

## Folk Medicine : Is it a Reflection of Man-Nature Relationship?

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### ABSTRACT

The present paper documents ethnomedicinal values of various wild plants and herbs by Santal forest villagers of Jaypur forest range of Bankura district, West Bengal. Traditional knowledge often restores cultural heritage and establishes the identity of a group in a particular society. The concept of folk medicine is based on the folk education system, philosophical thought, and cultural origins of society and is usually transmitted orally. This research is a detailed field survey based on interviewing Santal medical healers and a few knowledgeable aged persons in three tribal villages of Jaypur, dense with natural forest resources and populated by tribal. I have applied a semi-structured and open-ended questionnaire. Apart from qualitative techniques, some relevant quantitative approaches like Informant Consensus factor, Fidelity Level analysis, Importance value, etc., have helped to explain the intimate man-nature relationship between forest resources and Santals through medicinal use of plants. It also discusses this social group's traditional knowledge to conserve and preserve forest resources.

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### Introduction:

From the beginning of human civilization, primitive human beings used to live in forest nurtured by nature. India's tribal communities live in the forest regions being isolated from the mainstream of life but in harmony with nature. They are in the multiplex relationship among populations of organisms for sustaining their livelihood within their habitat. Over 53 million tribal people in India, about 60% of the rural communities directly rely on the forest for their daily requirements (Saha and Sengupta, 2014). They use different parts of plants as medicine for ages as they are readily available, safe, and cost-effective. They have devised systems to get relief from the illness employing their indigenous technique, rooted in their belief

system. However, the ethnic minorities in rural India are characterized by geographic isolation and a strong sense of socio-cultural exclusion. Folk medicine includes healing practices and ideas on health care, limited to a specific cultural groups. This treasure of knowledge is transmitted orally by generation without any written document and is still retained by various indigenous groups of India. Folk healers carry an outstanding knowledge of wild plants. They have been developing the healthcare traditions through constant experimentation and years of experience rooted in understanding and realistic considerations (Gupta, Sharma and Sharma, 2014). The ethnic knowledge of using medicinal plants by these 'ecosystem people' has made them sustain their life through ages

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(Sengupta and Saha, 2013). Documenting this indigenous knowledge through ethnobotanical studies is very significant for the conservation and utilization of biological resources and to assess the socio-economic conditions of the native people through rituals, legends, religious ceremonies, tales, riddles, etc. This is a pre-requisite for any developmental planning concerned with the welfare of the tribal and their environment. A few modern drugs have been deducted from folklore and traditional medicine (Faulks, P.J., 1958). Therefore, the present paper opts to explain healing practices by applying folk medicine prepared by a few Santal key medicine men from the wild plants of Jaypur forest of Bankura district, enriched with natural forest resource and indigenous population, to unfold the knowledge of rural folks and tribal people of Jaypur forest on use of native plants for curing common diseases. To explore the man-nature relationship between forest and Santals, employing some relevant quantitative techniques include another arena of the study.

#### Area Identity and Geo-Environmental Specificities

Bankura, the fourth largest district of West Bengal, is located in the western part of the state, popularly known

as “Rarh”. This district forms an intermediate tract lying between the rice producing alluvial plains of Bengal to the east and the Chhotonagpur plateau in the west. Along the middle of the district, the ground surface gradually rises in an undulating plain. The Bankura district is enriched with the wealth of forest (Recorded forest area of 21.53%, State Forest Report, 2006-07, Govt. of West Bengal) covering Jaypur, Bishnupur, Ranibandh, Taldangra block etc. The Jaypur forest (Fig. 1) is generally a tropical dry deciduous type dominated by Sal tree (*Shorea robusta Gaertn. f.*). It is especially rich in wild plants having medicinal values. The climate is dry and hot summers with moderate monsoons. The western part of the district consists of poor ferruginous soil and a hard bed of laterite. Agro-ecologically and socio-economically, it is one of the poorest regions of West Bengal. Santal constitutes one of the largest tribal communities of the district.

