetes	2	0.93	0.02	66	0.21
13	*Anogeissus acuminata* (Roxb. ex DC.) Wall. exGuillem. &Perr.	*Chakwa*	Combretaceae	T	Flowers	J	Epilepsy	1	Epilepsy	1	0.31	0.008	100	0.02
14	*Annona squamosa* L.	*Ata*	Annonaceae	S	Leaves, fruits	D	Leaves are applied on the wound. Fruit is use for stomach disorder.	1	Stomach disorder	1	0.31	0.008	100	0.05
15	*Asparagus racemosus* Willd. (Plate 2.f)	*Satamuli*	Liliaceae	C	Entire plant	D	Diuretic, laxative, cardiac, aphrodisiac and Jaundice.	4	Jaundice	3	1.24	0.03	75	0.13

16	*Aristolochia indica* L. (Plate 2.g)	*Iswarmul*	Aristolochiaceae	C	Entire plant	P	Treatment of cholera, fever, ulcers, bowel troubles, leprosy, skin diseases, menstrual problems and snakebites.	4	Snakebites	4	1.24	0.03	100	0.21
17	*Atylosia scarabaeoides* Benth.	*Bon kurthi*	Fabaceae	C	Roots	P	In Pregnancy, Menstrual disorder.	2	Menstrual disorder	2	0.62	0.016	100	0.05
18	*Azadirachta indica* A. Juss. (Plate 3.a)	*Neem*	Meliaceae	T	Barks, leaves, fruits, seeds	P	Barks and leaves are used in anthelmintic, piles, syphilis, and leucoderma. Fruit muse in cures urinary discharge, tumors, and piles. Seeds cure leprosy.	3	Anthelmintic	3	0.93	0.02	100	0.21
19	*Barlaria lupulina* Lindl	*Bishalyakarani*	Acanthaceae	H	Roots	P	Any Pain	1	Pain	1	0.31	0.008	100	0.02
20	*Boerhaavia diffusa* L. (Plate 3.b)	*Punarnava*	Nyctaginaceae	H	Roots, stem	D	Useful in diarrhea, dysentery, edema, jaundice, cholera and internal inflammation.	1	Dysentery	1	0.31	0.008	100	0.16
21	*Bougainvillea glabra* Conn. (Plate 3.c)	*Bougainvillea*	Nyctaginaceae	S	Leaves, flowers	P	Plants are used in antiseptic, diuretic, stomachic, and also useful in dysentery, diarrhoea and fever.	1	Stomachic	1	0.31	0.008	100	0.16
22	*Butea superba* Roxb.	*Palash*	Fabaceae	Twiner	Leaves, bark	P	Used on piles and gastrointestinal.	3	Piles	2	0.93	0.02	66	0.05
23	*Brassica campestris* L.	*Sarse*	Brassicaceae	H	Leave, seeds	P	Leaves used in cough and bronchitis. Seeds are use in laxative. Oil mixed with paste of *Allium cepa* applied on wound.	2	Cough	2	0.62	0.016	100	0.10

24	*Calotropis procera* (Aiton) Dryand. (Plate 3.d)	*Sweet Aakanda*	Apocynaceae	S	Entire plant	D	Leaves extract used as a remedy for leprosy, tumor, wound, dropsy, worm, digestive, asthma and skin disease. Root is used for Dyspepsia, any poisonous sting.	10	Leprosy Dyspepsia	7	3.11	0.08	70	0.27
25	*Catharanthus roseus* L.	*Nayantara*	Apocynaceae	H	Roots, leaves	J	Juice of leaves and roots are useful in diabetes and leukemia.	6	Diabetes	5	1.86	0.05	83	0.05
26	*Calotropis gigantea* (L.) R. Br. (Plate 3.e)	*Akanda*	Apocynaceae	T	Roots, bark, leaves, latex	D	Root is prescribed for leucorrhoea and worm. Leaves are used for rheumatic pain, elephantiasis, jaundice and epilepsy. Latex is used for scorpion sting, bronchitis, asthma, leprosy and teeth ache.	16	Any pain	10	4.98	0.13	62	0.3
27	*Cajanus cajan* (L.) Millsp.	*Arhar, Arki, Rahri*	Papilionaceae	S	Leaves	P	Used for Jaundice, Menstrual problem, Pregnancy and Diabetes.	7	Jaundice	5	2.18	0.05	71	0.1
28	*Caesalpinia bonduc* (L.) Roxb.	*Kanta karanja*	Fabaceae	C	Leaves, Bark, Roots	P	Used to cure fever, headache, chest pain, anthelmintic and Jaundice.	2	Fever	2	0.62	0.016	100	0.13
29	*Ceropegia candelabrum* L.	*Chandwa*	Apocynaceae	C	Roots	P	Epilepsy, fever and headache.	2	Epilepsy	2	0.62	0.016	100	0.081
30	*Cissus quadrangularis* L.	*Harjora, Harbhanga*	Vitaceae	C	Stem	P	Diabetes and heart disease.	3	Diabetes	2	0.93	0.02	66	0.051
31	*Cissampelos pareira* L.	*Tijjumala*	Menispermaceae	C	Roots	P	Epilepsy.	2	Epilepsy	2	0.62	0.016	100	0.02
32	*Cryptolepis dubia* (Burm.f.) M.R.Almeida	*Kankrashringi, Karilata*	Apocynaceae	C	Stem, leaves, Latex	P	Any pain and Cancer.	5	Cancer	3	1.55	0.04	60	0.05

33	*Crotalaria pallid* Aiton	*Jhunjhunia*	Fabaceae	H	Roots	P	Epilepsy.	1	Epilepsy	1	0.31	0.008	100	0.02
34	*Curculigo orchioides* Gaertn. (Plate 3.f)	*Talmuli*	Hypoxidaceae	H	Roots	P	Finger pain, jaundice and menstrual problem.	4	Menstrual problem	3	1.24	0.03	75	0.08
35	*Curcuma caesia* Roxb.	*Nilkantho*	Zingiberaceae	H	Roots	P	Throat pain.	1	Throat pain	1	0.31	0.008	100	0.02
36	*Cuscuta reflexa* Roxb.	*Alokjui, Swarnalata*	Convolvulaceae (Cuscutaceae)	Holopar asite	Entire plant	P	Wound pain and Fever.	3	Wound pain	3	0.93	0.02	100	0.05
37	*Cycas pectinata* Buch.-Ham.	*Manuraj*	Cycadaceae	T	Bark	P	Fever.	2	Fever	2	0.61	0.016	100	0.02
38	*Cyperus pangorei* Rottb. (Plate 4.a)	*Madur grass*	Cyperaceae	H	Entire plant	D	Useful in treatment of dysuria and healing ulcer. Rhizome used as stimulant and tonic.	1	Dysuria	1	0.31	0.008	100	0.10
39	*Cymbopogon citratus* (DC.) Stapf	*Dhanwantari*	Poaceae	H	Leaves	P	Dysentery.	3	Dysentery	3	0.93	0.02	100	0.02
40	*Datura metel* L.	*Dhutra*	Solanaceae	S	Entire plant	P	Used for asthma, cough, skin disease, ulcers and gonorrhea. Root is used for knee arthritis.	2	asthma, cough	2	0.62	0.016	100	0.16
41	*Datura innoxia* Mill. (Plate 4.b)	*Sadadhutra*	Solanaceae	H	Roots	P	Any Pain.	3	Any Pain	3	0.93	0.02	100	0.02

