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A Preliminary Study on Ethnomedicinal Plants of Bankura District, West Bengal, India

Bandana Pradhan

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ABSTRACT

In the present investigation, thirty (30) medicinal plants have been recorded from the Bankura district. Investigated 30 taxa belonging to 16 dicot families. Among these 16 dicot families, Fabaceae is the dominating family (representing 6 species). Euphorbiaceae (4 species), Acanthaceae (4 species) and Apocynaceae (3 species) are the other dominant families. Among these 30 taxa, leaves of 13 plants, roots of 6 plants, the bark of 4 plants, the whole plant of 3 plants, the fruit of 2 plants and the stem of 1 plant are used as medicine by the local and tribal people of the study area. Habitually the investigated taxa fall under four groups: Trees, shrubs, climbers and herbs. The numbers of species in each group and their respective percentages have been defined as herbs-15 (37.5%), shrubs-4 (10%), climbers-10 (25%) and trees-11 (27.5%). A preliminary phytochemical screening of some selected medicinal plants has been done and these taxa show promising results for sugar, tannin, lignin and saponin.

Keywords Ethnomedicine, Medicinal plants, Conservation, Phytochemicals, Saponin.

INTRODUCTION

Every plant species surrounding us has some active principles which may be used as medicine as we observed since the 'Charaka' age to till date. The readily available and culturally important traditional medicinal plants, as used to fight illness and maintain health, are an important source of livelihood for indigenous and rural populations. From that perspective, medicinal plant species have received specific and commercial attention. A focus on documentation of medicinal plants in the area of the Bankura district (especially Susunia Hill) has been undertaken in this present study. This is done by making scientific exploitation, utilization and future conservation measures for human beings easier, as documentation of any biological resource is an essential prerequisite for all the above. Different tribal peoples are significantly distributed throughout the district. The races that are dominating are Bhumij, Santals, Muda and Oraon. On investigation, it was found that the tribal people in the remote village depend very much on plants as medicine for their primary health care needs. Several plants are used every day.

Several workers (Mallick and Mallick 2012, Mondal and Biswas 2012, Mallick *et al*. 2012, Sin-

Bandana Pradhan
Assistant Professor, Department of Botany, Bankura Sammilani College, Bankura 712102, India
Email: pradhanbandana.vb@gmail.com

hababu and Banerjee 2013, Rahaman and Karmakar 2015) have already documented some ethnobotanical and ethnomedicinal plants from the district of Bankura. In this endeavour, the present study has been undertaken to add additional information to enrich the medicinal plant's reservoir in the district and to explore new ethnomedicinal data provided by the local and tribal people of the district.

Phytochemicals are biologically active, naturally occurring substances in plants that have protective or disease-preventive properties. Several phytochemicals are known, some of which include alkaloids, saponins, flavonoids, tannins, glycosides, anthraquinones, steroids and terpenoids. They do not protect plants but have enormous physiological effects on humans and animals. These include cancer prevention, antibacterial, antifungal, antioxidative, hormonal action, enzyme stimulation and many more (Pandey *et al*. 2013).

Phytochemicals are responsible for the medicinal activity of plants and they have protected humans from various diseases and health hazards (Thilagavathi *et al*. 2015). Phytochemicals are divided into two groups: Primary and secondary metabolites, based on the function of plant metabolism. Tannins are secondary metabolites responsible for antimicrobial properties in various plants (Saswade 2019). Terpenoids and tannins are attributed to analgesic and anti-inflammatory activities. Apart from this, tannins contribute to the property of astringency, which means faster healing of wounds and inflamed mucous membranes. In addition to industrial applications as foaming and surface-active agents, saponins have been extensively used as detergents, pesticides and molluscicides and also have beneficial health effects. Alkaloids have been associated with medicinal uses for centuries and one of their common biological properties is their cytotoxicity. Several workers have reported the analgesic, antispasmodic and antibacterial properties of alkaloids.