The study was carried out in three villages in the Jaypur forest range of Bankura district, having a high concentration of tribal population viz. Adhakata (87.97%), Basudebpur (41.48%), and Natungram Radhamohanpur (80%). A large segment of the tribal population depends on the forest for their day-to-day

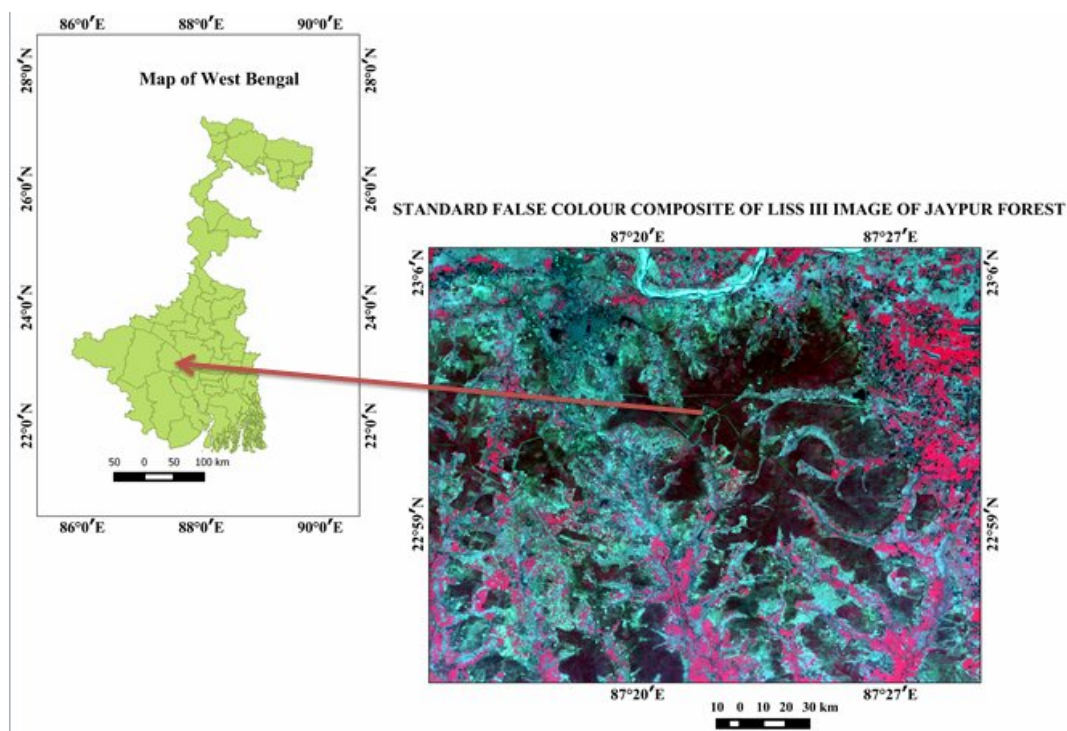


Fig. 1: Location map of the Jaypur Forest within the district of Bankura

livelihood. The villages have been selected taking the following criteria into account:

- a. High dependency ratio between forest and Santals;
- b. Isolated and scattered hamlets of Santals within the forest which harbours rich biodiversity;
- c. Forest is the only source of natural resource for Santals;
- d. Very poor accessibility and connectivity;
- e. Location of primary health centers far away (avg. 10 km) from habitation.

### Methodology

The methodology for the collection of ethnomedicinal data has been precisely qualitative. For collecting the necessary database and information, primary data sources have been fruitful in the present enquiry. The study areas were visited in different seasons, viz. summer, monsoon, and winter, to avail the wild plant resources in their exact condition. To select the study villages Census data (2011), Land Use-Land Cover Map, Topographical Maps (Ref. no. 31 J/1, 31J/5, 31J/2, 31J/9 and 31J/10) and LISS III satellite image were also referred to explore the man-forest relationship.

Collection of ethnobotanical information included structured and semi-structured questionnaires, complemented by free interviews and informal conversations with knowledgeable people native in each site territory. During the first contact with the Santal forest villagers, a few medicine men, especially *Mathur Hansda*, a middle-aged Santal, were identified, who consider themselves and the community as having extra-ordinary knowledge about using ethnomedicinal plants. An extended interview was continued to record, their unique knowledge about traditional and indigenous use of different plant species and their mode of usage. For each plant recorded, one questionnaire was filled.

