EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 3
Issue: 10
197-204
Year: 2016

# ETHNOBOTANICAL SURVEY IN INDO-GANGETIC PLAINS AND CENTRAL INDIA AND DOCUMENTATION AND EXCHANGE OF ETHNOBOTANICAL KNOWLEDGE OF THIS AREA

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**Article Received on 07/08/2016** **Article Revised on 27/08/2016** **Article Accepted on 17/09/2016**

**ABSTRACT**
This chapter deals with Documentation and Exchange of ethnobotanical data in Indo-Gangetic Plains and Central India. Indo-Gangetic Plain and Central India is biodiversity rich area and dominating by tribal community tribal community have very rich knowledge of medicinal plant. So I had conducted Ethnobotanical study in Indo-Gangetic Plain and Central India. Ethnobotany is the study of interrelationships between human cultures and plants, animals, and other organisms in their environment. It also creates an awareness of the link between biodiversity and cultural diversity. From the beginning of civilization, people have been using plants for various purposes like food, shelter, medicines, etc. Ethnobotanists play a key role in exploring these kinds of information from indigenous people which creates a gateway for formulating a novel drug. The content in this chapter deals with these aspects in an approachable manner.

**KEYWORDS:** Documentation of ethnobotanical knowledge, Exchange of ethnobotanical data, Traditional knowledge of indigenous community.

## 1. INTRODUCTION

Ethnobotany is the science which deals with study of tribal and rural people, with a view to unearth their deep and unique knowledge about the properties and uses of plants, to aid in search for new herbal sources of food, drugs etc. Ethnobotany literally means the study of botany of the primitive race. This term was first used by Harshberger in 1895 to the study of plants used by primitive and aboriginal people. Ethnobotany defined as the study of the interrelations of primitive human's and plants (Jones, 1941). Later ethnobotany was interpreted as the study of the "relationships which exist between people of a primitive society and their plant environment (Schultes, 1962)". Ethnobotany is the study of the interaction between plants and people, with a particular emphasis on traditional tribal cultures. According to World Health Organization about 65-80% of the world's population in developing countries depends essentially on plants for their primary health care due to poverty and lack of access to modern medicine (Awoyemi *et al*. 2012). The focus of ethnobotany lies on, how plants have been or are used, managed and perceived in human societies. This includes plants used as food, medicine, cosmetics, dyeing, textiles, building, tools, currency, clothing, rituals, social life, and music etc. Now worldwide Ethnobotany became a part of tradition and culture.

Ethnobotanical work has its beginning long back in A.D. 77, with the publication of "De Materia Medica" which is a Catalogue of about 600 medicinal plants in Mediterranean. The modern ethnobotanical work was begun in the 20$^{th}$ century. In recent time modern ethnobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual re-orientation. This is also the beginning of academic study in the field of ethnobotany. The modern approach to the science of ethnobotany evolved in U.S.A. and the foremost center is the Botanical museum of Harvard University in Massachusetts. The Indian subcontinent represents one of the greatest empires of ethnobotanical wealth (Schultes, 1967); however, ethnobotany study in India is of recent origin. India is rich in Biodiversity, comprises multitude of religions, casts and creeds. There about 68 million people belonging to 227 ethnic groups and 573 tribal communities derived from six racial stocks in the country (Pushpgandhan, 1994). India has a great relationship with Ethnobotany from the ancient times as in India, medicinal plants have been used in Indian traditional systems of medicine namely Ayurveda and Sidda from immemorial days. Ethnobotanical work was initiated by Janaki Ammal (1955) and Jain (1967). Since then many works have been done in this field but even now in 21$^{st}$ century the field offers a lot of challenges.

Though it was Harshberger who first mentioned the ethnobotany as a discipline, but its history begins long before that. Many known scientists had already referred important plants and their various uses in their published records. In India, it was Jain who made pioneering investigations on ethnobotany and affectionately known as "Father of Indian Ethnobotany". It will be the credit of ethnobotanist to see that people find themselves in a world, where there is food for the hungers, medicines for the sick and roof for them who have not.

Ethnobotanical work has great importance in present time as the ancient knowledge of use of plants requires immediate efforts for the conservation. Tribal have a great treasure of knowledge regarding plants to use for various purposes in their day to day life. Gradually this knowledge is vanishing with new generation. Interrelationships between human cultures, plants, animals and other organisms in their environment like its parent field; ethnobotany makes an apparent connection between human cultural practices and the sub-disciplines of biology.

