

## Arboreal ethnoflora of Western Madhya Pradesh India

Vijay V. Wagh<sup>1\*</sup> and Ashok K. Jain<sup>2</sup>

<sup>1</sup>Plant Diversity, Systematics and Herbarium Division, CSIR- National Botanical Research Institute, Rana Pratap Marg, Lucknow 226 001, Uttar Pradesh, INDIA

<sup>2</sup>S.K. Jain Institute of Ethnobiology, Jiwaji University, Gwalior 474 011, Madhya Pradesh, INDIA

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The present study was aimed to document the ethnobotanical information on medicinal and useful tree species in Jhabua district of western Madhya Pradesh India. An ethnobotanical surveys were conducted in Jhabua district from 2008-2013. Data were collected by interview and semi-structured questionnaire from selected local informants and traditional practitioners. Present study documented the ethnobotanical uses of 169 tree species belonging to 127 genera and 43 families curing 45 types of ailments and 71 miscellaneous uses. Leguminosae was the dominant family representing 31 species. It has been noticed that leaf is the most favoured plant parts followed by stem bark for curing various diseases. The highest number of species is used for curing skin disease (25 species) and joint disease (24 species). Most of the tree species recorded in the present study grow wild (79 species) in the study area. Some tree species seem to be vulnerable due to overexploitation and deforestation.

**Key Words:** Arboreal flora, Conservation, Ethnobotany, Jhabua district, Madhya Pradesh.

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### Introduction

Ethnobotany, an area of human ecology, defines the interface between people and their forests and offers clues needed for rural development based on sustainable yields of forest products<sup>1</sup>. The importance of timber and other tree products from outside forests is increasing attention, to help meet growing demands and reduce pressure on natural forests<sup>2</sup>. Trees are an important source of wood for timber and lumber, but also provide non-timber forest products. Trees growing in open areas seem to have potentials to provide options for rural livelihoods and biodiversity conservation<sup>3</sup>. These trees can contribute to poverty mitigation serving as subsistence "safety nets" or low income "gap fillers". The prosperity of any country might be partially determined by its forest and tree resources. In addition to their productive and protective benefits, tree species might play a vital role in ecosystem stability, providing of habitat to a large number of faunal diversity<sup>4,5</sup>. Estimates have shown that about 90 per cent of cooking and heating energy comes from trees<sup>6</sup>. Traditional societies in

Africa and elsewhere have always used plants to promote healing and traditional medicine is still the predominant means of health care in developing countries<sup>7-9</sup>.

India is rich in its ethnic diversity of which many aboriginal cultures have retained traditional knowledge concerning the medicinal utility of the flora<sup>10</sup>. Over 8000 plant species are used in traditional and modern medicine in India, and 90-95% collection of medicinal plants is from the wild<sup>11</sup>. In ancient literature utilization of plants for medicinal purposes in India has been documented long back<sup>12</sup>. The World Health Organization (WHO) reported that as many as 80% of the world population depends upon traditional medicines for their primary health care<sup>13,14</sup>. The traditional systems of medicine are still very effective predominantly in rural areas for the treatment of various ailments<sup>15</sup>. Being rich in plant biodiversity and with its magnificent past of traditional health care system, India is one of the eight major centres of origin<sup>16</sup>.

Present study is conducted in the Jhabua district of western Madhya Pradesh. The area of western Madhya Pradesh selected for this study is a rich diversified region of medicinal plants. Due to the remoteness, there is no hospital for intimate treatment

\*Correspondent author  
Email: vijaywagh65@gmail.com

of the tribal people; they have to rely on the indigenous medicinal plant for basic healthcare treatment. A literature survey reveals that scattered ethnobotanical studies so far have been conducted<sup>17-26</sup>, but no ethnobotanical surveys of tree species of Jhabua district have been conducted. The local tribal people of the study area dependant on the trees for various purposes, the usefulness of these plants remains high and over-exploitation are putting most tree species under pressure of extinction. The purpose of this investigation was, therefore, to document the uses of indigenous and cultivated species of trees growing in the open as well as forest areas prior to their possible elimination through urbanization, deforestation and social development.

## Material and Methods

### Study Site and tribal community

The Jhabua district is situated in the westernmost part of Madhya Pradesh state. It lies between latitude 21°31' to 23°41' N and longitude 74°30' to 75°01' E at an average altitude of 428 m. The total area of the district is 6,792 km. A major part of the district is covered by dense forest area in which various tribes, like *Bhil*, *Bhilala* and *Pataya* are living in the majority. The *Bhil* tribe is one of the most important and the third largest tribe of India. The tribal community of the district is totally depending on the forest resources for their livelihood and healthcare practices.

### Medicinal plant survey and data collection

A systematic and extensive survey was carried out in different villages of the district from 2008 to 2013 for the collection of the information on ethnomedicinal tree species being used by the locals in the study area. Among the inhabitants, knowledgeable persons primarily the aged ones, medicine men or women (Badwa) were interviewed. The first-hand information on medicinal uses of tree species, part(s) used, vernacular name(s) and mode of utilization were collected. Methods adopted by various earlier workers were followed in the present work while collecting the ethnobotanical information<sup>27,28</sup>. Interview and discussions were carried out using a local dialect for easy communication with the participants.

### Collection and identification of plant species

From study sites, the plants were collected and identified with the help of published literature and local flora<sup>29-35</sup>. Specimens collected during the

surveys were processed in the laboratory according to known method<sup>36</sup> and deposited in the herbarium of S.K. Jain Institute of Ethnobiology, Jiwaji University, Gwalior.

## Results and discussion

A total of 169 tree species belonging to 43 families and 127 genera were recorded in study area and all of them were reported as being useful to the local tribal community. Out of 43 families, the highest number of species belongs to Leguminosae (31 species), followed by Malvaceae (13 species), Apocynaceae (10 species each), Rubiaceae (9 species), Moraceae (8 species) and Combretaceae (7 species) (Table 1). Botanical families including Leguminosae, Apocynaceae, Malvaceae and Combretaceae are known to have the highest number of species<sup>37-39</sup>.