42	*Dalbergia volubilis* Roxb.	*Narimurga*	Papilionaceae	T	Roots	P	Ulcer and tongue infection.	2	Tongue infection	2	0.62	0.016	100	0.05
43	*Desmodium triflorum* (L.) DC .	*Bhumisusmi*	Fabaceae	H	Roots	P	Dysentery and arthritis.	6	Dysentery	4	1.86	0.05	66	0.05
44	*Dioscorea alata* L.	*Kham alu*	Dioscoreaceae	C	Tubers	J	Used in leprosy, piles, Jaundice and gonorrhea.	2	Leprosy	2	0.62	0.016	100	0.10
45	*Diospyros melanoxylon* Roxb. (Plate 4.c)	*Kendu*	Ebenaceae	T	Leaves, Fruits	P	Leaves are used for the treatment of scabies, old wounds, laxative and carminative medicine. Fruit also helps in stomach disorders. The dried fruit powder is used as carminative and astringent agent and is useful in treating urinary, skin and blood diseases. Dysentery	3	Stomach disorders	2	0.93	0.02	66	0.27
46	*Dregea volubilis* (L.f.) Benth. ex Hook.f.	*Titakunga*	Apocynaceae	C	Roots	P	Arthritis.	2	Arthritis	2	0.62	0.016	100	0.02
47	*Elephantopus scaber* L.	*Mejurjhuti*	Asteraceae	H	Roots	P	Scorpion sting.	2	Scorpion sting	2	0.62	0.016	100	0.02
48	*Emblica officinalis* Gaertn.	*Amlaki*	Euphorbiaceae	T	Fruits	P	Used to treat vomiting, leprosy, constipation, piles and inflammation, leucorrhoea.	4	Constipation	3	1.24	0.03	75	0.16
49	*Enydra fluctuans* DC.	*Hingcha*	Asteraceae	H	Leaves	J	Hemoglobin enrichment.	3	Hemoglobin enrichment	3	0.93	0.02	100	0.02

50	*Euphorbia fusiformis* Buch.-Ham. ex D.Don	*Dudhmul*	Euphorbiaceae	H	Latex	J	Milk production increase for women.	1	Milk production	1	0.31	0.008	100	0.02
51	*Evolvulus alsinoides* (L.) L. (Plate 4.d)	*Vishnugandhi*	Convolvulaceae	H	Leaves	J	Use to brain Tonic, vermifuge, and anti-inflammatory. It is also used in the treatment of epilepsy, leucoderma, cuts sleeplessness, chronic bronchitis, asthma, syphilis, and ulcers.	1	Anti-inflammatory	1	0.31	0.008	100	0.27
52	*Ficus racemosa* L.	*Jaggyadumur*	Moraceae	T	Roots, leaves and fruits	J	Sap is taken to treat diabetes, dysentery. Leaves used in bronchitis, bleeding piles. Fruit useful in leprosy, urinary discharge, haemoptysis.	1	Urinary discharge	1	0.31	0.008	100	0.18
53	*Flacourtia indica* (Burm.f.) Merr.	*Boichi*	Salicaceae	S	Fruits, Barks and Roots	P	Fruits are used as appetizing, diuretic, and digestive, in jaundice and enlarged spleen. Barks are used for the treatment of intermittent fever. Roots are used in nephritic colic and gum is used in cholera.	2	Digestive	2	0.62	0.016	100	0.21
54	*Flemingia strobilifera* (L.) W.T. Aiton.	*Ghorachabuk*	Fabaceae	H	Roots	P	Gastrointestinal.	1	Gastrointestinal	1	0.31	0.008	100	0.02
55	*Gmelina arborea* Roxb.	*Gamar*	Verbenaceae	T	Bark	P	Snake bite.	2	Snake bite	2	0.62	0.016	100	0.02
56	*Gymnema sylvestre* (Retz) R. Br.ex Schult. (Plate 4.e)	*Gurmar*	Apocynaceae	C	Entire plant	P	Leaves used as diuretic, diabetes, enlargement of the liver and spleen. Roots used in piles. Entire plant useful in dyspepsia.	7	Diabetes	5	2.18	0.05	71	0.16
57	*Haldina cordifolia* (Roxb.) Rids.	*Karam*	Rubiaceae	T	Roots	P	Menstrual problem.	1	Menstrual problem	1	0.31	0.008	100	0.02

58	*Hemidesmus indicus* R. Br. (Plate 4.f)	*Anantamul*	Apocynaceae	C	Roots	P	Uses as a snake bite, wound pain, Measles, Jaundice	6	wound pain	4	1.86	0.05	66	0.10
59	*Heliotropium indicum* L.	*Hatisure*	Boraginaceae	H	Roots	P	Ulcer, tongue infection	1	tong infection	1	0.31	0.008	100	0.05
60	*Helicteres isora* L.	*Antamora*	Malvaceae	S	Entire plant	P	Used as a folk medicine to treat snake bite, diarrhea and constipation of new born baby.	2	snake bite	2	0.62	0.016	100	0.08
61	*Holostemma ada-kodien* Schult. (Plate 5.a)	*Mouron arak, Jivanti*	Apocynnaceae	C	Roots	P	Epilepsy	5	Epilepsy	5	1.55	0.04	100	0.02
62	*Hybanthus enneaspermus* (L.) F. Muell.	*Laukesre*	Violaceae	H	Roots	P	Dysentery and diarrhea.	4	Dysentery	3	1.24	0.03	75	0.05
63	*Ichnocarpus frutescens* (L.) W.T.Aiton	*Shyamalata*	Apocynaceae	C	Roots	P	Roots are used for fever and as a diuretic.	2	Diuretic	2	0.62	0.016	100	0.05
64	*Jatropha podagrica* Hook.	*Bagbherenda*	Euphorbiaceae	S	Entire plant	P	Uses in folk medicine, including as an analgesic, tonic, aphrodisiac and to treat infections, intestinal worms, snakebite, gout, and more.	4	Intestinal worms	3	1.24	0.03	75	0.24
65	*Jatropha curcas* L.	*Sadaverenda*	Euphorbiaceae	S	Leaves, Latex	P	Stop Bleeding from teeth	2	Teeth bleeding	2	0.62	0.016	100	0.02

66	*Justicia gendarussa* Burm.f.	*Bishalyakarani*	Acanthaceae	H	Leaves	P	Wound pain	2	Wound pain	2	0.62	0.016	100	0.02
67	*Lannea coromandelica* (Houtt.) Merr.	*Doka*	Anacardiaceae	T	Bark	P	Dysentery, Menstrual	3	Menstrual	2	0.93	0.02	66	0.05
68	*Leea macrophylla* Roxb. exHornem.	*Hatikan*	Vitaceae	T	Leaves	D	Menstrual problem	1	Menstrual problem	1	0.31	0.008	100	0.02
69	*Leonotis nepetifolia* (L.) R.Br.	*Bhut bhairab*	Lamiaceae	H	Roots	P	Epilepsy	2	Epilepsy	1	0.62	0.016	100	0.02
70	*Lomelosia crenata* (Cirillo) Greuter&Burdet		Capparifoliaceae	H	Roots	J	Menstrual problem	2	Menstrual problem	2	0.62	0.016	100	0.02
71	*Madhuca longifolia* (Koening) Macb.	*Mahua*	Sapotaceae	T	Seeds	D	Oil are use for rheumatic swelling and skin disease	2	Skin disease	2	0.62	0.016	100	0.05
72	*Mallotus philippensis* Muell. Arg.	*GaraSinduri*	Euphorbiaceae	T	Fruits	P	Use for anthelmintic.	2	Anthelmintic	2	0.62	0.016	100	0.02
73	*Melastoma malabathricum* L. (Plate 5.b)	*Futki*	Melastomaceae	S	Barks, leaves, flowers	D	Useful in chronic diarrhea, leucorrhoea, hemorrhages, catarrhal pharyngitis and ulcers.	2	Chronic diarrhea	2	0.62	0.016	100	0.13