Ethnobotanical studies have range across the space and time, from archaeological investigations of the role of plants in ancient people to the bioengineering of new crops. Furthermore, ethnobotany is not limited to no mechanized or no developed societies. In fact, co-adaptation of plants and human cultures has changed and perhaps intensified in the background of urbanization and globalization in the twenty-first century. Nonetheless, indigenous, non-westernized cultures play a crucial role in ethnobotany, as they possess a previously undervalued knowledge of local ecology gained through centuries or even millennia of interaction with their biotic (living) environment.

The significance of ethnobotany is manifold. The study of indigenous food production and local medicinal knowledge may have practical implications for developing sustainable agriculture and discovering new medicines. Ethnobotany also encourages an awareness of the link between biodiversity and cultural diversity, as well as a sophisticated understanding of the mutual influence (both beneficial and destructive) of plants and humans. The use of plants by man for different purposes is dated back to the origin of human life on earth. In the beginning the plants were used as food, medicine and shelter but with the passage of time man explored many uses of these plants. Wild plants have always been the matter of high concern and have always been used for their potential of human well beings (Ali, 2003 and Ali *et al*.2003).

They are an important source of therapeutic drugs and play a significant role in the survival of indigenous communities. Indigenous people treasure the rich knowledge of medicinal plants which has been developed over generations through trial and error. This knowledge is passed on orally from one generation to another and is still retained by them. Recently, there has been an increased demand in herbal/ traditional medicine. These drugs are gaining popularity because of their natural origin and efficacy in treating various ailments **(**Senthilkumar 2013). Herbs are valued for their virtues as food as well as medicine. Herbal remedies may be prepared in different ways for use in treatment of diseases and ailments as decoctions, infusions, concoctions, maceration and bathing remedies. Ethnobotanical studies are important in revealing locally important plant species for the discovery of important drugs (Cox 1996). Documentation of indigenous knowledge of medicinal plants is important for preserving the knowledge before it diminishes with the knowledgeable people, so that plants can be conserved and sustainably managed and utilized by the local communities. The purpose of this study was to assess traditional knowledge with regard to respondents' demographic characteristics, such as, age, gender, knowledge transfer, etc. To document medicinal plant uses and associated indigenous knowledge for the management of various ailments. which is part of an initiative to document baseline data for future phytochemical and pharmacological studies. For analysis of general use of plants, factor informant consensus (Fic) was used.

**General description of study area**

**Indo-Gangetic Plain-** The Indo-Gangetic Plain has an area of about 270,000 square miles (700,000 square kilometers). It is the world's most extensive tract of uninterrupted alluvium, or river-deposited sediments. These sediments give rise to fertile soils and are rich in groundwater for well irrigation. The flat terrain also makes the area ideal for canal irrigation. The greater part of the Indo-Gangetic Plain is drained by the Ganges River, which rises in the southern Himalayas and flows in a generally south-to-southeast direction to the Bay of Bengal. One of its principal tributaries is the Yamuna, or Jumna, which flows past New Delhi to join the Ganges near Allahabad. The Brahmaputra River flows through northeastern India before joining the Ganges in Bangladesh. The Indus and its tributaries drain the western and southwestern parts of the plain. The northern part of this area, now divided between India and Pakistan, is traditionally known as the Punjab. Its name means "five waters," for the five major tributaries of the Indus—the Jhelum, Chenab, Ravi, Sutlej, and Beas—that flow through the region. Toward the west the plain becomes progressively drier. It includes the arid Thar, or Great Indian, Desert, which extends across the India-Pakistan border (Fig-1).