All knowledgeable and experienced persons were consulted for recording local names. The gathered information was further authenticated by crosschecking. Plant related information has been entered into a database. The data acquired (Appendix table 1) for each plant comprises the common ethnic local name, its use, the part of the plant used, its preparation processes, the name of the diseases cured, and the conservation method. The functions of plant collection, medicine preparation, storage, and preservation were photographed (Photograph Plate 1).

The consulted literature during the survey for the identification of species was Bhattacharya, S (2005), Caius, J.F. (1986), and Chopra, R.N., Nayar, S.L. & Chopra, I.C. (1956). The medicinal plants' proper scientific names have been used following the International Plant Names Index (IPNI).

Besides qualitative techniques, some relevant quantitative methods have enriched the present study. Tools like *Consensus Value for Plant Part (CPP)*, *Informant Consensus factor (F<sub>ic</sub>)*, *Fidelity Level (FL in %)*, *Importance Value (IVs)*, and *Pearsonian Product-Moment Correlation Coefficient (r)* were done to establish the organic linkage between man and forest.

**Consensus value for plant part (CPP)** measures the degree of agreement among the informants concerning the plant part/s used and is calculated as follows:

$$CPP = P_x / P_t$$

$P_x$  refers to the number of times a given plant part was cited and  $P_t$  is the total citation of all parts.

**Informant consensus factor (F<sub>ic</sub>)** has been applied to identify the most potential medicinal plant species used by the Santal medicine men. It is expressed as follows:

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

$N_{ur}$  is the number of reports of usage from informants for a particular disease category;  $N_t$  is the number of *taxa* used for that disease category. The value ranges from 0 to 1, where the value nearer to 1 indicates the greater informant consensus and vice-versa.

The Fidelity Level (FL) expressed as % is used to quantify the use of a certain plant for the major medical ground by the informants and is calculated as:

$$FL = N_p / N \times 100,$$

where  $N_p$  is the number of informants who cited the species for a particular disease, and  $N$  refers to the total number of informants that cited the species to treat any given disease. The last quantitative analysis for measuring the acceptance of ethnomedicine within the Santal tribe of Jaypur forest is the Importance value (IVs). It measures the proportion of informants who consider the species most important and is calculated as:

$$IVs = n_{is} / n,$$

Where  $n_{is}$  is the number of informants who consider the species most important and  $n$  is the total number of informants.

To measure the degree of a linear relationship between variables, Pearsonian Product-Moment Correlation Coefficient ( $r$ ) has been followed with a statistical software package (SPSS v21).

## Findings and Discussion

### Documentation of Medicinal Plants

In the first stage of analysis, all the medicinal plants have been documented in a tabular form in an alphabetical order carrying the scientific name and local name, plant parts to be used, disease/s cured and mode of preparation and administration (Appendix table A1). Altogether thirty-five folk medicinal plants have been recorded from the Jaypur forest. The investigated taxa belong to four groups like tree, shrub, herbs, and climbers. The most dominant form of the species used by the forest villagers includes herbs (47%), which indicate easy accessibility of the plants in the forest.

### Diseases Treated

The recorded thirty-five plants species are used to formulate different types of ethno-medicinal preparations to cure sixty-three kinds of diseases. The frequently occurring diseases include digestive and metabolic system disorder, dermatological problems, poisoning, urinary system disorder, fever, cough and cold, wounds, etc. These have been grouped into some major categories as listed in fig 2. A detailed ground investigation revealed that the medicine men of Jaypur forest prescribed eight different plant species for dermatological problems. It was followed by six species for dysentery, five species for snake bite and gynaecological disorder, three species for urinary problems, pain relief and scorpion sting, and two different species for diabetes, wounds, cough, and cold, etc.