Preliminary phytochemical screening of some medicinal plants has been done in the present study. From the perusal of literature, it has been found that there are available reports regarding ethnomedicinal plants have been reported from the district but phytochemicals analysis has not yet been done from the district, in this scenario present study has been undertaken to enrich the pharmacopeia of the district (Mallick and Mallick 2012, Mondal and Biswas 2012, Mallick *et al*. 2012, Sinhababu and Banerjee 2013, Rahaman and Karmakar 2015).

MATERIALS AND METHODS

Study area

Bankura is one of the most important districts of West Bengal where most of the tribal villages are adjacent to forests (Fig.1). It is located in the Western part of the state of West Bengal. It covers an area of 6.871.24 sq. km. The north and north east south and west borders of the district are demarcated by the district of Burdwan, Hoogly, Midnapur and Purulia respectively. The district approximately resembles and is a scales triangle with its northern apex at the junction of Burdwan and Purulia with an irregular east-west best line attached to Midnapur and Hoogly. The main tribal communities of the district consist of Santhals, Oraon, Munda, Bhumiz, Kaoru, Mahali, Kheria and Malpahariyas. Of these communities, Santhals have got a specific attachment to forests.

Data collection

Regular field surveys have been conducted in different villages and forest areas of the Bankura district in different seasons for the last two years (2018-2019) to gather information about medicinal plants of the district and to collect the herbarium specimens of the plants growing in the district. Before collection of the data, we had to approach friendship and kinship to feel comfortable sharing their valuable knowledge on the use of medicinal plants. The Prior Informed Consent (PIC) has been taken from each informant to publish their information which will protect the intellectual property of those traditional people. Special emphasis has been given to collecting the data on ethno-pharmacognosy. The aspects of ethno-pharmacognosy include the traditional collection practices of crude drugs, their collection time and season, practices of drying and storage of crude drugs. To confirm the authenticity of the information it has always been cross-checked by interviewing other tribal medicine

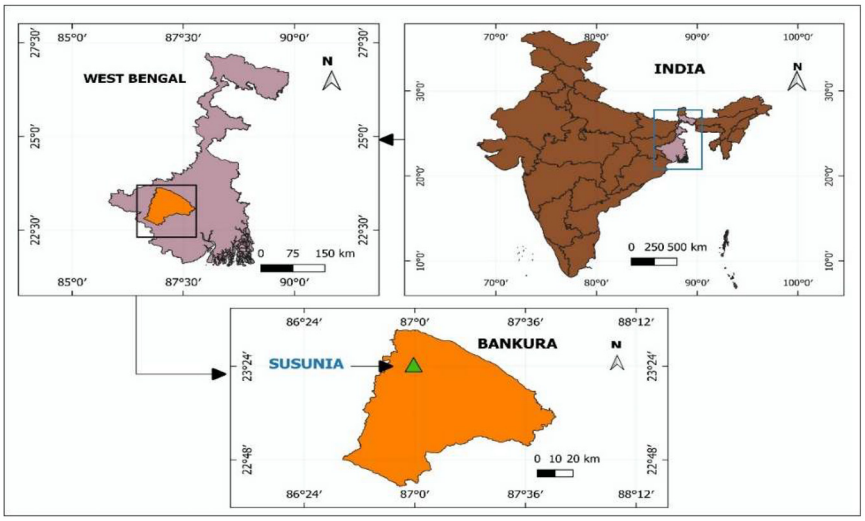

Fig. 1. Map of the study area.

men of the same and different localities.

Through a perusal of literature and field investigation on medicinal plants finally, a list of medicinal plant species of the district has been prepared (Mallick and Mallick 2012, Mondal and Biswas 2012, Mallick *et al*. 2012, Sinhababu and Banerjee 2013, Rahaman and Karmakar 2015). The collected plant specimens were carefully identified with the help of different floras (Manilal and Sivarajan 1982, Panigrahi and Murti 1989, BSI 1997, Paul *et al*. 2015, Sanyal 1994). The collected plant specimens are preserved as herbarium specimens following the standard method (Jain and Rao 1977) and kept in the Bankura Sammilani College Herbarium Department of Botany, Bankura Sammilani college for future reference.