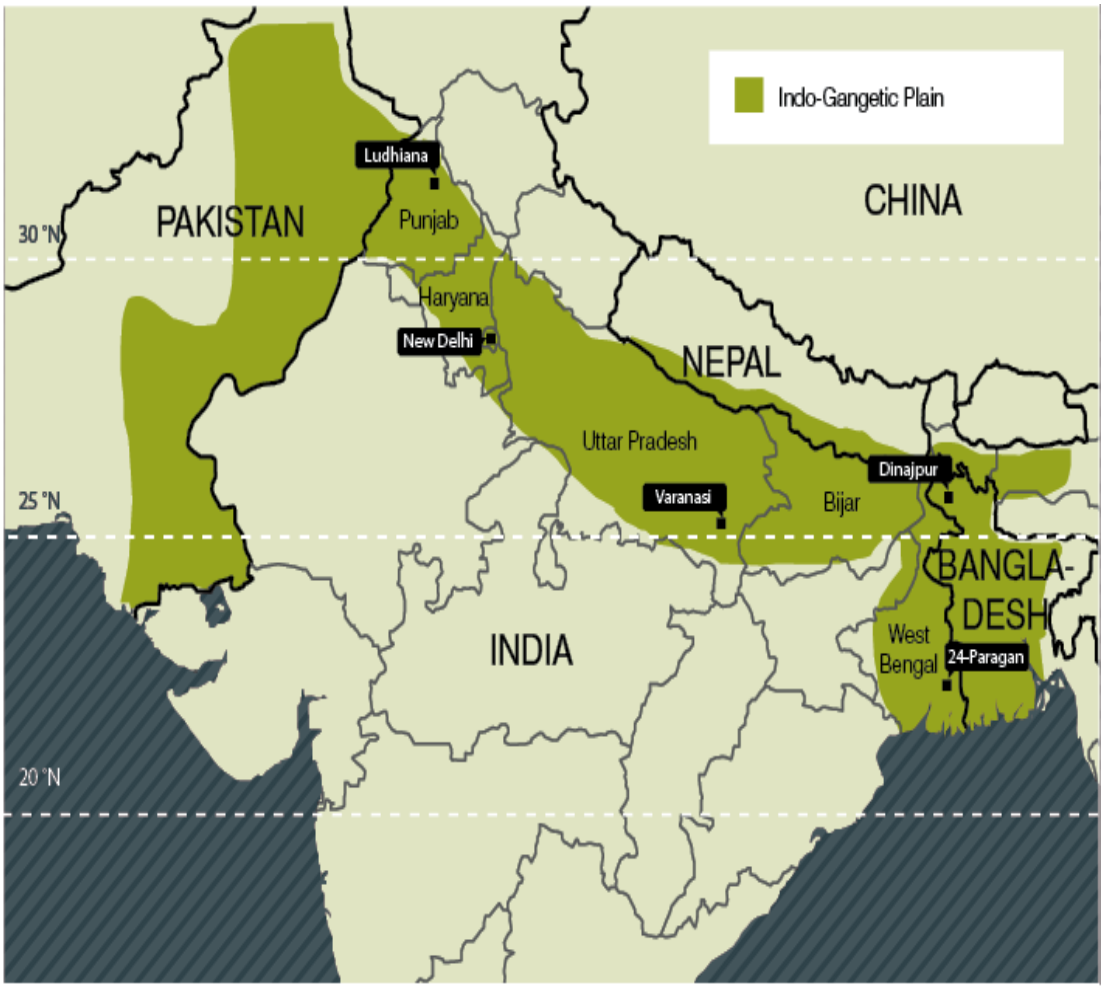


**Fig-1: Location map of Indo-Gangetic Plain in India.**

**Dominating tribe in Indo-Gangetic Plain-** (1) Aboriginal tribes: represented by Bumij, Chakma, Dhomal, Garo, Hajong, Kharria, Kharwar, Khasiya, Kol, Kuki, Lushai, Lepcha, Mech, Murmi, Nat, Santhal, Tipperah or Mroong, Uraon, Dhangar, etc.; (2) Semi-Hinduised aboriginals: represented by Bagdi, Bahelia, Bauri, Bediya, Bhuiya, Bind, Buna, Chain, Chamar or Muchi – [a] Kural or Kuril; 'Chandal' – [a] Abashan, Dom – [a] Turi, Doshad, Hadi Hatri, Hari, Kaora, Karanga, Khaira, Khyen; Koch – [a] Pali or Paliya, [b] Rajbansi, Kodmal, Mahili, Mal, Malo, Mandai; Mihtar – [a] Bhumiali, Pan, Pasi, Shikari, etc. (Census, 1872). Santhals were the most dominant among the aboriginal tribes, while the 'Chandals' were among the 'Semi-Hinduised Aboriginals', and also largest among the two groups.

**Forest area of Indo-Gangetic Plain-** The tropical moist deciduous forests found in the lower reaches of the Ganges and Brahmaputra rivers once stretched along the plains across the Indian states of Uttar Pradesh, Bihar, West Bengal, Assam, and Orissa, and most of Bangladesh. The vegetation is semi-deciduous, with the upper canopy containing the deciduous species, while the second story is dominated by evergreen species. Open forests are dominated by semal (*Bombax ceiba* Linn.) in association with *Albizia procera*, Benth., Duabanga sonneratioides Buch.-Ham. and Sterculia villosa Roxb. These are early seral communities that will eventually become sal (Shorea robusta C.F.Gaertn.) forests, if succession is allowed to proceed.