### Plant Parts Used

Within the medicinal plants and herbs, roots (CPP value of 0.29) and leaves (CPP value of 0.22) are most frequently used by the tribal villagers of Jaypur forest to prepare medicine compared to other parts of the medicinal plants. The seed and whole plant body scored the CPP value of 0.10 and 0.08, respectively, followed by stem and fruit (CPP value of 0.05), flower, latex and infusion (CPP value of 0.03) and Rhizome, tuber, wood, bark and cotyledon (CPP value of 0.02). The key medicine men of Jaypur forest prefer root and leaves most in the preparation of medicine. These two parts of plant species are easily accessible (Fig 3), more effective and leaves being the best site for synthesis of bioactive secondary metabolites. It is also noteworthy that tribal people are very much aware of the conservation of the forest. In most cases, at least one leaf is left unplucked, allowing the parent plant to survive normally.

### Procedure of preparation of medicine

In the study area medicine men follow the most traditional ways of preparing medicine depending on diseases. Usually, the major modes of medicine preparation (Fig 4) are paste (61.36%), juice and pill (13.64%), amulet and directly eaten (6.82%), ointment and powder (4.55%), and lastly, tablet (2.27%). Along with the plant body or its parts, various additives like termite mound's soil, garlic, ginger, sugar-candy, coconut oil, black salt, black cumin, cinnamon and caraway, etc., were used in the final preparation of folk medicines. The mode of preparation of these medicines re-establishes the man-nature relationship of the villagers of Jaypur forest. The medicines were prepared from fresh materials and dried materials as per the availability of ingredients from the forest. Informants