Chemical color reaction tests:

Preliminary phytochemical screening of the powdered drugs of some selected medicinal plants has been done by chemical color reaction tests with various reagents for detection of different. Phytochemical groups present in the drugs following different standard methods (Evans 2008, Harborne and Williams 1994, Trease and Evans 1983). This phytochemical screening helps in the identification of different bioactive chemical groups present in the collected crude drugs which indicate their medicinal properties (Thilagavathi *et al*. 2015).

For this, the leaf, stem, bark and root of investigated taxa have been collected, make them sun-dry and made into powders. Then the dried powders dissolve in 90% methanol and were covered with aluminum foils and kept in dark places for a few days these extracts were used for different chemical color reaction tests. Various reagents have been used for these tests Dragendroff's reagent, Wagner's reagent, Mayer's reagent, Millon's reagent, Benedict's test, Fehling's test, 10% aq $K_2Cr_2O_7$ Solution, 10% aq Lead acetate solution, 5% aq Ferric Chloride solution, Lugol's reagent, Keddie reagent, Molash's test, 1% Lead acetate solution.

RESULTS AND DISCUSSION

Investigated 30 taxa belonging to 16 dicot families (Table 1). Among these 30 investigated taxa Fabaceae is the dominating family, 6 species belong to Fabaceae. Other dominating families are Euphorbiaceae (4 species), Acanthaceae (4 species) and Apocynaceae (3 species) Table 1.

Chemical color reaction tests of some selected individuals (10 species) have been done to know the preliminary phytochemicals present in them. Most of the taxa show very positive results against various

Table 1. List of recorded plants along with scientific name, habit, family, parts used, and disease cured.

Serial no.	Scientific name	Habit	Family	Parts used	Disease cured
1	*Alstonia scholaris* (L.) R.Br.	Tree	Apocynaceae	Bark	Stomach trouble
2	*Aristolocia indica* L.	Climbers	Aristolochiaceae	Root	Snake bite
3	*Abrus precatorius* L.	Climbers	Fabaceae	Root	Stomach trouble
4	*Buchnania lanzan* Spreng.	Tree	Anacardiaceae	Fruit	Nutrition
5	*Butea monosperma* (Lam.) Taub.	Tree	Fabaceae	Root	Stomach trouble
6	*Calotropis procera* (Aiton) Dryand.	Shrub	Asclepiadaceae	Root	Stomach trouble
7	*Cassia occidentalis* L.	Herb	Fabaceae	Leaf	Skin infection
8	*Centella asiatica* (L.) Urban	Herb	Apiaceae	Leaf	Stomach trouble
9	*Cissus quadrangularis* L.	Climbers	Vitaceae	Stem	Bone fracture
10	*Croton bonplandianus* Baill.	Herb	Euphorbiaceae	Leaf	Cuts
11	*Curculigo orchioides* Gaertn.	Herb	Hypoxidaceae	Root	Stomach trouble
12	*Gendarussa vulgaris* Nees	Herb	Acanthaceae	Whole plant	Cuts and wounds
13	*Holarrhena antidysenterica* (L.) Wall.	Tree	Apocynaceae	Bark	Stomach trouble
14	*Hygrophilla schulli* (Buch.-Ham.) M.R.et.S.M. Almeida	Herb	Acanthaceae	Leaf	Anemia
15	*Ichnocarpus frutescens* (L.) W.T.Aiton	Climber	Apocynaceae	Leaves	Sprain or pain
16	*Ipomea pes-trigidis* L.	Climber	Convolvulaceae	Leaves	Tonsillitis
17	*Justicia adhatoda* L.	Shrub	Acanthaceae	Leaf	Cold and cough
18	*Shorea robusta* Gaertn.	Tree	Dipterocarpaceae	Bark	Burn
19	*Pergularia daemia* (Forssk.) Chiov.	Climbers	Asclepiadaceae	Leaf	Skin infection
20	*Emblica officinalis* Gaertn.	Tree	Euphorbiaceae	Fruit	Stomach ache
21	*Salomonia oblongifolia* DC.	Herb	Polygalaceae	Whole plant	Dysentery
22	*Jatropha gossypifolia* L.	Herb	Euphorbiaceae	Gum	Toothache
23	*Teramnus labialis* (L.f.) Spreng	Climber	Fabaceae	Whole plant	Liver trouble
24	*Tragia involucrate* L.	Climber	Euphorbiaceae	Leaves	Headache
25	*Melochia corchorifolia* L.	Herb	Malvaceae	Leaves	Indigestion
26	*Moringa olifera* Lam.	Tree	Moringaceae	Leaf	Nutrition
27	*Rungia pectinate* (L.) Nees	Climber	Acanthaceae	Leaf	Worm
28	*Vitex negundo* L.	Shrub	Verbenaceae	Leaf	Bone fracture
29	*Zizyphus oenoplia* (L.) Mill.	Shrub	Rhamnaceae	Root	Stomachache
30	*Zizyphus oenoplia* (L.) Mill.	Shrub	Rhamnaceae	Root	Stomachache