**Central India-** Central India is a region in the central part of India. It includes the states Madhya Pradesh and Chhattisgarh. It is situated at the heart of the India. The main cities in this region are Bhopal, Indore, Ujjain, Gwalior, Raipur etc.

**Madhya Pradesh-** Madhya Pradesh is often called the Heart of India. Madhya Pradesh lies in the middle of the India, sharing its border with six neighbouring states. The northern border of the state has two neighbour states namely the state of Rajasthan and Uttar Pradesh. The western border of the state is shared by a part of Rajasthan and a part of Maharashtra with Gujarat in between. On the southern part of the state of Madhya Pradesh lie the states Maharashtra and Andhra Pradesh. The entire eastern border of the state is bounded by the states of Chattisgarh and Jharkhand. The total geographical area the state of Madhya Pradesh covers is approximately 308,000 sq km divided among the 45 districts of the state. Forests cover a major part of the

state and the cultivated area accounts to almost half of the total landmass of the state. The state covers a wide area of the Indian plateau region. A number of significant rivers flow through this land. Thus, with the mountain ranges, rivers along with the plains, Madhya Pradesh has a varied physical feature.

**Dominating Tribe in Madhya Pradesh-** Baiga is a tribe found in Madhya Pradesh (population 250,000), Uttar Pradesh, Chhattisgarh and Jharkhand states of India. The largest number of Baigas is found in Baiga-chuk in Mandla district and Balaghat district of Madhya Pradesh. They have sub-castes – Bijhwar, Narotia, Bharotiya, Nahar, Rai Bhaina, and Kadh Bhaina.

**Chhattisgarh-** Chhattisgarh came to be recognized as a separate state in November 2000. Raipur is the capital of Chhattisgarh. The state is located in the central part of India. The geographical location of Chhattisgarh is 170 46' north to 2405' north latitude and from 80015' east to 84020' east longitude. Madhya Pradesh borders Chhattisgarh in the north western part. Maharashtra borders on the west and Andhra Pradesh lies in its south. Orissa is located in the eastern side, while the state of Jharkhand borders Chhattisgarh in the north eastern part. (Fig.-2). Geography of Chhattisgarh is diverse. The total area of Chhattisgarh is 192,000 square km. The state is also declared as the herbal state. The major tribes of this region are – Gond, Kanwar, Oraon, Halba, Bhatra, Korwa, Baiga, Nagesia, Kol etc.


**Fig-2: Location map of Central India in India.**

**Dominating Tribe in Chhattishgarh-** The major tribes of this region are – Gond, Kanwar, Oraon, Halba, Bhatra, Korwa, Baiga, Nagesia, Kol etc.

**Forest area of Central India-** Tropical Dry Deciduous Forests are mostly found in those areas having 25 to 75 cm rainfall. The general height of the trees found in these forests is around 8 metres to 20 metres. The major

species found in these forests are Terminalia chebula Retz (Harra), *Acacia karoo,* Linn (Kekar), *Acacia nilotica*, Linn. (Babul), *Diospyros melanoxylon*, Roxb. (Tendu), *Adina cordifolia*, Roxb. (Haldu), *Dalbergia sissoo*, Roxb. Ex Dc. (Shisham), *Tectona grandis*, Linn. (Sagon) and *Albizia lebbeck,* Benth. (Siris) etc. The other major type of forest found in Central India is tropical deciduous Forest. These forests are found in the areas that receives 50 cm to 100 cm rainfall. These are economically viable and used for building material and furniture. *Tectona grandis,* Linn. (Sagon), *Dalbergia sissoo,* Roxb. Ex Dc (Shisham), *Azadirachta indica*, A.Juss (Neem) tree, *Ficus religiosa*, Linn. (Pipal), etc. are the major species found in this type of forest.

**2. Documentation of Ethnobotanical knowledge**

Indigenous people have very strong knowledge of medicinal plant and they live in many villages. So select villages in Central India or Indo-Gangetic Plain which is the right way of Ethnobotanical documentation. Information collection from indigenous communities belonging to following category on the spot/ during the transit visit.

- ❖ Village head man/woman and old experienced person /village resource persons
- ❖ Middle men or interpreter
- ❖ Men and women working in the field
- ❖ Men and women in weekly markets and in other common places
- ❖ Local forest officers
- ❖ Baidyas, Sirahas, knowledgeable person, medicine men
- ❖ Traditional Birth attendant (Dai)
- ❖ Traditional Bone setter (haddibaidh) and Maatipujari of village

Information collection is done by visiting their villages, participating in their festivals and social events. Interviews are also conduct with indigenous people of in the study area.