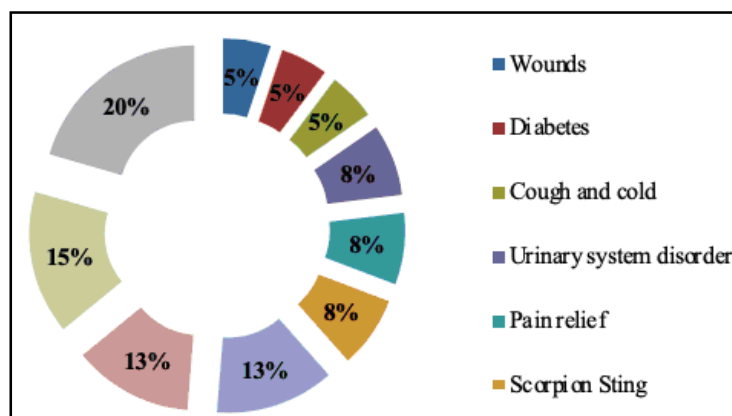


Fig. 2: Most common diseases treated at Jaypur Forest

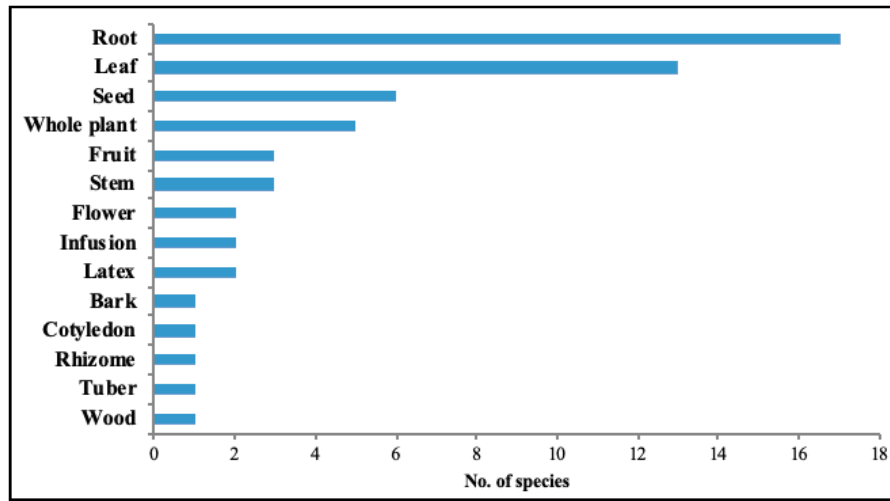


Fig. 3: Part of Plant Used for Preparation of Folk Medicine at Jaypur Forest

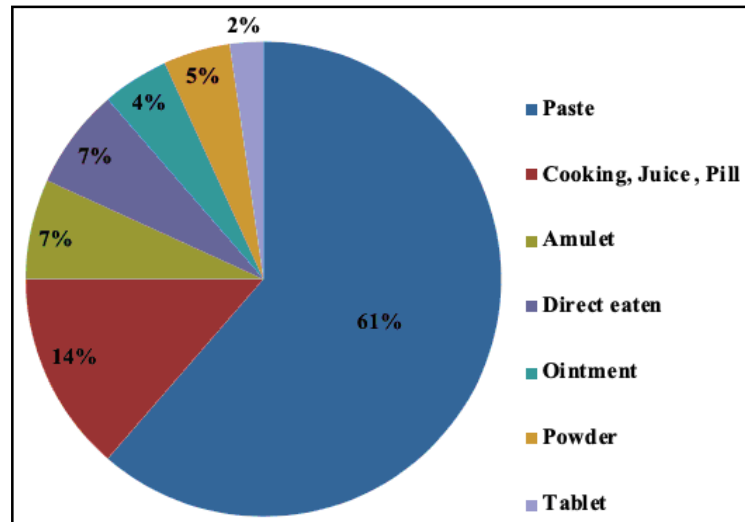


Fig. 4: Procedure of Preparation of Folk Medicine at Jaypur Forest

opined that the potentiality of the ingredients remained intact during its fresh condition.

**Quantitative Data Analysis**

The present study highlights that a high level of consensus prevails among the informants regarding the use of wild medicinal plants and diseases as the  $F_{ic}$  values of different disease categories range from 0.70 to 0.95 indicating high acceptance amongst the informants regarding phytotherapeutic uses of medicinal plants (Fig 5). The diseases scoring  $F_{ic}$  values above 0.90 such as dermatological, metabolic and

digestive system disorder, poisoning, infections, genito-urinary system disorder and gynaecological disorder, depict the high potentiality of the remedies against these disease categories and are practicing widely among the Santal medicine men of the study area. Heinrich (2000) has found out in his ethnobotanical research that high consensus species carry enough prospects for further investigation related to phytochemistry and pharmacology. Similarly, plant species with high  $F_{ic}$  values may be considered useful in documentation of evidence-based phytomedicine for the native tribes of the Jaypur forest.

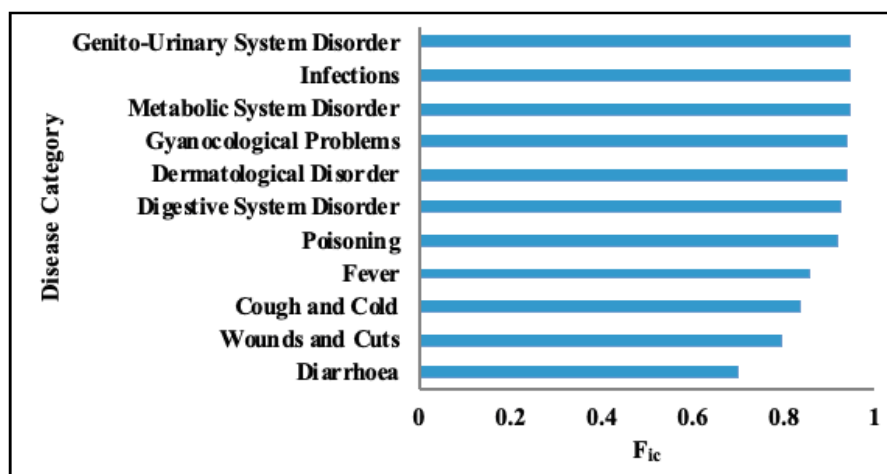


Fig. 5: Informant Consensus Factor for Each Disease Category

Fidelity Level (%) of the plant species in the study area ranges from 32 to 100, as shown in fig 6. Thirteen wild plant species showing the highest possible value of FL, i.e., 100% reveals the plants' high healing potential applied against related diseases. This may be an objective for a further phytochemical investigation to assess the bioactive compounds responsible for high healing capacity.

A substantial and significant ( $P$  value  $1.92987E-08$ ) positive correlation between Fidelity Level and Importance Value ( $r=0.79$ ) reveals the close association between tribal forest villagers with the natural environment (Fig 7).  $R^2$  (0.6209) denotes the IV is 62% determined by the Fidelity Level, further reflecting the symbiotic relationship between man and forest.