74	*Mimusops elengi* L.	*Bakul*	Sapotaceae	T	Roots, Bark, Flowers	D	The roots are used as diuretic, astringent, cardio tonic and stomachic. Flowers are used as an expectorant and in liver complaints and asthma. *Mimusops elengi* bark showed antiulcer activity. It is also used to prepare lotion for wounds and ulcers.	3	Ulcers	2	0.93	0.02	66	0.24
75	*Morinda citrifolia* L.	*Surangi, Noni*	Rubiaceae	S or T	Leaves	D	Diabetes	2	Diabetes	2	0.62	0.016	100	0.02
76	*Moringa oleifera* Lam.	*Sajina*	Moringaceae	T	Leaves, Fruits, Flowers	D	Pox, High Blood pressure	3	Pox	2	0.93	0.02	65	0.05
77	*Mucuna pruriens* (L.) DC. (Plate 5.c)	*Alkushi*	Fabaceae	C	Seeds	P	Menstrual disorder.	2	Menstrual disorder.	2	0.62	0.016	100	0.02
78	*Myristica fragrans* Houtt.	*Jai Phal*	Myristicaceae	T	Fruits	P	Epilepsy	1	Epilepsy	1	0.31	0.008	100	0.02
79	*Nymphaea nouchali* Burm.f.	*LalShaluk*	Nymphaeaceae	H	Rhizomes, leaves, roots	P	Rhizomes used as cooling, tonic. Used to treat dysentery, diarrhea, goiter, burn wounds. Leaves pastee applied to cure scabies.	1	Dysentery	1	0.31	0.008	100	0.18
80	*Oldenlandia corymbosa L.*	*Khetpapra*	Rubiaceae	H	Roots	J	Fever	2	Fever	2	0.62	0.016	100	0.02
81	*Oroxylum indicum* (L.) Kurz	*Bhaluksukti*	Bignoniaceae	T	Roots, Flowers and Leaves	P	Root is used in Epilepsy. Flower and leaf is used in Jaundice, Liver problem, Dysentery, Bronchitis.	3	Jaundice	2	0.93	0.02	66	0.13

82	*Oxalis corniculata* L.	*Amrul*	Oxalidaceae	H	Entire plant	P	Leaves used to treat scurvy, fever, dysentery, piles and diarrhea. Whole plant juice given in dyspepsia, piles and anemia.	1	Scurvy	1	0.31	0.008	100	0.21
83	*Oxystelma esculentum* (L. f.) Sm.	*Dudhulata*	Apocynaceae	C	Entire plant	D	Dyspepsia	2	Dyspepsia	2	0.62	0.016	100	0.02
84	*Pergularia daemia* (Forssk.) Chiov.	*Chagalbati*	Apocynaceae	C	Leaves, latex, seeds	J	Leaves juice treat piles, enlargement of spleen and liver. Latex used to treat leucoderma. Seeds powder given to children as anthelmintic.	3	leucoderma	2	0.93	0.02	66	0.13
85	*Pentatropis capensis* (L. fil.) Bullock .	*Dudhveti, Ambarvel*	Apocynaceae	C	Latex, Leaves	J	Pain, Constipation, Diarrhea.	4	Constipation	3	1.24	0.03	75	0.08
86	*Pereskia grandifolia* Haw.	*Singar*	Cactaceae	S	Leaves	P	Teeth parasite pain	2	Teeth pain	2	0.62	0.016	100	0.02
87	*Piper longum* L. (Plate 5.d)	*Pipul, Ralli*	Piperaceae	C	Fruits	P	Dysentery, Measles, Epilepsy, Asthma, Bronchitis	10	Asthma	6	3.11	0.08	60	0.13
88	*Psidium guajava* L.	*Peyara*	Myrtaceae	T	Leaves	J	Dysentery	1	Dysentery	1	0.31	0.008	100	0.02
89	*Quisqualis indica* L.	*Madhabilata*	Combretaceae	C	Leaves, seeds	D	Leaves D prescribed in abdominal pain. Seeds used as anthelmintic, treat diarrhea and fever.	1	abdominal pain	1	0.31	0.008	100	0.10

90	*Rouvolfia tetraphylla* L.	*Bara chandrika*	Apocynaceae	S	Entire plant	D	Used in hypertension and treat skin disease.	2	Hypertension	2	0.61	0.016	100	0.05
91	*Rouvolfia serpentina* Benth. (Plate 5.e)	*Sarpagandha*	Apocynaceae	S	Roots, leaves	J	Roots used to treat high blood pressure, Paralysis, Diabetes, Pneumonia, rheumatism, epilepsy and snake bite. Leaves used in removal of opacities of the cornea.	5	Blood pressure	5	1.55	0.04	100	0.21
92	*Selaginella bryopteris* L.	*Sanjeevani*	Selaginellaceae	H	Leaves	P	Malaria	1	Malaria	1	0.31	0.008	100	0.02
93	*Scoparia dulcis* L.	*Ban dhane*	Scrophulariaceae	H	Entire plant	J	Leaf juice use to treat cough, burning sensation in pulmonary artery and veins. Treat to painful urination. Seeds power treat kidney stone. Whole plants used to treat stone in bladder, mouth ulcer and diabetes.	2	Cough	2	0.62	0.016	100	0.18
94	*Ricinus communis* L. (Plate 6.a)	*Rerhi, Digherandi*	Euphorbiaceae	S	Roots	P	Scorpion sting	1	Scorpion sting	1	0.31	0.008	100	0.02
95	*Saraca asoca* (Roxb.) de Wilde (Plate 6.b)	*Ashok*	Fabaceae	T	Bark, flowers, seeds	D	Bark used to treat leucorrhoea, rheumatism, piles and heart disease. Flowers used as uterine tonic, hemorrhagic dysentery and diabetes. Seeds used in dysentery and skin disease.	3	Hemorrhagic dysentery	2	0.93	0.02	66	0.24
96	*Schleichera oleosa* (Lour.) Oken.	*Kusum*	Sapindaceae	T	Bark, seed oil	P	Bark used for skin disease, ulcers, malaria. Seeds oil applied to skin disease, ulcer, etc.	1	Skin disease	1	0.31	0.008	100	0.1
97	*Strychnosnux-vomica* L. (Plate 6.c)	*Kuchila*	Loganiaceae	T	Leaves, wood, seeds	P	Leaves paste applied to wound, ulcer. Wood used for dysentery, fever and dyspepsia. Seeds used to treat paralysis, cold and cough, low blood pressure, rheumatism, pains during menstruation.	3	Ulcer	2	0.93	0.02	66	0.3

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98	*Swertia chirayita* (Roxb. ex Fleming) Karsten	*Chirata*	Gentianaceae	H	Entire plant	P	Skin diseases, Liver disorders; stomach disorders, intestinal worms, vomiting, ulcers, gastrointestinal infections, and kidney diseases, Pregnancy.	4	Liver disorders	3	1.24	0.03	75	0.24
99	*Syzygium cumini* (L.) Skeels	*Jaam*	Myrtaceae	T	Bark	P	Stomach ache, Gastrointestinal problem.	1	Stomach ache	1	0.31	0.008	100	0.05
100	*Tectona grandis* Linn. f.	*Segun*	Verbenaceae	T	Bark, seeds, flowers	P / D	Flower used in bronchitis and urinary disorder. Oil obtained from flower and seeds are useful for treatment of scabies.	2	Urinary disorder	2	0.62	0.016	100	0.08
101	*Telosma pallida* (Roxb.) W. G. Craib	*Surkilla*	Apocynaceae	C	Stem, Latex	P	Stem is used for whooping cough, cold, asthma. Latex is used for leucoderma and other skin diseases	2	Leucoderma	2	0.62	0.016	100	0.13
102	*Temminalia arjuna* Roxb.	*Arjun*	Combretaceae	T	Bark	D	Bark extracts cardio tonic useful heart disease, against herpes, skin disease, Asthma, Diabetes.	5	Heart disease	4	1.55	0.04	80	0.13
103	*Terminalia chebula* Retz. (Plate 6.d)	*Haritaki*	Combretaceae	T	Fruits, bark	P	Used in piles, skin disease, ophthalmic. Cure dyspepsia. Used to treat ulcer, asthma, chronic diarrhea, dysentery etc. Bark used as diuretic and cardio tonic.	2	Dyspepsia	2	0.62	0.016	100	0.27
104	*Terminalia bellirica* (Gaertn.) Roxb.	*Bahera*	Combretaceae	T	Fruits, bark	P	Bark used as diuretic, paste used to treat leucoderma. Fruit used as asthma, dysentery, dropsy, diarrhea etc.	2	Dysentery	2	0.62	0.016	100	0.16
105	*Tinospora cordifolia* (Willd.) Hook. f. & Thoms.	*Gulancha*	Menispermaceae	H	Stem	P	Jaundice, Leprosy	1	Leprosy	1	0.31	0.008	100	0.05