chemical constituents (Table 2).

Habitually the investigated taxa fall under four groups Trees, Shrubs, Climbers and Herbs. The numbers of species in each group and their respective percentages have been defined as Herbs- 15 (37.5%), Shrubs- 4 (10%), Climbers- 10 (25%) and Trees- 11 (27.5%) Fig. 2.

Table 2. Preliminary phytochemical screening of crude drugs.

Name of the plant	Plant parts	Alkaloid	Protein	Amino acid	Reducing sugars	Tannin	Lignin	Saponin
Buchnania lanzan Spreng.	Bark	+	++	+	+++	+++	+++	++
Emblica officinalis Gaertn.f.	Leaves	++	++	_	++	_	_	_
Ichnocarpus frutescens R.Br.	Leaves	_	+++	__	++	++	++	+
Gendarussa vulgaris Nees	Leaves	+++	+++	_	++	+++	++	++
Shorea robusta Gaertn.f.	Bark	+	+	_	+++	+++	++	+++
Vitex negundo L.	Leaves	_ _	++ +	_ _	+	+++	_ _	_ _
Tamarindus indica L.	Bark	_	_	_	++	+++	++	++
Holarrhena antidysenterica (L.) Wall.	Bark	+++	+++	++	_	+++	+++	__

Table 2. Continued.

Name of the plant	Plant parts	Alkaloid	Protein	Amino acid	Reducing sugars	Tannin	Lignin	Saponin
Butea monosperma (Lam.) Taub.	Root	_	++	_	++	+++	++	+
Calotropis procera (Aiton) Dryand.	Root	++	+	_	_	+++	++	++

Considering individual plant-part it is found that different parts of plants like leaves, roots, stems, bark, fruit have been used as medicine by the local people for their primary health care needs. Among these 30 taxa leaves of 13 plants, roots of 6 plants, the bark of 4 plants, whole plant of 3 plants, fruit of 2 plants and stem of 1 plant used as medicine (Fig. 3).

Collection of the plant parts and their storage are also very important aspects of maintaining the quality of crude drugs. Though these ethnic communities do not have specific storage capacities they follow some ways or techniques regarding drug collection, storage, and mode of administration.

The preparation of drugs and mode of administration are also very important aspects of ethnic herbal practice. Medicines are given in various forms, they may be as an infusion, decoction, mixture, syrups, paste, powders, extract, fresh juice, massage balm. Fresh juice is given by squeezing any fresh medicinal plants.

These recorded 30 plant taxa used to cure 16 different health issues or diseases. Among these 16 disease categories most commonly recorded diseases are Stomach related disorders among 30 plants 10 plant species have been used by the local people for stomach problems or indigestion.

The informants also informed that the number of A*ristolochia Indica* L., *Curculigo orchioides* Gaertn., *Salomonia oblongifolia* DC., *Zornia diphylla* (L.) Pers. are decreasing day by day in the study area. From the literature survey, it has been found that these recorded plant taxa are also reported as rare species in another district as well as from the state of West Bengal and they have immense medicinal importance (Pradhan and Rahaman 2015, Pradhan and Rahaman 2019).

There may be some reason behind the decreasing number of these important taxa. As they are used by the local people randomly for their primary health care needs so, they face high use pressure and it may be one of the major reasons for their lower number in the study area.