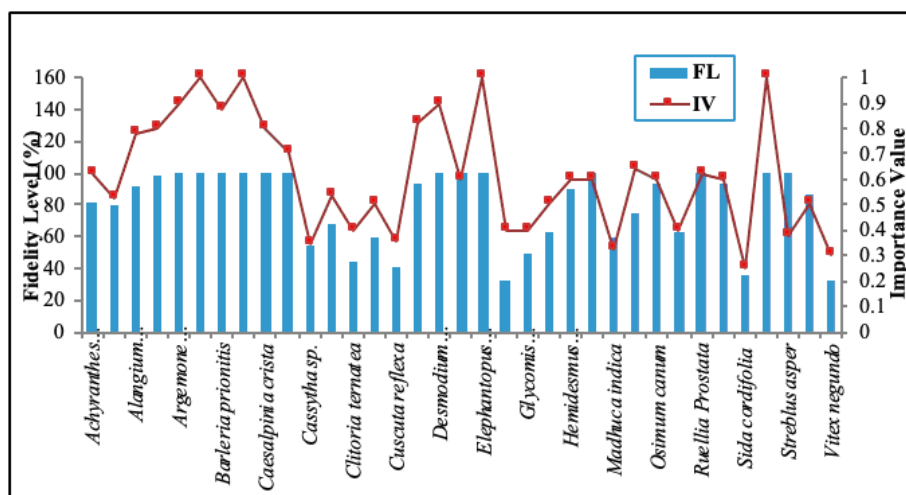


Fig. 6: Fidelity Level and Importance Value of Medicinal Plants of Jaypur Forest

Likewise, the plants scoring high Importance Values (IVs) are therapeutically significant. These plant species' values ranging from 0.25 to 1 indicate that Santal medicine men of Jaypur forest much rely upon these plant species for proper health treatment.

Finally, the regression line based on the Least Square method depicts a strong association between the proportion of informants who regard a species as the most important and the percentage of informants' claiming the use of a particular plant for the same purpose.

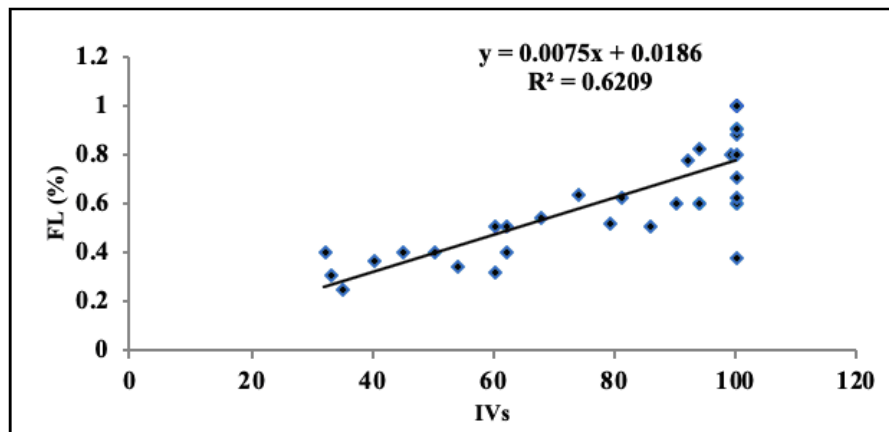


Fig. 7: Importance Value increases with Higher Fidelity Level

### Conclusion

The Santal of Jaypur forest range is closely associated with the physical environment, thus maintaining an inseparable relationship with the forest resources. They are rich in ethnomedical knowledge owing to their close affinity with the surrounding forest cover. Religious and cultural faith, economic uncertainty and lack of modern medical facilities in remote villages seem to be the main cause of these wild plants' utilization. But the ways of preparation of medicine by these plants are only known to a few local healers. , Nowadays, the young Santal is reluctant to carry on this ethnic tradition in coming days. The government should take some initiatives for sustainable marketization of medicinal herbs, thereby providing an opportunity to take advantage of the market and improve locals' living standards. It will also protect the IPR of the Santal community of the forest.