106	*Tragia involucrata* L. (Plate 6.e)	*Bichuti*	Euphorbiaceae	H	Roots	P	Scorpion sting	1	Scorpion sting	1	0.31	0.008	100	0.02
107	*Tylophora indica* (Burm. f.) Merr.	*Anantamul*	Apocynaceae	S	Entire plant	D	Use for respiratory problems, Diarrhea, Dysentery and is also a cardiac tonic.	1	Respiratory problems	1	0.31	0.008	100	0.10
108	*Urginea indica* Kunth.	*Jangli-Piaz*	Liliaceae	H	Bulbs	P	Useful in bronchitis, diuretic.	1	Bronchitis	1	0.31	0.008	100	0.05
109	*Utricularia bifida* L.	*Arakjhawar*	Lentibularlaceae	H	Entire plant	D	Plant extract used in urinary diseases.	2	Urinary diseases	2	0.62	0.016	100	0.02
110	*Urena sinuata* L.	*Kunjia*	Malvaceae	S	Entire plant	P	Leaves used in inflammation of the intestine and the bladder. Flower used in bronchitis. Plants used in colic.	1	Bronchitis	1	0.31	0.008	100	0.08
111	*Uraria picta* (Jacq) Devs.ex DC.	*Sankarjata*	Papilionaceae	H	Entire plant	J	Used in cold and cough, fever, swelling, rheumatism, piles, eye disease and applied to treat fractures.	3	Cough	2	0.93	0.02	66	0.18
112	*Uvaria acuminata* Oliv		Annonaceae	S	Roots	D	Treatment of anemia, dysentery, snakebite, painful menstruation, stomach-ache.	2	Anemia	2	0.62	0.016	100	0.19
113	*Vernonia cinerea* L.	*Kukchima*	Asteraceae	H	Entire plant	P	Used as a remedy for spasm of bladder, piles. Root is said to ant diabetic property.	1	Diabetes	1	0.31	0.008	100	0.08

114	*Vitex nigundo* L.	*Begna*	Verbenaceae	S	Roots, leaves	J	Root expectorant, febrifuge. Leaves useful in depressing swelling of joint from acute rheumatism, gonorrhea. Leaves juice used for removing worms from ulcers.	2	Rheumatism	2	0.62	0.016	100	0.13
115	*Wedelia chinensis* Merrill	*Bhringaraj*	Asteraceae	H	Leaves	P	Used in dysentery, swelling, nervous weakness, skin disease, chronic acidity.	2	Skin disease	2	0.62	0.016	100	0.13
116	*Withania somnifera* Dunal	*Aswagandha*	Solanaceae	H	Roots	P	Menstrual, pregnancy, nervous system	3	Pregnancy	2	0.93	0.02	66	0.08
117	*Woodfordia fruticosa* (L.) Kurz (Plate 6.f)	*Dawai*	Lythraceae	H	Entire plant	D	Used in leprosy, toothache, leucorrhea, fever, dysentery, bowel disease.	2	Leucorrhea	2	0.62	0.016	100	0.16
118	*Wrighti aantidysenterica* (L.) R.Br.	*Indrajog*	Apocynaceae	T	Bark	P	Gastrointestinal disorder, menstrual problem, Fever, Snake bite	6	Menstrual problem	4	1.86	0.05	66	0.10
119	*Ziziphus oenoplia* (L.) Mill.	*Bon kul, Shiakul*	Rhamnaceae	S	Roots	P	Dysentery	3	Dysentery	3	0.93	0.02	100	0.02

**C- Climber; D – Dried; F – Fresh; H – Herb; J –Juice; P – paste; S – shrub; T – Tree*

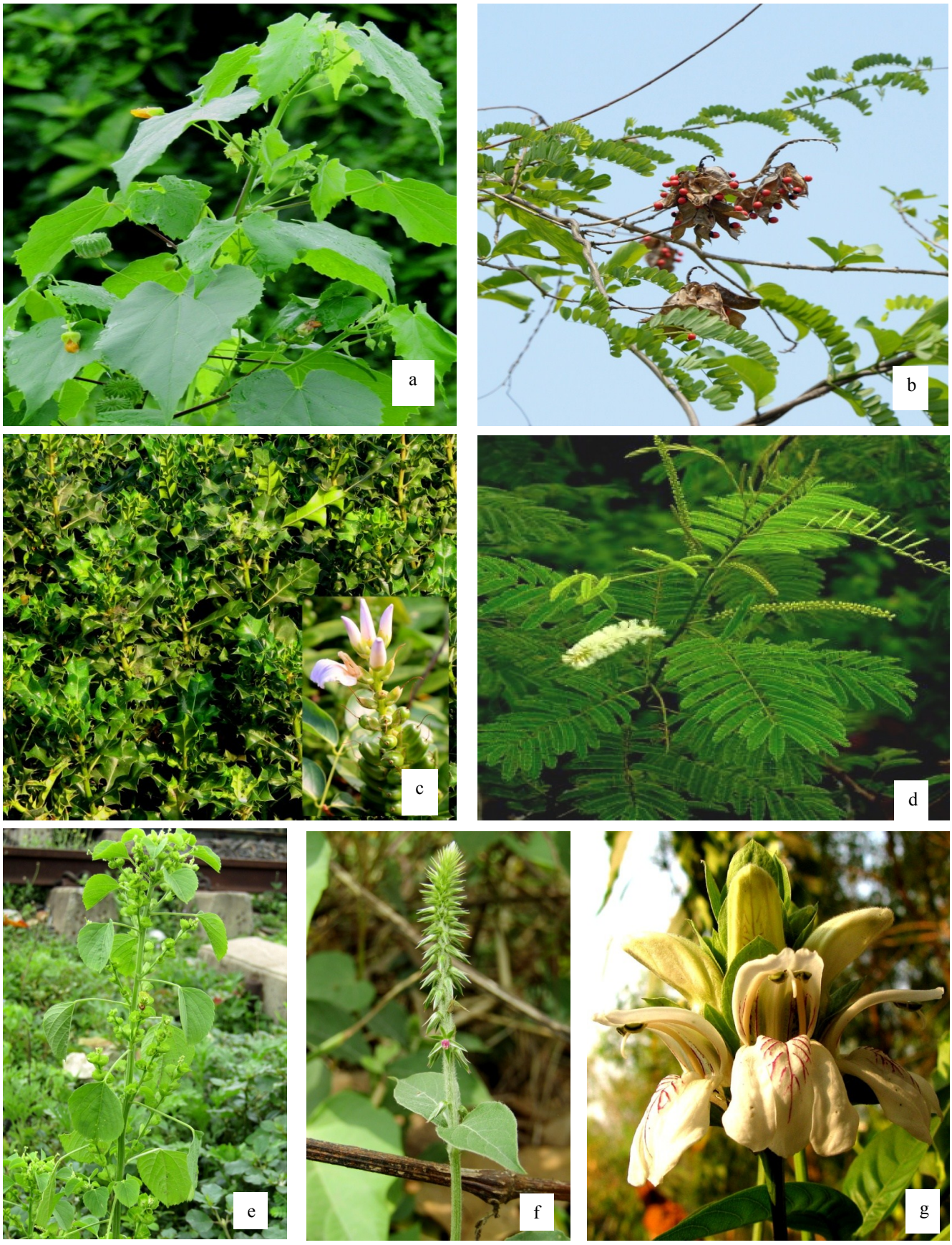

Plate 1. a. *Abutilon indicum* L.; b. *Abrus precatorius* L.; c. *Acanthus ilicifolius* L.; d. *Acacia catechu* Willd.; e. *Acalypha indica* L.; f. *Achyranthus aspera* L.; g. *Adhatoda vasica* Nees.