The reported medicinal plants were used for more than 45 different types of diseases by the local community. More treated ailments and plants used in herbal preparations were skin diseases (25 species), joint pain (24 species), diarrhoea (20 species), stomach disorders (17 species), diabetes (14 species), respiratory disorders (11 species) and the least treated ailments and plants used were abortifacient, anorexia, blood clotting, bone fracture, carminative, cough and cold, dog bite, lumbago, throat infection, and typhoid fever representing (1 species) each Table 1.

Plant parts utilization patterns indicate that, the leaf of 66 species and stem bark 63 species, fruits of 35 species, seeds of 23 species, roots of 16 species, gum of 13 species, flowers of 11 species. Whereas latex of 7 species, stem of 4 species, twig of 2 species, pod, inflorescence and whole plant of one species each are used collectively for different purposes (Table 1). Extensive use of leaves in the ethnobotanical survey was also reported in other country also<sup>40-43</sup>. The leaf is the major site of photosynthesis, or in other words, metabolically most active part of the plant. As a result, various biogenetic pathways take place to produce secondary metabolites which contribute towards its medicinal value<sup>44,45</sup>. Moreover, collection and mode of preparation of medicine from leaves is much easier than other parts of the plant and makes them the first choice for use<sup>43,46</sup>.

Method of preparation fell into 13 categories that were decoction 58 species, paste 15 species, juice 18 species, powder 17 species, infusion 8 species, extract 6 species, fruit pulp 6 species, oil 4 species,

Table 1 — List of medicinal and useful tree species with family, botanical name, accession number, local name, ethnobotanical uses and source of collection.

Sr. No.	Family Botanical Name and voucher specimen number	Local Name	Etnobotanical uses	Source
ANACARDIACEAE				
1	<i>Anacardium occidentale</i> L. (JBA - 130)	Kaju	Leaf decoction is given in constipation.	C
2	<i>Buchanania cochinchinensis</i> (Lour.) M.R. Almeida (JBA - 387)	Chironji	Stem bark paste is massaged over limb in rheumatism. Soft stem and leaves are used as fodder. The wood is used in making agricultural implements.	W
3	<i>Lannea coromandelica</i> (Houtt.) Merr. (JBA - 424)	Moyan	Gum paste is applied on the chest in bronchial disorder. Decoction of stem bark is given twice a day in rheumatism it also used as a fish poison.	W
4	<i>Mangifera indica</i> L. (JBA - 113)	Aam	The gum of the plant is mixed with salt thoroughly and the formed paste is applied on bitten area in scorpion bite.	C
5	<i>Rhus parviflora</i> Roxb. (JBA - 329)	Tung	Fruit juice is used as anthelmintic.	W
6	<i>Semecarpus anacardium</i> L.f. (JBA- 900)	Bhilama	Seed oil is useful in skin diseases	W
7	<i>Spondias pinnata</i> (L. f.) Kurz (JBA - 327)	Khatta aam	Fruit are used for making pickle. Decoction of stem bark is given in menstrual disorders.	W
ANNONACEAE				
1	<i>Annona reticulata</i> L. (JBA-471)	Ramphal	Leaves extract is used as hair tonic.	C
2	<i>Annona squamosa</i> L. (JBA-134)	Sharifa	One teaspoonful seed powder is taken orally thrice a day for 5 consecutive days for inducing abortion.	C/W
3	<i>Miliusa tomentosa</i> (Roxb.) J. Sinclair (JBA-58)	Umbia	Wood is used for preparing the agricultural implements. Leaf paste is useful in skin disorders.	W
4	<i>Polyalthia longifolia</i> (Sonn.) Thwaite (JBA - 180)	Asok	Leaf juice is given to enhance blood circulation.	C
APOCYNACEAE				
1	<i>Alstonia scholaris</i> (L.) R.Br. (JBA - 70)	Saptarni	A glassful bark decoction is given orally twice a day daily for some days in tuberculosis.	C
2	<i>Calotropis gigantea</i> (L.) Dryand (JBA - 159)	Madar	Root bark is used in leucorrhoea. Leaves are warmed with mustard oil and tied on chest in pneumonia	C/W
3	<i>Calotropis procera</i> (Aiton) Dryand (JBA - 157)	Aak	One teaspoonful root powder with cow milk is taken twice a day for 15 days to reduce sperm count by men.	C/W
4	<i>Carissa carandas</i> L. (JBA-587)	Karonda	Fruits are used in making pickle. Leaf decoction is given in malarial fever.	C/W
5	<i>Holarrhena pubescens</i> Wall. ex G. Don. (JBA - 76)	Kutaj	Stem bark decoction is given in diabetes. Seed powder is given in malarial fever.	W
6	<i>Nerium oleander</i> Mill. (JBA - 453)	Kaner	Seed powder is used as an antidote against snakebite.	C
7	<i>Plumeria alba</i> L. (JBA - 205)	Champa	Leaf infusion is given in cardiac disorders.	C
8	<i>Plumeria rubra</i> L. (JBA - 443)	Champa	Stem bark decoction is given in diabetes.	C
9	<i>Wrightia arborea</i> (Dennst.) Maberley (JBA - 517)	Dudh kueda	Seed decoction is given thrice a day in malarial fever. Stem bark decoction is given to male as aphrodisiac.	W
10	<i>Wrightia tinctoria</i> R. Br. (JBA - 82)	Kueda	One teaspoonful seed powder is given orally thrice a day for one week in malaria. Bark decoction is given in piles and also as antidote against snakebite. Seed powder in is given in diarrhoea	W
ARECACEAE				
1	<i>Borassus flabellifer</i> L. (JBA - 555)	Tad	Fruit juice (Tadi) is taken twice a day for 15 days in kidney stone. The pulpy leaf base is luke warmed and the liquid is poured in ear in earache. The ash of inflorescence is mixed with the coconut oil and the formed paste is applied on the affected part in eczema. The jaggery made from fruit juice is taken twice a day in asthma	W/C

(Contd.)