### Recommendations and Suggestions

- Conservation of medicinal plants in their natural habitats by traditional ways, i.e., Herbarium, *in-situ* preservation as well as in applied methods, i.e. conservation in a gene bank, seed bank, biotechnological applications;
- Well-organized marketing system to promote the medicinal plants and herbs, thus creating employment opportunities for the tribal people;
- Training for improving knowledge so that local people can use and conserve the wild plants adequately;

- To improve Santals' way of life, drinking water facilities, literacy campaign, health care centers is needed;
- Government policies to support research in herbal medicines and to check over-exploitation of medicinal plants in forests.

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### Authors' contributions

MS and SS designed the study and developed the methodology. SS processed the data, analyzed and mapping of data and wrote the manuscript. MS and SS aided in interpreting the results and in drafting the manuscript. They both critically reviewed the manuscript. All authors read and approved the final manuscript.

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Annexure  
Table 1. Medicinal Use of Plants by Santal Forest Villagers of Jaypur Forest Range of Bankura District, West Bengal, 2014

SL NO.	SCIENTIFIC NAME	LOCAL NAME	PARTS USED	MEDICINAL USES	MODE OF PREPARATION
1	<i>Achyranthes aspera</i>	Apang	Plant, seed, Root	Hydrophobia, Skin eruption, Piles, Dropsy, Snake bite	Dry root is given within amulet and used for Hydrophobia patients; paste of seed and plants are externally applied on affected areas.
2	<i>Acorus Calamus</i>	Boch	Rhizome, Infusion	Louse infestation, Dysentery	Paste is taken as juice prepared by root, cumin, caraway, salt and water. Paste is made by leaf and root and applied externally.
3	<i>Alangium salvifolium</i>	Akarh	Whole plant, Leaf	Rheumatism, Snake bite, Urinal infection	
4	<i>Andrographis paniculata</i>	Kalmegh	Leaf, whole plant	Dysentery, worm infection, work as liver tonic	Paste is prepared by root ad leaf, dried and taken as tablet for liver purification.
5	<i>Argemone Mexicana</i>	Shialkanta	Seed, Plant Latex	Impotence, Indigestion, Female Gynaecological problem	Paste is made by root, cardamom, cinnamon, clove, cumin, peepul, nutmeg and taken once a day.
6	<i>Asparagus racemosus</i>	Shatamuli	Root	Refrigerant, Diuretic, Dysentery, Urinary problem.	Have the paste of root with sugar-candy.
7	<i>Barleria prionitis</i>	Felankuri	Root	Pain-relief (Headache mainly), nose-bleeding.	Have the paste of root with sugar-candy.
8	<i>Blumea lacera</i>	Fuksima	Leaf, Root	Root for Cholera and leaf for external cut	In case of Cholera amulet is made with root and used. It is edible also.
9	<i>Caesalpinia crista</i>	Karanj	Seed, Leaf	Alopecia, Diabetes Mellitus, Skin disease.	Leaf paste is applied topically on cut area to stop bleeding
10	<i>Cassia fistula</i>	Bandar lathi	Leaf, Fruit, Seed	Fungal infection, Urinary problem	Seed is mixed with oil and applied on body for curing skin disease. It is edible also.
11	<i>Cassutha ciliolate</i>	Alakjari	Whole plant	Ricket	Paste of root is taken as medicine. Santals have a religious belief that carrying Bandar lathi with body, it will save them from 'The Atman'.
12	<i>Clerodendrum indicum</i>	Ghnetu	Root	Veterinary use, female Gynaecological problem.	Cosmetic powder is prepared from the tree and paste with a kind of medical creeper, grass and potato-skin. It is applied externally.
13	<i>Citoria ternatea</i>	Swet Aparajita	Root	Infertility	Young shoot of the tree, cosmetic powder made of water-logged Banian tree and various spices are mixed and taken daily.
14	<i>Croton bonplandianum</i>	Churchuri	Root, Leaf	Blood-coagulant, Antiseptic, used in Dysentery.	Root is given within amulet and used. Root paste is edible also for cure.
15	<i>Cuscuta reflexa</i>	Swamalata	Stem	Diarrhoea in cows	Root and leaf paste with 'Thankuni leaf' (a local medical leaf) are used for dysentery.
16	<i>Datura metel</i>	Datura	Leaf, root	Alopecia, snake bite, boil	Paste is applied externally. Root and leaf paste make warmed and applied externally