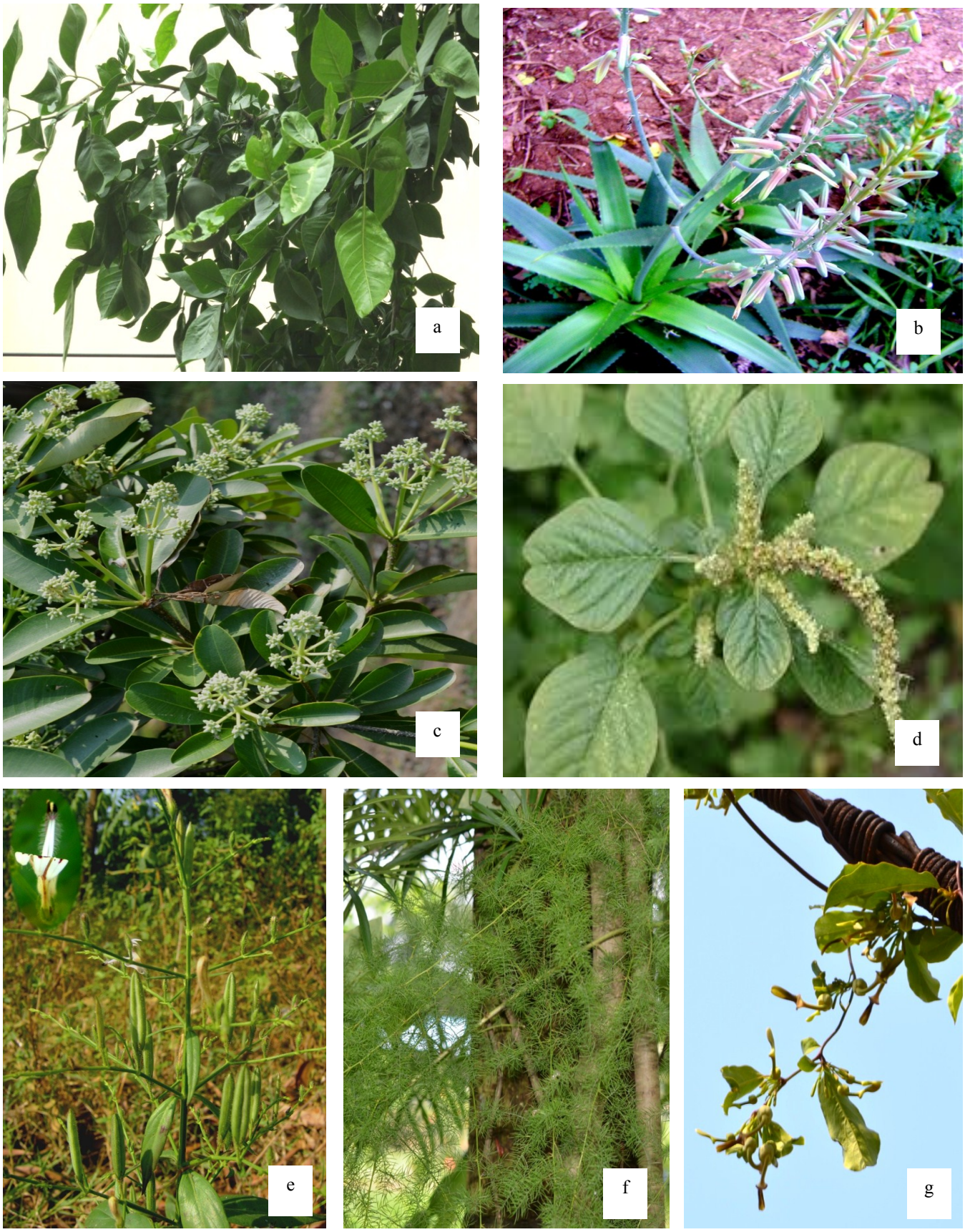

Plate 2. a. *Aegle marmelos* (L.) Corr.; b. *Aloe vera* (L.) Burn.f.; c. *Alstonia scholaris* (L.) R. Br.; d. *Amaranthus viridis* L.; e. *Andrographis paniculata* (Burm.f) Wall.ex Ness.; f. *Asparagus racemosus* Willd.; g. *Aristolochia indica* L.

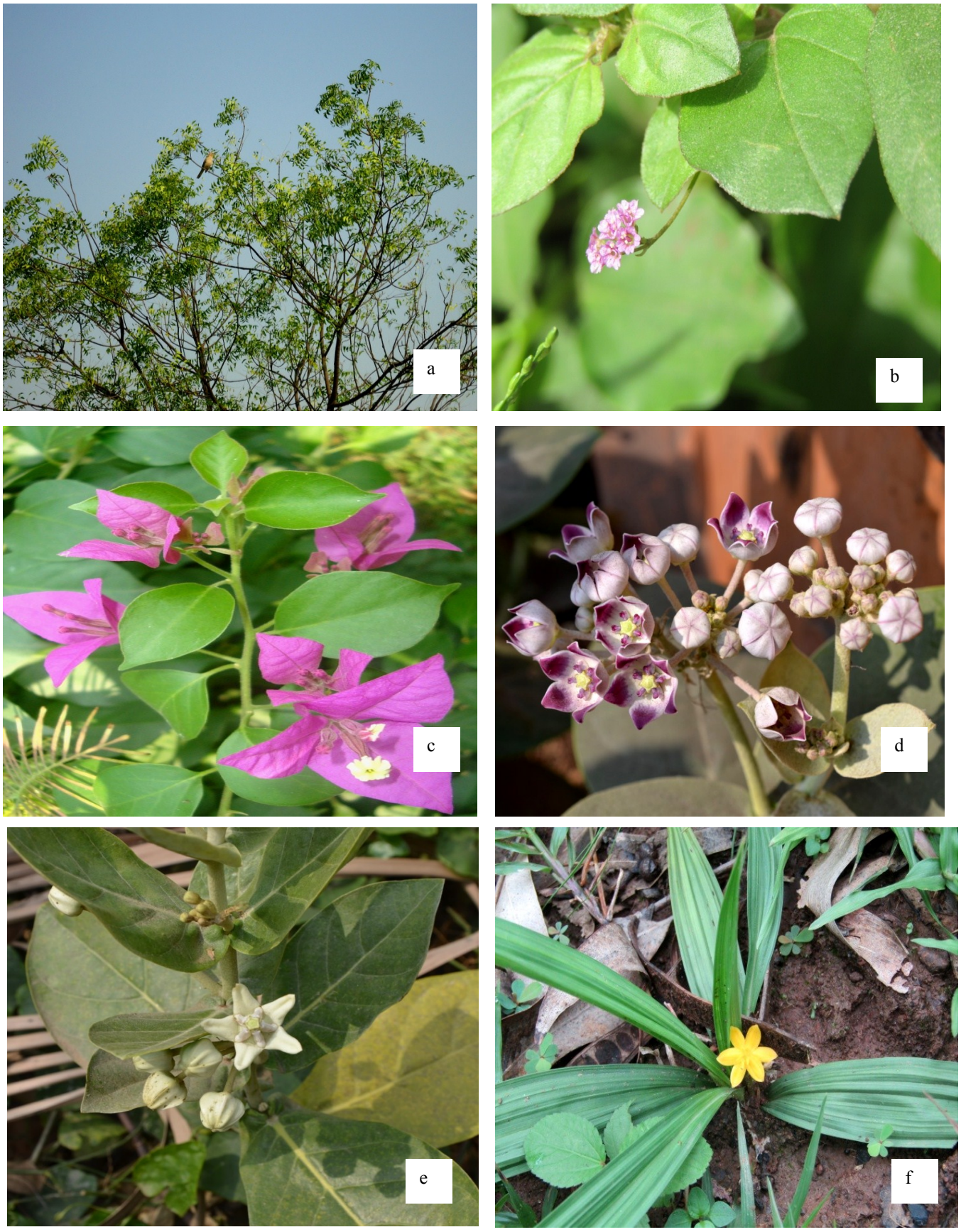

Plate 3. a. *Azadirachta india* A. Juss.; b.*Boerhavia diffusa* L..; c. *Bougainvillea glabra* Choisy.; d. *Calotropis procera* (Aiton.) W.T Aiton Drynad.; e. *Calotropis gigantea* W.T Aiton .; f. *Curculigo orchioides* Gaertn