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Sr. No.	Family Botanical Name and voucher specimen number	Local Name	Etnobotanical uses	Source
2	<i>Cocos nucifera</i> L. (JBA - 525)	Nariyal	Fruits hairs ash mixed with curds and given daily in the morning in the treatment of piles.	C
3	<i>Phoenix sylvestris</i> (L.) Roxb. (JBA - 111)	Shindi	Ointment of leaf ash in butter is applied on ringworm	W
4	<i>Roystonea regia</i> (Kunth) O.F. Cook (JBA - 536) BIGNONIACEAE	Palm	Ornamental and the leaf are used for thatching.	C
1	<i>Dolichandrone falcata</i> (Wallich ex DC.) Seem. (JBA - 447)		Planted as ornamental. Stem bark decoction is given in leucorrhoea.	W
2	<i>Jacaranda mimosifolia</i> D. Don (JBA - 606)	Nili Gulmohar	Ornamental tree, the leaf poultice is applied on scabies.	C
3	<i>Kigelia africana</i> (Lam.) Benth. (JBA - 643)	Jharphanoos	Fruits are useful in expulsion of intestinal worm. Fruit juice is used as aphrodisiac.	C
4	<i>Millingtonia hortensis</i> L. f. (JBA - 658)	Aakashneem	Ornamental tree, Leaf decoction is given in respiratory disorders.	C
5	<i>Oroxylum indicum</i> (L.) Kurz (JBA - 302)	Sanpata	Root bark is used in cardio-vascular disorder. Root bark decoction is also given as liver tonic.	W/C
6	<i>Tecoma stans</i> (L.) Juss. ex Kunth (JBA - 448)		Flower decoction is given in diabetes. Stem bark decoction is given in constipation	C
7	<i>Tecomella undulata</i> (Sm.) Seem. (JBA - 586) BORAGINACEAE	Rangatroeda	Flower decoction is given in Jaundice. Stem bark decoction is given in anorexia.	W/C
1	<i>Cordia dichotoma</i> G. Forster (JBA - 311)	Gondi	Leaf juice is applied on mouth ulcer. Fruits are consumed to maintain blood pressure. Fruits are used to prepare pickle	W
2	<i>Ehretia laevis</i> Roxb. (JBA - 64) BURSERACEAE	Datrangi	Fresh leaf paste is used to treat skin disorders. Stem bark decoction gargle in throat infection.	W
1	<i>Boswellia serrata</i> Roxb. ex Colebr. (JBA - 244)	Salai	Gum is fried in Sesamum oil and massaged on affected parts in arthritis. The papery bark decoction is given in asthma. The gum is used in cardiac disorder.	W
2	<i>Garuga pinnata</i> Roxb. (JBA - 135) CACTACEAE	Kikar	The stem bark decoction is given in asthma. Gum is used in bleeding piles.	W
1	<i>Opuntia elatior</i> Mill. (JBA - 333)	Nanli Nagphani	Root bark decoction is given in tuberculosis	W
2	<i>Opuntia ficus-indica</i> (L.) Mill. (JBA - 403) CANNABACEAE	Motali Nagphani	Root powder is given with water in snakebite. Fruit decoction is given in pneumonia.	W/C
1	<i>Trema orientalis</i> (L.) Blume (JBA - 498) CAPPARACEAE		Stem fibres are used for making ropes	C
1	<i>Capparis decidua</i> (Forsk.) Edgew. (JBA - 723)	Tethi	Root decoction is used as diuretic.	W
2	<i>Capparis sepiaria</i> L. (JBA - 324)	Kurrel	Root decoction is given an antidote against snakebite	W
3	<i>Crateva religiosa</i> G. Forst. (JBA - 473) CARICACEAE	Barna	Stem bark paste is applied on pimples and blemishes. Root bark decoction is used as blood purifier	W
1	<i>Carica papaya</i> L. (JBA - 237)	Papaya	Fruit juice is given twice a day in constipation. Fruit rind hot infusion is given in jaundice.	C