SL NO.	SCIENTIFIC NAME	LOCAL NAME	PARTS USED	MEDICINAL USES	MODE OF PREPARATION
17	<i>Desmodium gangeticum</i>	Shalaparni	Root	Cough, Asthma, Vomiting, Snake bite and Scorpion sting	Root paste is used in cuts and wounds. It is edible also.
18	<i>Dioscorea bulbifera</i>	Kham alu	Tuber, fruit.	Dysentery, Piles, ulcers, Birth control	Tuber is edible directly. Fruit is taken after boiling.
19	<i>Elephantopus scaber</i>	Lankasuti	Root, whole plant	Vertigo, skin disease, scorpion sting	Root paste is applied on affected area.
20	<i>Flacourita indica</i>	Bincha	Root, fruit	Jaundice and enlarged spleen	Root paste and fruit is eaten regularly.
21	<i>Glycomis pentaphylla</i>	Ashhoura	Root, Wood	Snake bite, Fever, skin problem.	Paste is applied externally.
22	<i>Gymnema sylvestre</i>	Gurmar	Leaf	Diabetes, wound	Paste is applied at wounds; juice is taken for curing diabetes.
23	<i>Hemidesmus indicus</i>	Anantamul	Root	Fever, Dysentery, Skin disease, Blood purification	Paste is prepared with root and salt and taken regularly.
24	<i>Jatropha gossypifolia</i>	Bherenda	Fresh Latex, stem.	Dental disease, Carbuncles	Directly used in dental disease.
25	<i>Madhuca indica</i>	Mahwa	Bark, flower	Cough and cold, Piles	Paste made of bark is used.
26	<i>Mimosa pudica</i>	Swet Lajjabati	Root	Infertility	Paste made of root is used.
27	<i>Osimum canum</i>	Ban tulsi	Leaf	Skin disease, Rheumatism	Paste is prepared with plant root, garlic; then heated with oil and applied externally.
28	<i>Ricinus communis</i>	Redi	Seed, leaf, root	Headache, Purgative, Scorpion sting, breast pain after child birth	Paste is applied externally. Leaves are made into paste and applied breast.
29	<i>Ruellia Prostrata</i>	Footkari	Stem	Jaundice, Gynaecological problems, Anamia	Root paste is prepared with black cummin, cinnamon and sugar-candy and eaten regularly.
30	<i>Shorea robusta</i>	Sal	Flower, seed	Dysentery	Juice is prepared with sal seed and taken.
31	<i>Sida cordifolia</i>	Berela	Root, Leaf	Blood Vomiting, Gynaecological problem	Tablet is prepared by dry root and eaten.
32	<i>Smitax macrophylla</i>	Ramdatan	Root	Jaundice, Blood Dysentery, Gynaecological problem	Root paste is prepared with different barks of tree and eaten.
33	<i>Streblus asper</i>	Sheora	Bark, Leaf	Diarrhoea, Night wetting	Paste of bark and leaf is prepared and eaten.
34	<i>Vigna mungo hepper</i>	Mash-kalai	Cotyleden, Infusion	Antiseptic, Bronchitis, Anti-inflammatory	Paste is prepared and eaten.
35	<i>Vitex negundo</i>	Nishinda	Leaf	Kidney stone	Juice prepared from leaf is taken.
				Antispetic, Anthelmintic, Tranquillizer, headache.	

Photograph Plate 1: Some medicinal plants and herbs of Jaypur forest, Bankura district collected by the authors with the help of local people in the year 2019



*Caesalpinia crista*

*Hemidesmus indicus*

*Andrographis paniculata*

*Flacourita indica*



*Cassytha sp.*

*Smilax macrophylla*

*Madhuca indica*

*Elephantopus scaber*



*Asparagus racemosus*

*Barleria prionitis*

*Ricinus communis*

*Shorea robusta*



*cordendrum indicum*

*Ruellia Prostrata*

*Desmodium gangeticum*

*Achyranthes aspera*



*ycopersicon pentaphyllum*

*Argemone mexicana*

*Blumea lacera*

*Sida cordifolia*