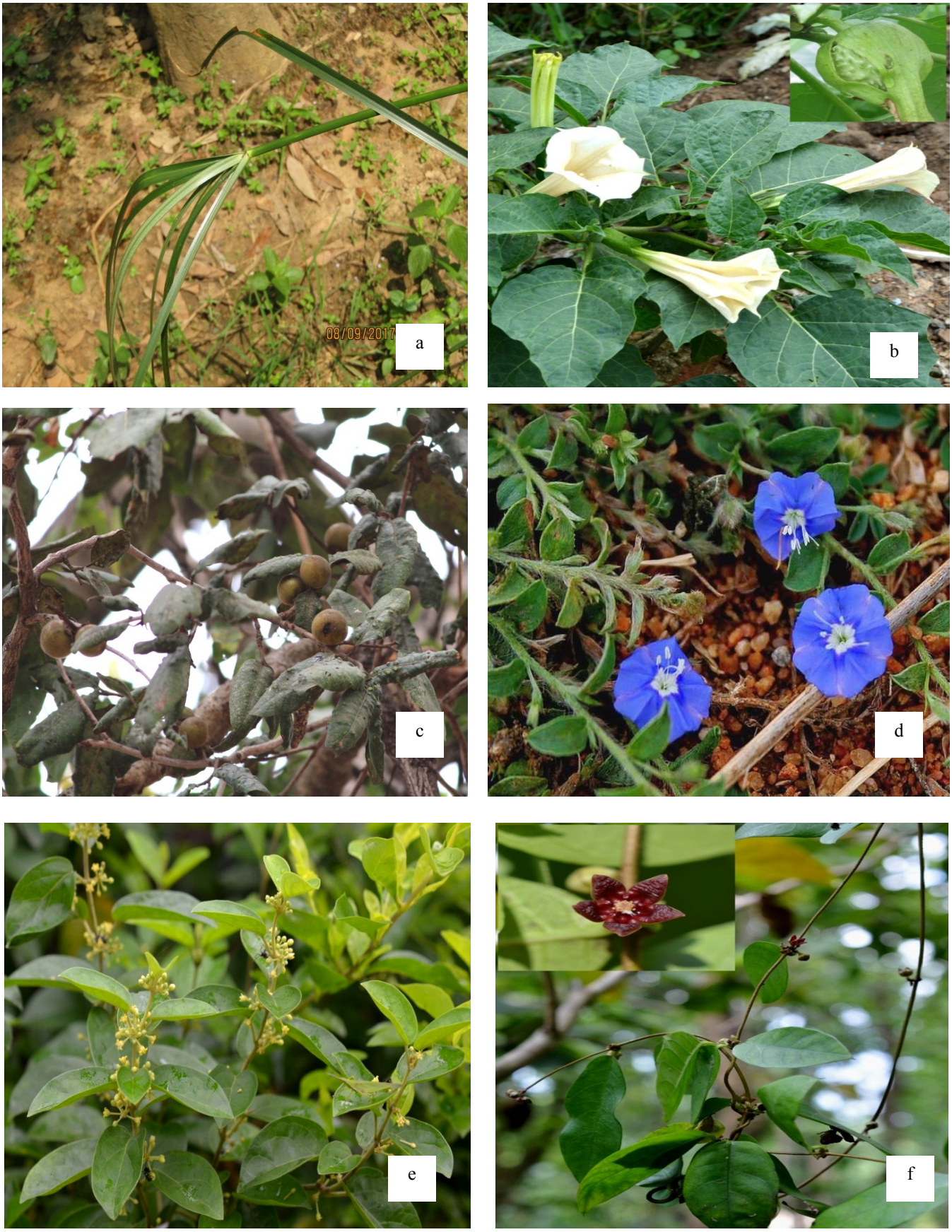

Plate 4. a. *Cyperus pangorei* Rottb.; b. *Datura innoxia* Mill.; c. *Diospyros melanoxylon* Roxb.; d. *Evolvulus alsinoides* (L.) L..; e. *Gymnema sylvestre* (Retz) R. Br. ex Schult.; f. *Hemidesmus indicus* R. Br.

Plate 5. a. *Cynanchum annularium* (Roxb.) Liede & Khanum b. *Melastoma malabathricum* L.; c. *Mucuna puriens* (L.) DC.; d. *Piper longum* L..; e. *Rauvolfia serpentina* (L.) Benth. ex Kurz

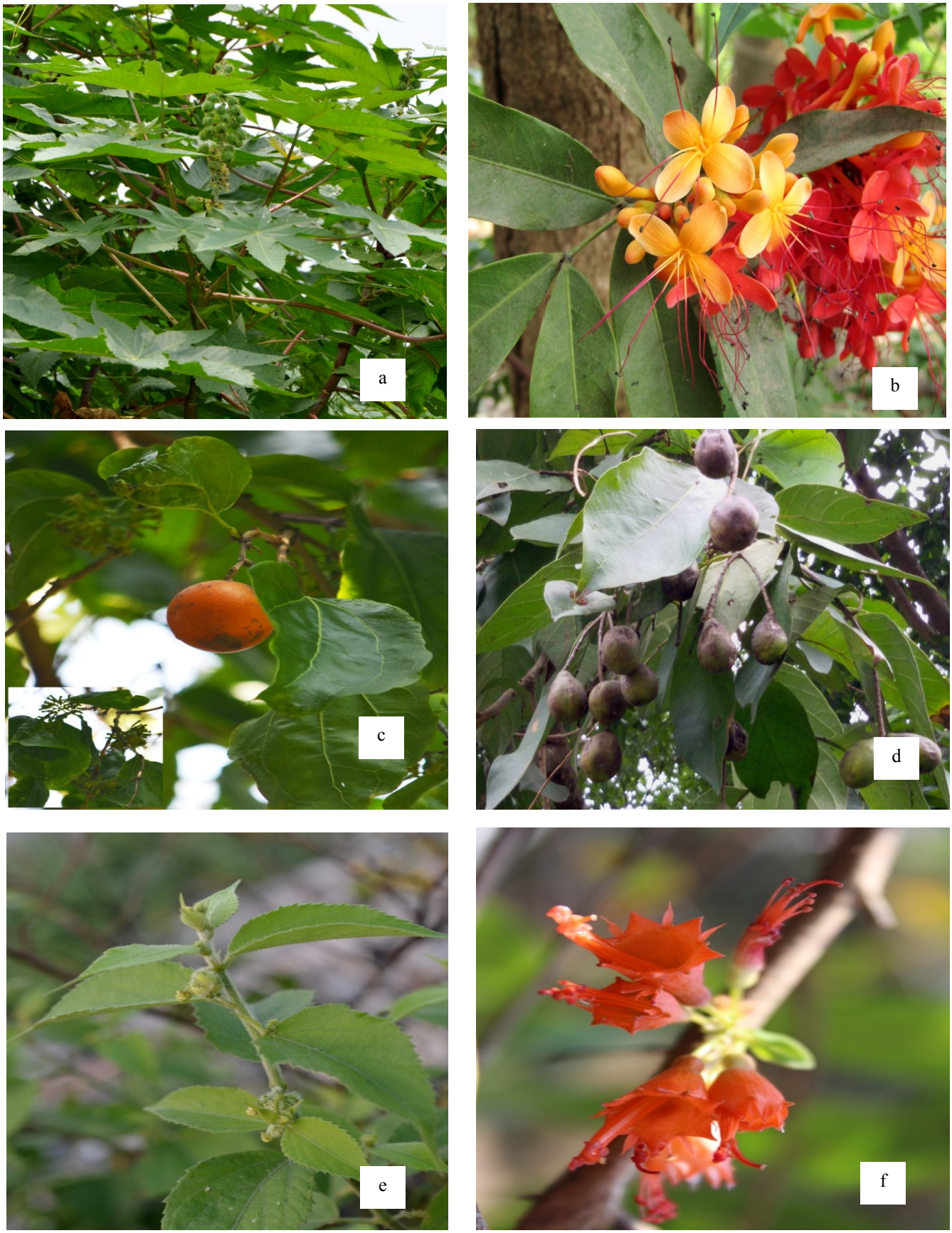

Plate 6. a. *Ricinus communis* L.; b. *Saraca asoca* (Roxb.) de Wilde; c. *Strychnos nux-vomica* .; d. *Terminalia chebula* Retz.; e. *Tragia involucrata* L.; f. *Woodfordia fruticosa* (L.) Kurtz.