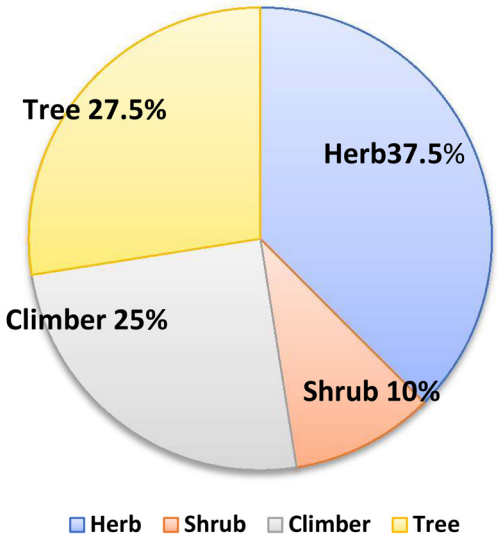

Fig. 2. Distribution of plants across the various life form (Habits).

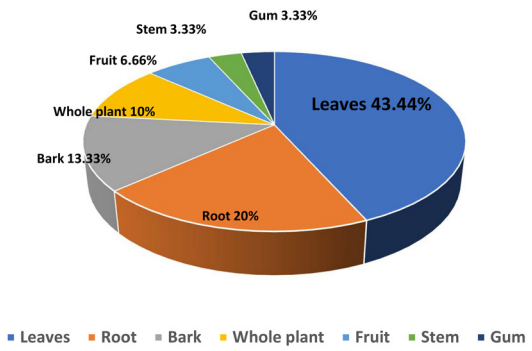

Fig. 3. Percentage of different plant parts used as medicine.

Fig. 4. Photographs of color reaction test showing positive results.

Besides these, there may be some problems regarding their seed germination, habitat destruction, or other anthropogenic disturbances.

Chemical color reaction tests of some selected individuals (10 species) have been done to know the preliminary phytochemicals present in them. Most of the taxa show very positive results against various chemical constituents (Table 2, Fig. 4).

Buchnania lanzan spreng. Shows positive results for reducing sugar, tannin and lignin whereas *Ichnocarpus frutescent* R.Br. shows positive results only for protein.

Gendarussa vulgaris Nees shows positive results for alkaloid, protein and tannin whereas *Tamarindus indica* L. shows positive results for tannin.

Shorea robusta Gaertn.f. showing positive results for reducing sugar, tannin and saponin whereas *Vitex negundo* L. shows positive results for protein, tannin and saponin.

Holarrhena antidysenterica (L.) Wall. showing positive results for alkaloids, protein, tannins and lignin.

Butea monosperma (Lam.) Taub. and *Calotropis Procera* (Aiton) Dry and Showing positive results tannin.

From the phytochemical screening, it is found that most of the plants show very positive results against various chemical reagents and from the literature, it is well established that many of the phytochemicals have immense importance so, they may act as good candidates for bioprospecting or drug discovery (Fig. 4).

A photo plate of six potent medicinal plants have been provided with their scientific name along with their author citation (Fig. 5).

CONCLUSION

From the study, it has been observed that the district is very rich in medicinal flora as 30 different species were recorded from the wild as medicinal plants. From the field survey as well as literature survey, it