*(Contd.)*

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CASURINACEAE				
1	<i>Casuarina equisetifolia</i> L. (JBA - 508)	Saru	Leaf paste is applied on swelling in arthritis.	C
CELASTRACEAE				
1	<i>Cassine glauca</i> (Rottb.) Kuntze (JBA - 341)	Bhutkasa	Stem bark decoction is given in cardiac disorders. Wood is used for making agricultural implements	W
COMBRETACEAE				
1	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr. (JBA - 292)	Dhawada	Leaf and bark powder is given with water in diarrhoea and dysentery. Gum is used as aphrodisiac	W
2	<i>Anogeissus pendula</i> Edgew. (JBA - 250)	Dhawai	Wood is used in making agricultural implements. Leaves are used as fodder	W
3	<i>Terminalia alata</i> Heyne ex Roth (JBA - 80)	Sajad	Wood is used for making agricultural implements. Leaf decoction is useful in burning urination.	W
4	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn. (JBA - 158)	Arjun	Stem bark decoction is useful in cardiac disorders. Stem bark paste is taken with water in stomach disorders. Wood is used in making house building.	W
5	<i>Terminalia bellirica</i> (Gaertn.) Roxb. (JBA - 191)	Baheda	Stem bark is kept in water overnight and administered next day in dysentery. Fruits are eaten in cough and cold. Seed powder taken with water in joint pain. Fruit powder is taken in stomach disorder	W
6	<i>Terminalia catappa</i> L. (JBA - 263)	Kadawi badam	Seeds are useful in stomach disorders. Stem bark decoction is given in diarrhoea.	C
7	<i>Terminalia chebula</i> Retz. (JBA - 234)	Harrah	Fruits and stem bark are useful in cardiac disorder.	W
CORNACEAE				
1	<i>Alangium salviifolium</i> (L.f.) Wangerin (JBA - 270)	Ankol	Root powder given in diarrhoea. Leaves are used externally in rheumatism. Seeds are used against dog bite .	W
DILLENACEAE				
1	<i>Dillenia indica</i> L. (JBA-259)	Chalta	Stem bark powder is useful in diabetes. Fruits are used for the preparation of pickle.	W
EBENACEAE				
1	<i>Diospyros melanoxylon</i> Roxb. (JBA - 255)	Tembru	The extract of unripened fruit in milk is given orally in diarrhoea. Young leaves are used in making local cigars (Beedi).	W
EUPHORBIACEAE				
1	<i>Euphorbia nivulia</i> Buch.-Ham. (JBA - 671)	Thor	The peace of stem is heat on fire and the gel is used in arthritis. Stem used as fish poison.	W
2	<i>Euphorbia tirucalli</i> L. (JBA - 627)	Thuvar	Latex is useful in ringworm. Stem used as fish poison.	W
3	<i>Jatropha curcas</i> L. (JBA - 33)	Ratanjyot	Seed oil is massaged on forehead in headache. Root bark decoction is given in diarrhoea and dysentery. Teeth are washed with the foam of the latex in toothache. Young twigs are used as tooth brush for dental care	W/C
4	<i>Jatropha gossypifolia</i> L. (JBA - 52)	Lal ratanjyot	Latex of plant is applied on burn part of body.	W/C
5	<i>Jatropha integerrima</i> Jacq. (JBA - 631)		Latex is used in skin diseases.	C
6	<i>Ricinus communis</i> L. (JBA - 57)	Arandi	Seed oil is used in joint pains. The decoction of leaves used as anthelmintic.	W/C
LAMIACEAE				
1	<i>Gmelina arborea</i> Roxb. (JBA - 102)	Gambhar	The fresh leaf juice is given in urinary disorder	W/C
2	<i>Tectona grandis</i> L. f. (JBA - 109)	Sagon	Wood is used for making houses and agricultural implements. Leaves are used for thatching.	W/C

*(Contd.)*

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Sr. No.	Family Botanical Name and voucher specimen number	Local Name	Ethnobotanical uses	Source
3	<i>Vitex leucoxylo</i> L. f. (JBA - 721)	Safed Nirgudi	Root decoction is given in joint pain. Leaf paste is used as insecticide	W
4	<i>Vitex negundo</i> L. (JBA - 421)	Nirgudi	Warmed boiled leaves are bandaged on old wound which does not heal soon. The dried leaves of 'Nirgudi', 'Arandi' ( <i>Ricinus communis</i> ) and 'lipta' ( <i>Eucalyptus umbilata</i> ) boiled together; the steam is used in joint pain. Leaf decoction is useful in expel of intestinal worm	W
LECYTHIDACEAE				
1	<i>Careya arborea</i> Roxb. (JBA - 108)	Kumbhi	Stem bark decoction is given in asthma Wood is used in the preparation of musical instruments.	W
LEGUMINOSAE				
1	<i>Acacia auriculoformis</i> Benth. (JBA - 352)	Bilayati babul	Bark paste is used as insecticide.	C
2	<i>Acacia catechu</i> (L. f.) Willd. (JBA - 560)	Khairi	Stem bark paste is used in eczema. Gum is useful in diarrhoea	W
3	<i>Acacia leucophloea</i> (Roxb.) Willd. (JBA - 45)	Reunja	Stem bark decoction is useful in respiratory disorders. Gum is useful in mouth ulcers. Wood is used as fuel	W
4	<i>Acacia nilotica</i> subsp. <i>indica</i> (Benth.) Brenan (JBA - 132)	Babool	One teaspoonful seed powder is given empty stomach in the morning to cure dysentery. Gum is used in blood dysentery. Wood is widely used in making houses and for agricultural implements. Tender leaves are used as fodder. Wood is used as fuel.	W
5	<i>Albizia lebbek</i> (L.) Benth. (JBA - 95)	Kala siris	Bark powder is used in stomach disorders. Wood is used in making house building and agricultural implements	W/C
6	<i>Albizia odoratissima</i> (L. f.) Benth. (JBA - 271)	Chichwa	Leaf powder is sprayed on the wound for healing.	W
7	<i>Bauhinia acuminata</i> L. (JBA - 546)	Ahlad	Leaf decoction is given in bronchial disorder. Leaves are used in making local cigars (Beedi)	W
8	<i>Bauhinia purpurea</i> L. (JBA - 73)	Koliar	Leaf juice is useful for healing wound. Leaves are used in making local cigars (Beedi)	W/C
9	<i>Bauhinia tomentosa</i> L. (JBA - 413)	Pili kachnar	Planted as ornamental, stem bark poultice is useful in skin diseases.	C
10	<i>Bauhinia variegata</i> L. (JBA - 312)	Kachnar	Stem bark decoction is used as liver tonic. Stem fibres are used for making cordages.	W/C
11	<i>Butea monosperma</i> (Lamk.) Taub. (JBA - 589)	Dhak	Stem bark powder is given with water in snakebite. Fruits are used in menstrual disorder. Gum is useful in lumbago. Dye is obtained from flowers. Leaves are used in making cups and plates (Dona and Pattal).	W
12	<i>Butea monosperma</i> var. <i>lutea</i> (Witt) Maheshwari (JBA - 247)	Pila Dhak	Whole plant is used in magico religious purposes. Flowers are soaked in water overnight and the extract is given in leucorrhoea. Bark decoction is given in fever. Leaves are bandaged on affected parts in bone dislocation. Leaves are used in making cups and plates (Dona and Pattal).	W
13	<i>Cassia fistula</i> L. (JBA - 50)	Garmala	Root bark decoction is given in constipation. Stem bark decoction is given in burning sensation during urination.	W/C
14	<i>Dalbergia lanceolaria</i> subsp. <i>paniculata</i> (Roxb.) Thoth. (JBA - 243)	Safed sisam	Leaf paste is useful in skin diseases. Wood is used in making agricultural implements	W
15	<i>Dalbergia latifolia</i> Roxb. (JBA - 91)	Kala Sisam	Stem bark decoction is given in constipation. Wood is used in house building.	W
16	<i>Dalbergia sissoo</i> DC. (JBA - 13)	Shisam	Stem bark is used in menstrual disorders. Leaves are used in skin diseases	C
17	<i>Delonix regia</i> (Hook.) Raf. (JBA - 169)	Gulmohar	Flower decoction is given in gonorrhoea. Flower are considered as aphrodisiac	C
18	<i>Desmodium oojainense</i> (Roxb.) H. Ohashi (JBA - 262)	Tinchali	Leaf decoction is useful in diabetes. Wood is used in making agricultural implements	W
19	<i>Erythrina suberosa</i> Roxb. (JBA - 125)	Gadha palash	The flower is soaked in water overnight and extract is given in leucorrhoea. Flower dye is used to impart colour to the clothes	W/C