Table 3. List of ailments under broad disease categories

Sl. No.	Disease Category	Name of the disease
1.	Gastrointestinal disorder	Acidity, appetizing, bowel disease, carminative, cholera, constipation, diarrhoea, dyspepsia, dysentery, hepatic, hemorrhage, inflammation of bladder, jaundice, liver problem, piles, stomach disorder and ulcer.
2.	Respiratory disorder	Asthma, bronchitis, cough & cold, catarrhal pharyngitis, pneumonia and whooping cough.
3.	Poisonous bite	Snakebite and scorpion sting.
4.	Cardiovascular disorder	Anemia, cardiac, heart bit controlling, heart, hemoglobin enrichment, hypertension.
5.	Pain	Abdominal pain, arthritis, analgesic, chest pain, finger pain, gout, headache, rheumatic pain, stomach pain, tooth pain, throat pain and wound.
6.	Renal disorder	Diuretic, dysuria and urinal trouble.
7.	Sexual disorder	Aphrodisiac, gonorrhea, herpes, leucorrhea, menstrual and syphilis.
8.	Parasitic disorder	Anthelmintic, elephantiasis, malaria, scabies, vermifuge and worm.
9.	Birth related problems	Contraceptive, colic syndrome, pregnancy and milk production.
10.	Neurological disorder	Epilepsy, nervous weakness and paralysis.
11.	ENEM & skin	Leprosy, leucoderma, night blind, ophthalmic, scurvy, skin disease, tongue infection and teeth bleeding.
12.	Others	Astringent, beriberi, cancer, diabetes, dropsy, fracture, fever, leukemia, measles, pox, swelling, sleeplessness, spleen enlargement, tumor and vomiting.

Table 4. Informant consensus factor for each disease category

Category of Disease	Number of use report (Nur)	% of use report	Number of taxa used (Nt)	% of use taxa	ICF
Gastrointestinal	203	28.39	69	57.98	0.66
Respiratory	69	9.65	29	21.84	0.58
Poisonous bite	38	5.31	17	14.28	0.56
Neurological Disorder	23	3.21	12	10.08	0.50
Pain	75	10.48	39	32.77	0.48
Others	86	12.02	46	38.65	0.47
Sexual Disorder	53	7.41	29	24.36	0.46
Ear, Nose, Eyes, Mouth (ENEM) & Skin	72	10.06	39	32.77	0.46
Cardiovascular Disorder	35	4.89	20	16.8	0.44
Parasitic disorder	22	3.07	13	10.92	0.42
Birth related problems	13	1.81	9	7.56	0.33
Renal Disorder	26	3.63	19	15.96	0.28

Total one hundred and seventy-seven numbers of citations are noted on uses of plant parts. Different socio-cultural communities have mostly used the root of different medicinal plants and they are mostly preparing the remedy through the paste method which is supported by previous works in this region. The highest use values are noted on *Alstonia scholaris* (0.37), *Justicia adhatoda* (0.32), *Calotropis gigantea, Strychnosnux-vomica* (0.30 for each), *Calotropis procera*, *Diospyros melanoxylon*, *Evolvulus alsinoides*, *Terminalia chebula* (0.27 for each). It also gives an idea about which plants should be taken for detailed study in near future. This type of quantitative tool mainly attempted for assess the relative importance of species within the different socio-cultural groups, rather than only list-making exercise usually associated with most ethnobotanical studies (Datta *etal.*, 2014; Mandal *et al.,* 2014; Sannigrahi, 2014; Chaudhury *et al.*, 2018; Das Dutta and Bhakat, 2018; Manna and Mishra, 2018; Raj *et al.*, 2018).

Calotropis gigantea from the family Apocynaceae is the topper in the list of RFC rank. *Calotropis gigantea* commonly known as *'Akanda'* has been identified for relief of any pain. Approximately 50% of informants have reported the uses of that species and out of 16 informants, 10 informants have claimed the uses of this species for any pain. Beside these uses, *Calotropis* sp. is prescribed for leucorrhoea, worm, rheumatic pain, elephantiasis, jaundice, epilepsy, scorpion sting, leprosy, teeth ache, asthma, bronchitis. Its uses were well confirmed as antimicrobial (Kumar *et al.*, 2010), analgesic (Pathak and Argal, 2007), wound healing (Deshmukh *et al.*, 2009), insecticidal (Alam *et al.*, 2009), anti-diarrhoeal (Chitme *et al.*, 2004), anti-inflammatory (Das *et al.*, 2009), antioxidant (Singh *et al.*, 2010), pregnancy (Srivastava *et al.*, 2007). The RFC values emphasize the ethnobotanical data collected, based on popular species used by the different socio-cultural groups. It also gives an idea about which plants should be taken for detailed study in near future.

Besides Use Value, RFC value, Fidelity level (FL%) is another quantitative tool by which we can identify the species according to their relative effectiveness. It is also indicated the successful plant species for a specific disease in selected areas and utilization of that species by the local healers to treat any disease. Eighty-four numbers of species were found with 100% FL value. *Euphoribia fusiformis*, *Woodfordia fruticosa,* have also been reported for poor lactation, leucorrhea respectively (Chaudhury, Singh and Bharati, 2017) and *Syzygium cumini* for stomach ache (Rahaman and Karmakar, 2015) with 100% FL value. Informant consensus factors (ICF) raged found in my study from 0.66-0.28 and the average value of all categories was 0.47 which was higher than the previous work (Muhammad, Muhammad and Mehmood Abbasi, 2017). The high ICF value indicates the species are used for particular disease categories is well known across the different socio-cultural groups. Whereas low ICF value indicates that either the knowledge regarding species is not transmitted among the different socio-cultural groups or it has been substituted by other species due to unavailability in their area. My findings signify that gastrointestinal and respiratory disorders are prevalent in my study region. Similar findings have been reported previously from Bangladesh (Faruque *et al.*, 2018) and Pakistan (Muhammad, Muhammad and Mehmood Abbasi, 2017). Whereas different findings were also reported from China (Chang *et al.*, 2017) and West Bengal, India (Rahaman and Karmakar, 2015).

In previous literature, *Abrus precatorius* (Fabaceae), *Aristolochia indica* (Aristolochiaceae), *Asparagus racemosus* (Aspragaceae), *Cissampelos pareir* (Menispermaceae), *Curculigo orchioides* (Hypoxidaceae), *Hemidesmus indicus* (Apocynaceae), *Rauvolfia serpentina* (Apocynaceae), *Woodfordia fruticosa* (Lythraceae) were reported for Leucorrhea and *Euphorbia fusiformis* (Euphorbiaceae) was reported as poor lactation by '*Lodha*' tribe from Paschim Medinipur district, West Bengal (Chaudhury *et al.,* 2017). In our investigation, the above mention species have different uses but *Aristolochia indica, Curculigo orchioides* also reported here for menstrual problem. *Woodfordia fruticosa*, *Euphorbia fusiformis* uses were found in this investigation for same purposes. *Aegle marmelos, Aristolochia indica*, *Asparagus racemosus, Cynanchum annularium* and *Mucuna pruriens* were reported for febrifuge (Dey and De, 2012) whereas *Aegle* sp. and *Aristolochia* sp. were also used here for febrifuge.

Ethno-medicinal uses of total 40 species were reported from Bankura Susunia hill on '*Santal*' tribe (Rahaman and Karmakar, 2015), in which total 13 species are matched in my present investigation in respect of their uses. However *Diospyros melanoxylon* was reported as jaundice; *Oxalis corniculata* reported as gastric problem, stomachache; *Riccinus communis* reported as breast pain, scorpion sting, stomachache, induce lactation; *Tragia involucrata* reported as hair fall, scorpion sting but in my investigation, these species are mainly used for stomach disorder; scurvy; scorpion sting respectively. Ethnomedicinal documentation was done (Chaudhury *et al.*, 2018) on '*Lodhas*' tribal group of West Bengal and 250 ethnomedicinally important species were documented. From my investigation, it was observed that the uses of 21 species were partially matched and 29 species have other uses.

4. Conclusion

The study will enlighten the major phyto-resources used by tribal communities of the Western part of West Bengal. The quantitative tools are the very potent approach for the analysis of medicinal plants. With the help of quantitative tools, it was observed that *Calotropis gigantea* is highly potent plant taxa that have maximum uses in the selected area. Simultaneously few more species like *Woodfordia fruticosa, Euphorbia fusiformis, Alstonia scholaris, Aristolochia indica, Achyranthes aspera, Diospyros melanoxylon, Terminalia chebula* etc. also have tremendous medicinal uses. From this survey uses of seven species are recorded for new [*Anogeissus acuminata* (Roxb. ex DC.) Wall.; *Ceropegia candelabrum* L.; *Wattakka volubilis* (L.F.) Stapf.; *Cynanchum annalurum* (Roxb.) Liede&Khanum.; *Oxystelma esculentum* (L. f.) Sm.; *Pentatropis capensis* (L. fil.) Bullock.; *Utricularia bifida* Linn.] in these regions. It is found that many asclepiadaceae s.l. members are used for treatment of different ailments and one carnivorous plant also noted for treatment. The present survey is guiding us the potent medicinal plants for the study in future aspect and any application in drug preparation.