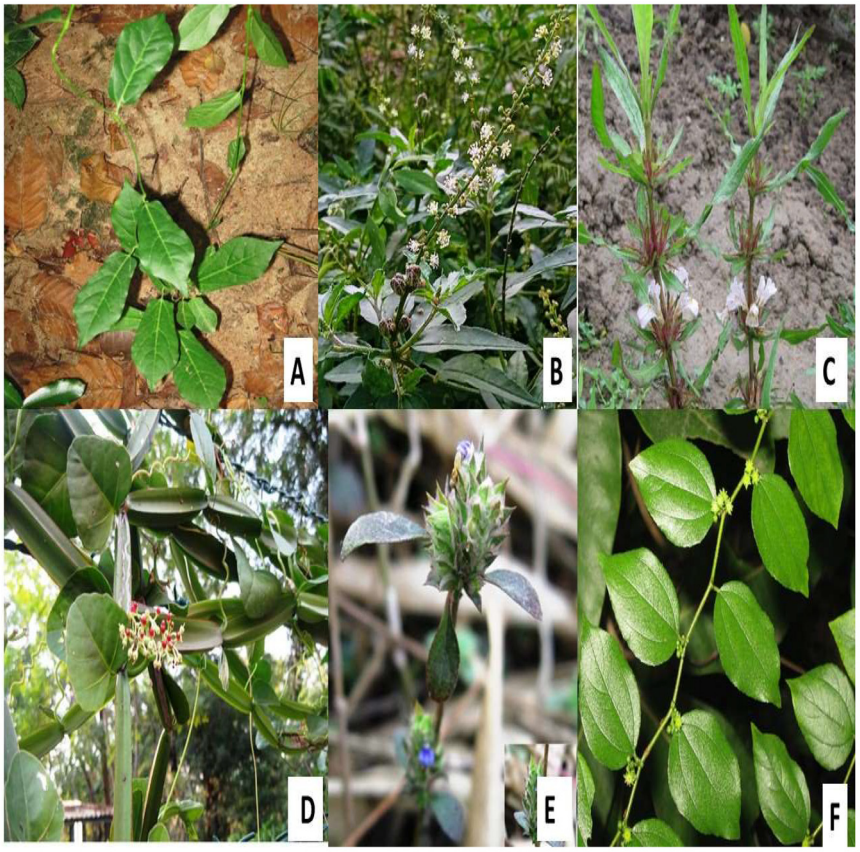

Fig. 5. Photographs of the investigated taxa. A. *Aristolochia indica* L., B. *Croton bonplandianus Baill*., C. *Hygrophilla schulli* (Buch.-Ham.) M.R.et.S.M. Almeida, D. *Cissus quadrangularis* L., E. *Rungia pectinate* (L.) Nees, F. *Zizyphus oenoplia* (L.) Mill.

was noticed that most of the recorded species have immense medicinal value as they are used in different Indian systems of medicine and for the primary health care needs of the local people in the Bankura district. From the primary phytochemical screening, it is found that many taxa show positive results, so they may act as good candidates for future drug discovery. Many medicinally important taxa are decreasing in number in the study area, so local people should be aware of the decreasing number and ways to sustainably harvest the medicinal flora. So that the valuable species can be conserved for future generations.

ACKNOWLEDGMENT

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REFERENCES

BSI (1997) Flora of West Bengal, in Ranunculaceae to Moringaceae. Vol 1. Calcutta: Botanical survey of India.

Evans WC (2008) Trease and Evans' Pharmacognosy. 15th edn. Saunders Comp Ltd (Elsevier) Singapore.

Harborne JB, William CA (1994) Recent advances in the chemosystematics of the Monocotyledons. *Phytochemistry* 37(1): 3-8.

Jain SK, Rao RR (1977) A Handbook of Field and Herbarium Methods. Today and Tomorrows Publishers, New Delhi, India.

Mallick H, Mallick SK (2012) Medicinal plants used by the tribals of Natungram village district Bankura, West Bengal. *Int J*

Bas Appl Sci 1(2): 131-133.

Mallick SK, Banerjee P, Saha A (2012) Medicinal plants used by the tribals of Ratanpur village of Bankura, West Bengal. *Int J Life Sci* 1(2): 82-86.

Manilal KS, Sivarajan VV (1982) Flora of Calicut: The flowering plants of the greatest Calicut area consist of the western sectors of the Calicut and Malappuram districts. Bishen Singh Mahendra Pal Singh, Dehra Dun.

Mondal T, Biswas S (2012) Ethnoveterinary uses of some medicinal plants of Bankura district, West Bengal. *Life Sci Leaflets* 5: 47-49.

Pandey P, Mehta R, Upadhyay R (2013) Physico-chemical and preliminary phytochemical screening of *Psoralea corylifolia*. *Arch Appl Sci Res* 5(2): 261-265.

Panigrahi G, Murthi SK (1989) Flora of Bilaspur (Madhya Pradesh). Vol 1. Calcutta.