**2.1 Method of documentation**

Ethnobotanical studies conducted in the selected area. Study areas regularly visited during the study and data recorded by using following methods

- Study area visits: Personal visits to the area selected for the study,
- Frequency to be decided by self – annually/seasonally.

**2.2 Information collection: By questionnaire way & personal interview on the spot**

- Source of information – Questions asked to Baidyas, Sirhas, Knowledgeable person of corresponding area, experienced people, medicine men and heads / local inhabitants who have knowledge of plants.

**2.3 Plant Material collection: During field visits to selected area**

- Sample collection, information collection regarding different uses of plant, plant parts, origin, availability, vernacular names etc was noted down during the field visits. Informants to be asked about name of plants they knew, to reveal uses of the respective species
- In cases of illiterate informants, photographs and fresh plant specimens from the field was shown/presentation to them and questionnaires was filled from their responses.

**2.4 Relative Information**

- Ask open ended questions to find relative information e.g. use of a plant to cure some disease and this information was recorded properly, plant parts, diseases treated, the botanical name, local name and mode of preparation and administration of the medicine.

**2.5 Listing of plant material: Tabulation should consist of following details**

- Name of the disease
- Name of the plant
- Vernacular name
- Name of the family
- Plant part used.
- Habit of the plant
- Other ingredients used.
- Drug preparation.
- Drug application and its effectiveness.
- Cost of treatment / episode.

**2.6 Storage of plant material:** Herbarium prepared for permanent storage.

**2.7 Documentation of drug preparation practiced by indigenous community**

The Baidyas and folk healers of the area interviewed individually for collection of information regarding the preparation of drug and its administration against diseases. Information should be documented disease-wise, use of plant/plant parts for the preparation of drug. The information should be cross checked by the other informants in the same locality for verification of medicinal claims by indigenous community. This practice resulted credibility of data regarding the use of plants and statements of informants.

**2.8 Identification and use of medicinal plants**

Plant samples and plant parts collected during the survey should be preserved as herbarium specimens, and voucher specimen. The plant samples were identified by following the flora like The Flora of British India, Vol. I-VII by Hooker (1872, 1879). Publications of Gamble(1935), Bore(1960), Cooke(1967), Panigrahi & Murti (1989) etc consulted as per need, for the identification of plant samples. Capture photographs during the field survey of the plants, plants parts, life

style of indigenous communities, and their plant related activities in study area. Beside that some indigenous technology and equipment's also recorded in the field. In the prepared herbarium, plants arranged by following Bentham and Hookers system of classification (1872-1897).

**2.9 Study of conservation practices of indigenous people**

Conservation of natural resource has been the integral part of many indigenous communities all over the world, especially in India. The indigenous people celebrate many festivals related with plants. Many plant species are being used in the festival such plants are propagated by them and by this way plant species are conserved by the indigenous communities. The documentation of conservation practices was done by visiting such festival celebration.

**2.10 Phytosociological study of study area**

Quadrate method used to study Phytosociological parameters, as required during study. Quadrates are sampling units containing an area of definite size with rectangular shape. Since plant community should be heterogeneous, the determination of size and number of quadrates necessary for adequate sampling was determined by following Mishra, (1968).

**Documentation of some medicinal plant in Central India**

| S.N. | Botanical Name | Vernacular name of the plant | Family |
|---|---|---|---|
| **1.** | *Ficus religiosa*, Linn. | Pipal | Moraceae |
| **2.** | *Terminalia chebula* Retz. | Harra | Combretaceae |
| **3.** | *Diosphyros melanoxylon*, Roxb. | Tendu | Ebenaceae |
| **4.** | *Dendrocalamus giganteus*, Munro. | Bans | Poaceae |
| **5.** | *Azadirachta indica*, A.Juss | Neem | Meliaceae |
| **6.** | *Pterocarpus marsupium*, Roxb. | Beeja | Fabaceae |
| **7.** | *Diospyros melanoxylon*, Roxb. | Tendu | Ebenaceae |
| **8.** | *Shorea robusta*, Roth. | Sal | Dipterocarpaceae |
| **9.** | *Anogeissus latifolia*, Roxb. | Dhawa | Combretaceae |
| **10.** | *Tectona grandis*, Linn. | Sagon | Lamiaceae |
| **11.** | *Dalbergia sissoo*, Roxb. Ex Dc. | Shisham | Fabaceae |
| **12.** | *Albizia lebbeck*, Benth. | Siris | Fabaceae |
| **13.** | *Acacia nilotica*, Linn. | Bbool | Fabaceae |
| **14.** | *Adina cordifolia*, Roxb. | Haldu | Rubiaceae |
| **15.** | *Acacia karoo*, Linn | Kekar | Fabaceae |
| **16.** | *Cassia tora*, Linn. | Charota | Caesalpinaceae |
| **17.** | *Corchorus capsularis*, Linn. | Sabarkhai | Tiliaceae |
| **18.** | *Emblica officinalis*, Gaertn. | Aonla | Euphorbiaceae |
| **19.** | *Eclipta prostrata* Linn. | Bhringraj | Compositae |
| **20.** | *Melia azedarach*, Linn. | Bakain | Meliaceae |
| **21.** | *Cassia tora*, Linn. | Charota | Caesalpinaceae |
| **22.** | *Corchorus capsularis*, Linn. | Sabarkhai | Tiliaceae |