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References

Alam M A, Habib M R, Nikkon F, Khalequzzaman M and Karim M R 2009. Insecticidal activity of root bark of *Calotropis gigantea* L. against *Tribolium castaneum* (Herbst). World J. Zoology. 4(2): 90–95.

Chang N, Luo Z, Li D, and Song H 2017. Indigenous Uses and Pharmacological Activity of Traditional Medicinal Plants in Mount Taibai, China. eCAM. 1–11.

Chaudhury S, Singh H and Bharati K A 2017. Quantitative analyses on ethnogynecological remedies used by Lodhas of Paschim Medinipur district, West Bengal, India. Indian J. Trad. Knowled. 16 (2): 325–332.

Chaudhury S, Singh H and Rahaman C H 2018. Ethnomedicinal uses of plants by the Lodhas tribal group of West Bengal, India. J. Trad. Folk Pract. 6(1): 67-97.

Chitme H, Chandra R and Kaushik S 2004. Studies on anti-diarrhoeal activity of *Calotropis gigantea* R. Br. in experimental animals. J. Pharm. Pharmaceut. Sci. 7(1): 70–75.

Das D S and Bhakat R K 2018. A Note on Ethno-medicinal Herbs of Gopiballavpur Block-I of Jhargram district, West Benagl, India. Indian J. Biol. Sci. 24: 69–75.

Das S, Das S, Das M K and Basu S P 2009. Evaluation of anti-inflammatory effect of *Calotropis gigantea* and *Tridax procumbens* on Wistar albino rats. J. Pharm. Sci. & Res. 1(4): 123–126.

Datta T, Patra A K and Dastidar S G 2014. Medicinal plants used by tribal population of Coochbehar district, West Bengal, India–an ethnobotanical survey. Asian Pac. J. Trop. Biomed. 4: S478–S482.

Deshmukh P T, Fernandes J, Aarte A and Toppo E 2009. Wound healing activity of *Calotropis gigantea* root bark in rats. J. Ethnopharmacol. 125(1): 178–181.

Dey A and De J 2012. Traditional use of medicinal plants as febrifuge by the tribals of Purulia district, West Bengal, India. Asian Pac. J. Trop. Dis. 2: S800–S803.

Faruque M O, Uddin S B, Barlow J W, Sheng H, Shuang D, Qian C, Xiaohua L and Xuebo H 2018. Quantitative ethnobotany of medicinal plants used by indigenous communities in the Bandarban District of Bangladesh. Front. Pharmacol. 9(40): 1-12.

Friedman J, Yaniv Z, Dafni A and Palewith D 1986. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethno pharmacological field survey among Bedouins in the Negev desert, Israel. J. Ethnopharmacol. 16(2–3): 275–287.

Ghosh A 2003. Herbal folk remedies of Bankura and Medinipur districts, West Bengal. IJTK. 02(4): 392-394.

Ghosh A 2008. Ethnomedicinal plants used in West Rarrh region of West Bengal. NPR. 7(5): 461-465.

Jain S and Mudgal V 1999. A hand book of ethnobotany. Bishen singh Mahendra Pal Singh. Dehra Dun, India.

Jain S and Rao R 1977. A hand book of Field and Herbarium Methods. Today and Tomorrow Publisher. New Delhi, India.

Jain S K 1987. A Manual of Ethnobotany. Scientific Publ. Jodhpur, India.

Karthikeyan S 2009. Flowering plants of India in 19th and 21st Centuries – A comparision. In: Krishnan, S. & Bhat, D.J. (Eds.), Plant and fungal biodiversity and bioprospecting. Goa University. Goa.

Kumar G, Krthik L and Bhaskara Rao K 2010. *In vitro* anti-candida activity of *Calotropis gigantea* against clinical isolates of Candida. J. Pharm. Res. 3(3): 539–542.

Mandal M, Paul Sand Dey S 2014. Ethno-Medicobotany of Some Tribal Communities of Bankura District, West Bengal, India. Explor. Anim. Med. Res. 4(1): 64-80.

Mandal S and Chouhan P 2018. Scheduled tribes in West Bengal:

An analysis of Literacy Scenario of a Disadvantage Group in India. Int. J. Basic and Applied Research. 8(7): 310–323.

Manna S S and Mishra S P 2018. Ethnomedicinal survey of plants used by tribal in Lalgarh, forest range, W.B. India. J. Pharmacol. 7 (2): 199–202.

Monteiro J M, Albuquerque U P de, Lins-Neto E M de F, Araujo E L de and Amorim E L C de 2006. Use patterns and knowledge of medicinal species among two rural communities in Brazil's semi-arid northeastern region. J. Ethnopharmacol. 105(1–2): 173–186.

Muhammad U, Muhammad A and Mehmood A A 2017. An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, PunjabPakistan. Plos one. 12(6): 1–22.

Pathak A and Argal A 2007. Analgesic activity of *Calotropis gigantea* flower. Fitoterapia. 78(1): 40–42.

Phillips O and Gentry A H 1993. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. Economic Botany. 47(1): 15–32.

Prain D 1903. Bengal Plants. Bishen singh Mahendra Pal Singh. Dehra Dun, India.

Prakash O, Jyoti A K, Kumar P and Manna N K 2013. Adulteration and Substitution in Indian Medicinal Plants: An Overview. J. Medicinal Plants Stud.1(4): 127–132.

Rahaman C and Karmakar S 2015. Ethnomedicine of Santal tribe living around Susunia hill of Bankura district, West Bengal, India: The quantitative approach. Journal of Applied Pharmaceutical Science. 5(02):127–136.

Raj A J, Biswakarma S, Pala N A, Shukla G, Vineeta, Kumar M, Chakravarty S and Bussmann R W 2018. Indigenous uses of ethnomedicinal plants among forest-dependent communities of Northern Bengal, India. Journal of Ethnobiology and Ethnomedicine. 14(8): 1-28.

Sagar P K 2014. Adulteration and substitution in endangered ASU medicinal plants of India: a review. Int. J. Medicinal Aromatic Plants. 4(1): 56–73.

Sannigrahi N 2014. Traditional knowledge of medicinal plants & self-help group: a key to sustainable development. J. Medicinal Plants Stud. 2(3): 14–24.

Sanyal M 1994. Flora of Bankura District. Bishen singh Mahendra Pal Singh. Dehra Dun, India.

Sheng-Ji P 2001. Ethnobotanical Approaches of Traditional Medicine Studies: Some Experiences From Asia. Pharm. Biol. 39(1): 74–79.

Singh N, Jain N K, Kannojia P, Garud N, Pathak A K and Mehta S C 2010. In vitro antioxidant activity of *Calotropis gigantea* hydroalcohlic leaves extract. Der Pharmacia Lettre. 2(3): 95–100.

Singh P and Dash S S 2014. Plant Discoveries 2013-New genera, Species and New Records. BSI. Calcutta.

Srivastava S, Keshri G, Bhargavan B, Singh C and Singh M M 2007. Pregnancy interceptive activity of the roots of *Calotropis gigantea* Linn. in rats. Contraception. 75(4): 318–322.

Tardío J and Pardo-de-Santayana M 2008. Cultural Importance Indices: A Comparative Analysis Based on the Useful Wild Plants of Southern Cantabria (Northern Spain) 1. Economic Botany. 62(1): 24–39.

Trotter R T and Logan M H 1986. Informant Consensus: A New Approach for Identifying Potentially Effective Medicinal Plants. Ed. Bedfore Hills, New York, 91-112.

Van der Merwe D, Swan G E and Botha C J 2001. Use of ethnoveterinary medicinal plants in cattle by Setswana-speaking people in the Madikwe area of the North West Province of South Africa. J. S. Afr. Vet. Assoc. 72(4): 189–196.