(Contd.)

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Sr. No.	Family Botanical Name and voucher specimen number	Local Name	Etnobotanical uses	Source
20	<i>Gliricidia sepium</i> (Jacq.) Walp. (JBA - 269)	Giripushp	Leaf paste is useful in skin diseases.	C
21	<i>Hardwickia binata</i> Roxb. (JBA - 103)	Anjan	Leaf ash is poured in eyes twice a day for 2 - 3 days to relief redness in eyes	W
22	<i>Leucaena leucocephala</i> (Lamk.) de Wit. (JBA - 119)	Subabool	Seeds powder is useful in diabetes. Tender leaves are used as fodder. Wood is used as fuel.	C
23	<i>Parkinsonia aculeata</i> L. (JBA - 543)	Bilayati babul	Stem bark decoction is given in dysentery	C
24	<i>Peltophorum pterocarpum</i> (DC.) K. Heyne (JBA - 522)	Copper pod	Stem bark decoction is given in diarrhoea and dysentery.	C
25	<i>Pithecellobium dulce</i> (Roxb.) Benth. (JBA - 479)	Jangali jalebi	Seeds are used in indigestion. Stem bark decoction is given in diarrhoea.	C
26	<i>Pongamia pinnata</i> (L.) Pierre (JBA - 480)	Kanji	Seed oil useful in joint pain. Leaf decoction is anthelmintic.	W/C
27	<i>Prosopis juliflora</i> (Sw.) DC. (JBA - 26)	Bilayati Bawliya	Stem bark decoction is given in asthma. Gum is useful in skin diseases. Wood used as fuel.	W
28	<i>Pterocarpus marsupium</i> Roxb. (JBA - 206)	Lohgal	Stem decoction is used in diabetes. Leaf paste is applied on forehead in headache. Decoction of stem bark is given in kidney stone	W
29	<i>Senna siamea</i> (Lam.) H.S. Irwin & Barneby (JBA - 67)	Kasod	Leaf paste is applied on skin diseases. Wood is used as fuel	C
30	<i>Sesbania grandiflora</i> (L.) Pers. (JBA-290)	Agast	Flower paste is useful in leucoderma.	C
31	<i>Tamarindus indica</i> L. (JBA - 05)	Imli	Seed powder mixed with honey and given twice a day in diabetes. Wood is used in house building, wheels of cart and agricultural implements. Seed paste in goat milk is bandaged on bitten area in scorpion bite.	W/C
LOGANIACEAE				
1	<i>Strychnos nux-vomica</i> L. (JBA - 650)	Kuchla	Leaf extract is applied on scabies. Stem bark decoction is given in epilepsy	W
LYTHRACEAE				
1	<i>Lagerstroemia indica</i> L. (JBA - 283)	Sawan	Leaves decoction is given in fever. Planted as ornamental.	C
2	<i>Lagerstroemia parviflora</i> Roxb. (JBA - 265)	Lendia	Leaf decoction is useful in diabetes. Tender leaves are used as fodder.	W
3	<i>Lawsonia inermis</i> L. (JBA - 07)	Mehandi	Leaf juice is applied on scalp for hair growth. Stem bark decoction is given in snakebite.	W
4	<i>Punica granatum</i> L. (JBA - 578)	Anar	Fruit juice is taken thrice a day for one week to cure jaundice. Leaf juice is taken thrice a day for two days in diarrhoea and dysentery	C
5	<i>Woodfordia fruticosa</i> (L.) Kurz (JBA- 151)	Kardhai	Flower decoction is given in leucorrhoea. The flower is useful in blood purification. Leaf paste is massaged over affected parts in arthritis	W
MAGNOLIACEAE				
1	<i>Magnolia champaca</i> (L.) Baill. ex Pierre (JBA-278)	Champa	A glassful bark decoction of flower is given in leucorrhoea.	W/C
MALVACEAE				
1	<i>Adansonia digitata</i> L. (JBA - 330)	Gorakhimli	Fruit pulp powder mix with honey and the formed pill is given twice a day in diabetes. Stem bark decoction is given in diarrhoea.	W/C
2	<i>Bombax ceiba</i> L. (JBA - 48)	Kanta Semala	10 - 15 gm gum of tree is chewed thrice a day in diarrhoea. Flowers are used for making curry and given in mouth ulcers.	W/C
3	<i>Ceiba pentandra</i> (L.) Gaertn. (JBA - 575)	Semala	Stem bark decoction is used as aphrodisiac.	C
4	<i>Ceiba speciosa</i> (A.St.-Hil.) Ravenna (JBA - 722)	Safed semala	Stem bark paste is useful in pimple and blemishes.	W/C
5	<i>Firmiana simplex</i> (L.) W. Wight (JBA - 152)	Kadhai	Papery stem bark decoction is useful in fever. Gum is useful in joint pain	W
6	<i>Grewia asiatica</i> L. (JBA - 469)	Phalsa	Dried fruit powder is useful in muscular weakness.	W/C

*(Contd.)*

Table 1 — List of medicinal and useful tree species with family, botanical name, accession number, local name, ethnobotanical uses and source of collection (Contd.)