**Documentation of some medicinal plant in Indo-Genatic Plain**

| S.N. | Botanical Name | Comman Name | Family |
|---|---|---|---|
| **1.** | *Curcuma amada*, Roxb | Aamra haridra | Zingiberaceae |
| **2.** | *Acanthus ilicifolius*, Linn. | Sundarbans | Acanthaceae |
| **3.** | *Enhydra fluctuans*, Lour. | Helencha | Asteraceae |
| **4.** | *Nardostachys grandiflora*, DC | Jatamansi or muskroot | Caprifoliaceae |
| **5.** | *Curcuma caesia*, Roxb. | Kali haldi | Zingiberaceae |
| **6.** | *Curcuma zedoaria*, Rosc. | Karchuura | Zingiberaceae |
| **7.** | *Strychnos nux-vomica*, Linn | Nux-vomica | Loganiaceae |
| **8.** | *Pterocarpus marsupium* Roxb | Piasal or Indian kino | Fabaceae |
| **9.** | *Trigonella corniculata*, Linn | Tvakshira | Leguminosae |
| **10.** | *Curcuma angustifolia*, Roxb | Haridra | Zingiberaceae |
| **11.** | *Curcuma aromatica*, Salisb | Van haridra | Zingiberaceae |
| **12.** | *Hemidesmus indicus*, Linn | Anantamul or kapuri | Asclepiadaceae |
| **13.** | *Tylophora indica*, Merr | Antamul | Asclepiadaceae |
| **14.** | *Withania somnifera*, Linn | Ashwagandha | Solanaceae |
| **15.** | *Eupatorium ayapana*, Vent | Ayapana | Compositae |
| **16.** | *Swertia chirata* C.B.Clarke | Chirata | Gentianaceae |

| | | | |
|---|---|---|---|
| **17.** | *Aloe vera*, Linn Burm.f. | Ghritakumar | Aloeaceae |
| **18.** | *Rauvolfia serpentina*, Benth. ex Kurz | Sarpagandha | Apocyanaceae |
| **19.** | *Cymbopogon flexuosus*, Steud. Wats | Lemon grass | Gramineae |
| **20.** | *Cymbopogon Spreng*, Spp. | Citronella | Poaceae |

**List of threatened, Endangered, Vulnerable, Low risk, Critically endangered Plant Species In Indo-Genatic Plain**

| S.N. | Botanical name | Family | Habit | IUCN status |
|---|---|---|---|---|
| **1.** | *Adina cordifolia*, (Roxb.) Ridsdale | Rubiaceae | Tree | Endangered |
| **2.** | *Aquilaria agallocha*, Roxb. | Thymelaeaceae | Tree | Endangered |
| **3.** | *Bauhinia malabarica*, Lamk. | Caesalpiniaceae | Tree | Threatened |
| **4.** | *Diospyros cordifolia*, L | Ebenaceae | Tree | Endangered |
| **5.** | *Heritiera fomes* Buch.-Ham. | Malvaceae | Tree | Endangered |
| **6.** | *Mesua ferrea* L | Clusiaceae | Tree | Endangered |
| **7.** | *Nypa fruticans*, Wurmb | Arecaceae | Tree | Endangered |
| **8.** | *Oryza officinalis*, L | Poaceae | Tall herb | Indeterminate |
| **9.** | *Sterculia foetida*, L | Sterculiaceae | Tree | Endangered |
| **10.** | *Tamarindus indica*, L | Fabaceae | Tree | Endangered |

**List of threatened, Endangered, Vulnerable, Low risk, Critically endangered plant species in Central India**

| S.N. | Botanical name | Family | Habit | IUCN status |
|---|---|---|---|---|
| **1.** | *Butea monosperma*, Lam. Taub. | Fabaceae | Tree | Endangered |
| **2.** | *Chlorophytum tuberosum*, Roxb. Baker. | Liliaceae | Herb | Endangered |
| **3.** | *Acorus calamus*, Linn. | Araceae | Grass | Endangered |
| **4.** | *Aegle marmelos*, Linn. | Rutaceae | Tree | Vulnerable |
| **5.** | *Costus speciosus*, J.Konig Sm. | Zingiberaceae | Herb | Near threatened |
| **6.** | *Tacca leontopetaloides*, Linn. Kuntze, | Taccaceae | Herb | Near threatened |
| **7.** | *Saraca asoca*, Roxb.De Wilde. | Fabaceae | Tree | Endangered |
| **8.** | *Celastrus paniculatus*, Willd. | Celastraceae | Climber | Near threatened |
| **9.** | *Madhuca longifolia* Var latifolia Roxb. Chev. | Sapotaceae | Tree | Endangered |

**3. Ethnobotanical data compilation**

The use of plants in different cultures globally precedes written human history. Ancient Ayurveda texts, originating around 6000 BC in India, describe more than 2000 medicinal plant species (Thatte and Dahanukar 1986, Narayana et al. 1998, Mukherjee and Wahile 2006). Known botanical studies documenting the use of plants by human's date back to the work of Theophrastus in 375 BC (Kokwaro 1995). Pedanius Dioscorides, a Greek surgeon, wrote De Materia Medica around 77 AD, a compendium containing medicinal information on 600 plant species from the Mediterranean region (Osbaldeston 2000). In the 19th century, intensive ethnobotanical data was gathered and compiled as a result of colonialism and ambitious botanical explorations (Davis 1995, Mauro 1997). However, in the 20th century, when traditional knowledge worldwide was being lost (Turner 1995, Cox 2000), the importance of ethnobotanical studies decreased due to advances in areas such as molecular pharmacology (Cox 2000). Interest in ethnobotanical studies has recently been revived, due to a number of factors which include the successful discovery of novel drugs following an ethnobotanical approach (Fabricant and Farnsworth 2001) as exemplified by the discovery of the antiviral drug prostratin from Homalanthus nutans (Cox 2000) and the antimalarial artemisinin from Artemisia annua (Klayman 1985), threatened food security (FAO 2009), and climate change (Cavaliere 2009). Additionally, concerns for diminishing traditional knowledge and biodiversity along with increasing drug resistance in infectious agents have rekindled an interest in ethnobotanical studies (Lewis 2003, Sanon et al. 2003, Singh 2007).

**4. Ethnobotanical data exchange**

Knowledge dissemination, it is important to provide information to a wide audience in the language they understand, for conducting research, policy making and conservation. Ironically, much of the available ethnobotanical information is only in English, thus restricting its usability and leading to content and knowledge divide. The native language of many countries rich in biodiversity and traditional knowledge is not English. For the sustenance and conservation of this knowledge, it is crucial to digitize and disseminate information in the respective native languages as well. For example, information from (Traditional Knowledge Digital Library) TKDL is available in English, French, Japanese, German, and Spanish as well as local native languages. Further, to protect against misappropriation, access to data shared by indigenous communities should be accessible only to authorized users. Conversely, the secondary data collated from public domain resources

such as reports, publications and theses can be made publicly available. Simultaneously, similar to federated data resources such as (National Center for Biotechnology Information) NCBI, (Global Biodiversity Information Facility) GBIF and (Australia's Virtual Herbarium) AVH, there is a need for federated ethnobotanical data portals for accessing distributed and multi-disciplinary datasets.