Sr. No.	Family Botanical Name and voucher specimen number	Local Name	Ethnobotanical uses	Source
7	<i>Grewia flavescens</i> Juss. (JBA - 137)	Dhamni	Fruits are eaten in general weakness	W
8	<i>Grewia tiliifolia</i> Vahl (JBA - 580)	Phalsa	Stem bark decoction is given in stomach disorders. Leaves are used as fodder.	W
9	<i>Helicteres isora</i> L.(JBA - 138)	Atodi	The dried pod powder is given with milk in empty stomach early in the morning in griping of stomach pain.	W
10	<i>Hibiscus rosa-sinensis</i> L. (JBA - 11)	Gudhal	Infusion of flowers is useful in hair growth.	C
11	<i>Kydia calycina</i> Roxb. (JBA - 184)	Barangi	Leaf paste useful in skin diseases.	W
12	<i>Thespesia lampas</i> (Cav.) Dalzell (JBA - 579)	Paras peepal	Root bark decoction is useful in gonorrhoea. Stem fibre is used for making rope	W/C
13	<i>Thespesia populnea</i> (L.) Sol. ex Correa. (JBA - 572)	Jangali kapas	Root decoction is given in jaundice.	W/C
MELIACEAE				
1	<i>Azadirachta indica</i> A. Juss. (JBA - 72)	Neem	Dried leaves are used as mosquito repellent. Gum is useful in skin disease. Leaf extract is mixed with tobacco and sprayed over crops to kill catter pillar, mahoo, mosquitoes and houseflies. Stem bark decoction is used as anthelmintic.	W/C
2	<i>Melia azedarach</i> L. (JBA - 216)	Bakayan	Juice of leaves and stem bark given orally thrice a day for 2 days in dysentery	C
3	<i>Soymdia febrifuga</i> (Roxb.) A. Juss. (JBA - 463)	Rohani	Decoction of stem bark is applied on affected part in blood clotting. Bark decoction is given in leucorrhoea. Stem bark boiled in mustard oil and is massaged twice a day in arthritis	W
MORACEAE				
1	<i>Artocarpus heterophyllus</i> Lam. (JBA - 84)	Kathal	Fruit rind poultice is applied on pimple and blemishes. The fruit is used in making pickle.	C
2	<i>Ficus benghalensis</i> L. (JBA - 65)	Bad	A few drops of latex with <i>ghee</i> and sugar are consumed twice a day to get relief in piles as well as dysentery. The juvenile plant root is rubbed on stone and the formed paste is given twice a day in diabetes. The latex of plant is applied on the affected part in mouth ulcers. Latex is massaged on affected parts in gout.	W/C
3	<i>Ficus benamina</i> L. (JBA - 505)	Bilayatri pakar	Stem bark decoction is given in gonorrhoea	C
4	<i>Ficus hispida</i> L. f. (JBA - 513)	Bhuin Gular	Stem bark decoction is useful in urinary disorder.	W
5	<i>Ficus palmata</i> Forssk. (JBA - 507)	Khemri	Fruits are useful in sperm count, carminative and stomachic.	C
6	<i>Ficus racemosa</i> L. (JBA - 19)	Gular	Stem bark infusion is used to wound healing. Latex is used to treat mouth ulcers and typhoid fever	W/C
7	<i>Ficus religiosa</i> L. (JBA - 36)	Peepla	Stem bark decoction is given in cardiac disorder. Leaf decoction is useful in epilepsy.	C/W
8	<i>Ficus virens</i> Aiton (JBA - 51)	Pakar	Leaf decoction is given in diabetes. Fruit infusion is given in gastric disorders.	W
MORINGACEAE				
1	<i>Moringa oleifera</i> Lamk. (JBA - 464)	Shjhana	Steam bath of leaves is taken in jaundice. Stem bark and gum is pounded in water and the extract is given orally twice a day in rheumatism.	C
MYRTACEAE				
1	<i>Callistemon citrinus</i> (Curtis) Skeels (JBA - 219)	Bottle brush	Planted as ornamental.	C
2	<i>Eucalyptus tereticornis</i> Sm. (JBA - 12)	Lipta	Leaves are crushed, mildly heated and gently massaged over affected parts in arthritis. Leaves smoke is used as mosquito repellents. Leaves paste is also applied on forehead in headache.	C

(Contd)



Table 1 — List of medicinal and useful tree species with family, botanical name, accession number, local name, ethnobotanical uses and source of collection (*Contd.*)