**REFERENCES**


1. P. Cox, J. M. Balick. Ethnobotanical Research and traditional Health Care in Developing Countries: Plants, People and Culture. W.H. Freeman and Co. 1996.
2. Ali, H. Trade of medicinal plants in Mingora City. M.Sc. Thesis, Department of Botany, Government Postgraduate College Bannu.2003.
3. Awoyemi, O.K., Ewa, E.E., Abdulkarim, I.A. and Aduloju, A.R. Ethnobotanical assessment of herbal plants in South Western Nigeria, *Academic research international*, 2012; 2: 50-56.
4. Bore, N.L. *The Grasses of Burma*, Ceylon, India and Pakistan (excluding Bambusae). Pergamon Press, Oxford, 1960; UK. pp.767.
5. Cavaliere, C. (The Effects of Climate Change on Medicinal and Aromatic Plants. Herbal Gram: 2009; 44–57.
6. Cooke, T. *The Flora of the Presidency of Bombay*. 2nd reprint. Vol-I, II and III, BSI, Calcutta. 1967.
7. Cox, P. A. Will Tribal Knowledge Survive the Millennium? Science. 2000; 287: 44–45.
8. Davis, E.W. Ethnobotany: An old practice, a new discipline. In: R.E. Schultes and S. von Reis. (eds.). Ethnobotany: Evolution of a Discipline. Chapman and Hall, London. 1995; 40–51.
9. Fabricant, D.S. and N.R. Farnsworth. The value of plants used in traditional medicine for drug discovery. Environ. Health Perspect. 2001; 109: 69–75.
10. FAO. FAO and Traditional Knowledge: the linkages with sustainability, food security and climate change impacts. Food and Agriculture Organization of the United Nations. Rome, Italy. 2009; 1–16.
11. Gamble, J.S. *The Flora of Presidency of Madras*. Adlard and Sons LTD., London, England. 1935.
12. Harshberger, J.W. *Some new ideas*, Evening Telegraph, Philadelphia. 1895.
13. Hooker, J.D. *The Flora of British India*, Vols I – VII Reeve and Co., London, England. 1872-97.
14. Jain, S.K. Ethnobotany: Its scope and study in Indian, *Museum Bull*. 1967; 2: 39-43.
15. Janaki Ammal, E.K. *An introduction to the subsistence economy of India, Man's role in changing the face of the earth*, edited by William (Wenner-Gren foundation University of Chicago press, Chicago), 1955; 324-335.
16. Jones, V.H. (The nature status of ethnobotany, *Chronischer Botulismus*, 1941; 6(10): 219-221.
17. K. Senthilkumar, V. Aravindhan, A. Rajendran. Journal of Natural Remedies. 2013; 13: 119-132.
18. Klayman, D.L. Qinghaosu (artemisinin): an antimalarial drug from China. Science. 1985; 228: 1049–1055.
19. Kokwaro, J.O. Ethnobotany in Africa. In: R.E. Schultes and S. von Reis. (eds.). Ethnobotany: Evolution of a Discipline. Chapman and Hall, London, UK 1995; 216–225.
20. Lewis, W.H. Pharmaceutical discoveries based on ethnomedicinal plants: 1985 to 2000 and beyond. Econ. Bot. 2003; 57: 126–134.
21. Mauro, A. The Wild and the Sown: Botany and Agriculture in Western Europe. Cambridge University Press, Cambridge, UK. 1997.
22. Mishra, R. *Ecology Work Book.*, Oxford and IBH, New Delhi. 1968.
23. Mukherjee, P.K. and A. Wahile. Integrated approaches towards drug development from Ayurveda and other Indian system of medicines. J. Ethnopharmacol. 2006; 103: 25–35.
24. Narayana, D.B.A., C.K. Katayar, and N.B. Brindavanam. Original system: search, research or re-search. Indian Drug Manufacturer's Association (IDMA) Bulletin 1998; 29: 413–416
25. Osbaldeston, T.A. Dioscorides. De materia medica. IBIDIS Press, Johannesburg, South Africa. 2000.
26. Pushpagandhan, P. *Ethnobiology in India. A status report*, Ministry of Enviroment and Forest, GOI, New Delhi. 1994.
27. Sanon, S., E. Ollivier, N. Azas, V. Mahiou, M. Gasquet, C.T. Ouattara, I. Nebie, A. S. Traore, F. Esposito, G. Balansard, P. Timon-David, and F. Fumoux. Ethnobotanical survey and in vitro antiplasmodial activity of plants used in traditional medicine in Burkina Faso. J. Ethnopharmacol. 2003; 86: 143–147.
28. Schultes, R.E. The role of the ethonbotany in the search for new medicinal Plants, *Lloydia*, 1962; 24: 257-265.
29. Schultes, R.E. The place of ethnobotany in the ethnopharmacologic search for psychoactive drugs. Efron, D.(ed.) Ethnopharmacologic search for psychoactive drugs Public Health Service Washington. 1967; 1645: 33-57.
30. Singh, A. A Short Note on Designing Curriculum for Medicinal Phytochemistry. Ethnobotanical Leaflets. 2007.
31. Thatte, U.M. and S.A. Dahanukar. Ayurveda and Contemporary Scientific Thought. Trends Pharmacol. Sci. 1986; 7: 247–251.
32. Turner, N.J. Ethnobotany today in northwestern North America. In: R.E. Schultes and S. von Reis. (eds.). 1995. Ethnobotany: Evolution of a Discipline. Chapman and Hall, London. 1995; 264–283.