Sr. No.	Family Botanical Name and voucher specimen number	Local Name	Ethnobotanical uses	Source
3	<i>Psidium guajava</i> L. (JBA - 264)	Amrud	Stem bark infusion is given in bronchitis.	C
4	<i>Syzygium cumini</i> (L.) Skeels (JBA - 390)	Jamun	One teaspoonful seed powder is given orally twice a day for blood purification. Stem bark is pounded in water and given orally twice a day for two days in diarrhoea	W/C
5	<i>Syzygium salicifolium</i> (Wight) J. Graham (JBA - 236) OLEACEAE	Jangali jamun	One teaspoonful seed powder is given twice a day with water in diabetes	W
1	<i>Nyctanthes arbor-tristis</i> L. (JBA - 110)	Harsingar	Leaf juice is given in fever. Young twigs are used for the preparation of basketry. Leaves paste is used in joint pains	C
2	<i>Schrebera swietenoides</i> Roxb. (JBA - 350) PHYLLANTHACEAE	Mokha	Leaf juice is used in eye disorder	W
1	<i>Bridelia retusa</i> (L.) A. Juss. (JBA - 93)	Agon	Stem bark decoction given in diabetes. Fruit juice is useful in cardiac disorders.	W
2	<i>Phyllanthus emblica</i> L. (JBA - 29)	Aonla	Leaf extract is used in fever. Fruits are edible and used in making pickles	W/C
3	<i>Flueggea leucopyrus</i> Willd. (JBA - 514) PITTOSPORACEAE	Hartho	Stem bark decoction is given in kidney stone.	W
1	<i>Pittosporum wightii</i> A.K. Mukherjee (JBA - 360) PUTRANJIVACEAE	Yekadi	Root bark decoction is given in enhance sperm count.	W
1	<i>Putranjiva roxburghii</i> Wall. (JBA - 614) RHAMNACEAE	Kanghi	Seed infusion is used as aphrodisiac. Stem bark decoction is given in fever.	C
1	<i>Ziziphus jujuba</i> Mill. (JBA - 28)	Ber	Leaf extract is used for washing hairs and to kill the lice. Wood is used in making agricultural implements and also used in making houses	C
2	<i>Ziziphus xylocarpus</i> (Retz.) Willd.(JBA - 55) RUBIACEAE	Ghont	Fruit powder is given orally with goat milk in leucorrhoea	W
1	<i>Breonia chinensis</i> (Lam.) Capuron (JBA - 320)	Kadam	Bark decoction is given with black pepper in pyorrhoea	C
2	<i>Catunaregam nilotica</i> (Stapf) Tirveng. (JBA - 460)	Kalaphetra	Root decoction is given in stomach disorder.	W
3	<i>Gardenia gummifera</i> L. f. (JBA - 190)	Papada	Gum is used against worm infestation.	W
4	<i>Gardenia latifolia</i> Ait. (JBA - 123)	Dikamali	Stem bark decoction is given in bleeding of piles.	W
5	<i>Haldina cordifolia</i> (Roxb.) Ridsd. (JBA - 140)	Haldu	Leaf paste is applied on forehead in headache. Stem bark pounded in water overnight given twice a day in jaundice	W
6	<i>Hamelia patens</i> Jacq. (JBA - 725)			C
7	<i>Mitragyna parvifolia</i> (Roxb.) Korth. (JBA - 148)	Kalam	Seed paste is applied on the forehead in migraine	W/C
8	<i>Morinda pubescens</i> Sm. (JBA - 117)	Noni	Fruit paste is applied on the swelling in arthritis	W
9	<i>Morinda umbellata</i> L. (JBA - 459) RUTACEAE	Aaledi	Fruit paste in <i>Ricinus communis</i> oil is massaged over affected parts in gout.	W
1	<i>Aegle marmelos</i> (L.) Correa (JBA - 252)	Bel patra	Fruit pulp lemonade is used as cooling agent, and also used in diarrhoea and dysentery.	W/C

*(Contd)*

Table 1 — List of medicinal and useful tree species with family, botanical name, accession number, local name, ethnobotanical uses and source of collection (*Contd.*)

Sr. No.	Family Botanical Name and voucher specimen number	Local Name	Etnobotanical uses	Source
2	<i>Citrus limon</i> (L.) Osbeck (JBA - 576)	Nibu	Fruit juice is taken with salt and given in dysentery.	C
3	<i>Feronia limonia</i> (L.) Swingle (JBA - 185)	Kaith	Fruit pulp is useful in skin diseases	W
4	<i>Murraya koenigii</i> (L.) Spreng. (JBA - 406)	Meetha neem	Leaves are used in flavouring the stuff. Fresh leaf juice is given in indigestion.	C
5	<i>Murraya paniculata</i> (L.) Jack. (JBA - 261)	Madhukamini	Fresh leaf juice is applied on affected part in ringworm	C
SALICACEAE				
1	<i>Casearia tomentosa</i> Roxb. (JBA - 491)	Kirchi	Stem bark paste is bandaged over swelling part in joint diseases.	W
2	<i>Flacourtia indica</i> (Burm. f.) Merr. (JBA - 567)	Bilanga	Leaves poultice bandaged over bitten area in snake snakebite. Leaves are used as fodder.	W
SANTALACEAE				
1	<i>Santalum album</i> L. (JBA - 154)	Chandan	Fresh leaf juice is applied on forehead in migraine.	C
SAPINDACEAE				
1	<i>Sapindus emarginatus</i> Vahl (JBA - 549)	Reetha	Fruit pulp is massaged on affected part in sunlight in arthritis. It also used for washing hair as hair tonic and also used as detergent for washing clothes.	W/C
2	<i>Schleichera oleosa</i> (Lour.) Merr. (JBA - 481)	Kusumada	Seed oil is heated mildly and massaged over affected parts in arthritis	W
SAPOTACEAE				
1	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A. Chev. (JBA - 06)	Mahua	Seed oil is applied on affected part in joint pain. Seed cake is used as mosquito repellent. Leaves are warmed and tied on chest in case of pneumonia. Flowers are used for making local drink	W
2	<i>Manilkara hexandra</i> (Roxb.) Dubard (JBA - 470)	Khirni	Latex is applied on scabies	C
3	<i>Manilkara zapota</i> (L.) P. Royen. (JBA - 275)	Cheeku	Stem bark decoction is given in constipation	C
4	<i>Mimusops elengi</i> L. (JBA - 112)	Maulshri	Seed powder useful in pyorrhoea.	C
SIMAROUBACEAE				
1	<i>Ailanthus excelsa</i> Roxb. (JBA - 96)	Mahaneem	Stem bark powder are used in asthma and bronchitis. Decoction of bark is used in internal wounds	W
ULMACEAE				
1	<i>Holoptelea integrifolia</i> (Roxb.) Planch. (JBA - 09)	Ovala	Paste of leaves is applied over affected parts in case of ring worm	W
ZYGOPHYLACEAE				
1	<i>Balanites aegyptiaca</i> (L.) Delile (JBA - 724)	Hingota	Fruits are used as fish poison and also as detergent for washing clothes. Fruit pulp is also useful in leucoderma.	W

steam bath 3 species, smoking 2 species, seeds cake, 2 species and poultice 1 species. Plants are either used individually or in combination with other species. Decoctions, infusion extract, juice and a mixture of several plants are commonly used in treating malaria, pneumonia, typhoid, fever, diarrhoea, constipation, epilepsy, piles and many more diseases. Wounds, fractures and other skin diseases are treated topically. Decoctions can often be found as one of the major forms of drug preparation in ethnomedicinal practices

as it is easy to prepare by mixing with water tea or soup<sup>47,48</sup>. Water is commonly used if a solvent is required for the preparation. Sometimes other non-herbal materials like 'ghee', 'honey', 'salt', 'oil' are also used in some drug preparations as an adjunct to mask odour, bitterness or to increase the viscosity of the preparation. Paste and poultice are made by crushing plant parts using mortar and pestle. Besides this, a good number of plants species (71 species) are used for edible and other purposes e.g. drink,

fuel, fibre, dyes, gum, resin, fodder, agricultural implements, ornamental, musical instruments, house buildings etc. The highest number of species are used for preparation of agricultural implements (11 species) as most of the tree species has a good timber quality followed by ornamental and fodder (7 species) each, and the least number of species used in basketry, flavouring agent, magico-religious and local drinks (1 species) each (Fig. 1). Tribals of this region are also expert in making baskets, mats, ropes, cordages and several other household commodities from plant parts. This knowledge could be utilized in an organized way and kinds of cottage industries can be established in tribal areas. A majority of respondent indicated that they use trees produce as supplement their monthly income and for nutritional purposes. Most of the tree species are fruit yielding, gum-yielding, fibre yielding these plant species have a high market value. Most of the tribal people of the study area retain a large part of the produce for their own use and sell the remaining part in the market. The income generated by the sale of the produce is utilized for buying clothes and other necessary items.

Some of the medicinal properties of the plant species, mentioned in the present work, have already been scientifically validated on the basis of pharmacological assays e.g. The leaves of *Azadirachta indica*, have strong antibacterial activity are used for feeding and reducing the parasitic load of animal<sup>49</sup>. Ethanol extracts of *Pterocarpus marsupium* possess significant antidiabetic, antihyperlipidemic and antioxidant effects in alloxan-induced diabetic rats<sup>50</sup>. *Pongamia pinnata* seed extract has shown wound healing, anti-inflammatory, antioxidant and antimicrobial properties. The crude extract of seeds of this plant was non-toxic to Wistar female albino rats even at a dose of 2000 mg/kg bw<sup>51</sup>. *Semecarpus anacardium* has shown anti-inflammatory, antioxidant and antimicrobial properties. Milk preparation of nuts of this plant was non-toxic to Wistar male albino rats

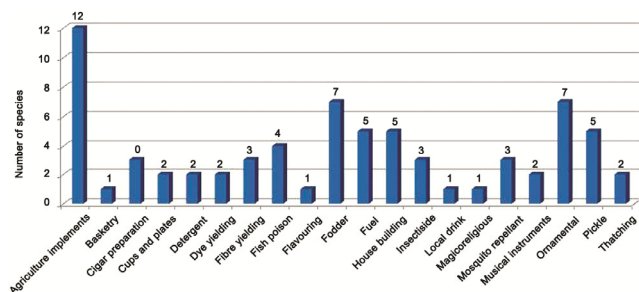


Fig. 1 — Miscellaneous uses of the tree species

even at a dose of 2000 mg/kg bw<sup>52</sup>. Keshri *et al.*, studied the hypoglycaemic activity of the *Holarrhena pubescens* seed<sup>53</sup>.

Most of the tree species recorded in the present study grow wild (79 species). According to the local inhabitants, suppliers of the plants materials to the herbal companies often collect plants from the wild without paying any attention to their conservation. Although some of the documented plants are widely available in the study area, some of them are rare and vulnerable class due to mass deforestation or harvesting them without any concern towards their conservation. Present survey revealed that some of the species including *Pterocarpus marsupium*, *Semecarpus anacardium*, *Firmiana simplex*, *Pittosporium wightii*, *Soymida febrifuga* are among threatened species in that area and requires attention to prevent their extinction<sup>24</sup>. Immediate action from the government is essential for the propagation and preservation of the medicinally and commercially valuable vulnerable tree species.

## Conclusion

This study revealed that Jhabua district of western Madhya Pradesh has an enormous wealth of tree species (169 species) commonly used by Bhil and Bhilala tribes for healthcare and other miscellaneous purposes. Uses of only tree species for different medicinal practices have been listed in the study area for the first time. Due to the increased dependence on herbal treatment and overexploitation of these tree species results in posing some tree species into various threat categories. Therefore, there is an urgent need for conservation of the genetic diversity of the tree species with special emphasis on anthropogenic activities. Further work should focus on the thorough phytochemical investigation of the unexplored tree species such as alkaloid extraction and isolation along with few clinical trials. This could help in creating mass awareness regarding the need for conservation of such plants and in promoting ethno-medico-botany knowledge within the region. Besides, the young generation should be motivated to acquire this traditional medicinal knowledge. The species on which the tribals are mostly dependent such as, wild edible and timber trees, firewood species etc. should be planted in large scale or cultivated. It would rejuvenate the eco-system with maximum indigenous floral and faunal elements.

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