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## Exploring perennial vegetative cover in the natural habitats of central Vindhya Plateau, Madhya Pradesh: A reconnaissance survey

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### Abstract

The Vindhya Plateau is one of the 11 agro-climatic zones in Madhya Pradesh, extending across districts such as Sehore, Bhopal, Raisen, Vidisha, Damoh, Sagar, and parts of Ashok Nagar. A project funded by the World Bank and run by PICU WRD of MP Govt Bhopal, coordinated by CAE, JNKVV Dept of Soil & Water Engineering Jabalpur conducted extensive reconnaissance surveys from 2012-2015 to assess the diversity of vegetative cover and soil conservation aspects taken into consideration in the natural habitat of this region. The surveys revealed that the Vindhya Plateau is home to 135 species of medicinal and aromatic plants and 17 species that aid in soil conservation and groundwater augmentation. These species vary in frequency and occurrence, and include sweet basil, parijat, mandukparni, brahmi, jyotishmati, safed musli, kali musli, palmarosa grass, jangli haldi, kali haldi, jangli piyaj, shankhapushpi, and Vishnukanta. Farmers in this agro-climatic zone also cultivate species like tulsi, asgandh, kalongi, chandrasur, and aloe. These vegetative cover species play a vital role in conserving natural resources such as soil, water and naturally help augmentation of groundwater recharge as well as offering easier solutions to various ailments. The fibrous roots of these grasses hold the soil particles together protecting soil cover against landslide and gully erosion hazards. The objectives in this paper is exploring the diverse vegetative cover of the Vindhya Plateau of Madhya Pradesh and its significance in soil & water conservation and biodiversity preservation.

**Keywords:** Vegetative cover, natural habitats, Vindhya Plateau

### Introduction

India accounts for 70% of total floral diversity in the world and is one of the 12 mega-diversity countries (Mcneely *et al.*, 1990) [3]. Western ghat and Eastern Himalayas of India are two of the 18 hot spots of the earth owing to rich phytodiversity and endemism (Myers, 1988) [4]. Approximately 17500 species of angiosperms are found in India (Chowdhery & Murti 2002) [1]. Human selection for high yielding cultivars and varieties through various breeding methods is the foremost event of last century leading to revolutionary increase in yield and productivity of agril./horticultural crops. Although, this event is highly beneficial to meet the food and other requirements of exponentially increasing human population in India but the degradation of rich diversity of species was also associated with it. There are many factors responsible for loss of genetic resource diversity of crops which are global climate change, species competitions, increased anthropogenic activities, destruction of natural habitats, etc. One of the major factors responsible for depleting genetic resources of crops is due to this unidirectional selection pressure without considering all aspects of variability present in the genetic resources.

Survey, collection, conservation, characterization and utilization of existing diversity of medicinal and aromatic crops are the major steps to strengthen genetic base of these crops. It is the basis of all crop improvement programmes. Due to unscientific exploitation medicinal plants from their natural habitat due to heavy pressure of exponentially increasing demand of herbal medicine in national and international markets. It resulted in serious degradation of their diversity during past decades species once found profusely are now becoming rare and will be on threat in future. The loss of variability in these crops will pose serious concern in future improvement program.

Vindhya Plateau (Covering Bhopal, Sehore, Raisen, Vidisha, Sagar Damoh and Ashoknagar districts) is a major agro-climatic zone of Madhya Pradesh and has rich diversity of medicinal flora in past but now with intervention of new technologies, old genetic resources are

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dwindling. However, in some remote areas are still having richness of these species. Some scattered informations on floristic diversity of M.P. is available (Roy *et al.*, 1920, Oommachan, 1977, Verma *et al.*, 1994, Samvatsar, 1996, Singh *et al.*, 2001, Wagh and Jain, 2013.) [6, 5, 9, 7, 8, 10]. However, There is practically no significant work is done in recent past to collect database of germplasm of medicinal plants in MP particularly in Vindhya Plateau zone and to conserve/characterize them in this zone. In spite, all the emphasis was given to exploit these non-timber produce without safeguarding the existing diversity of same. There is urgent need to survey, collect, and conserve medicinal plants of the area.

### Rich natural habitats of Medicinal Plants in Vindhya Plateau

There are many plant diversity rich pockets in the region, out of which followings are particularly rich in medicinal flora:

- Ratapani wild life sanctuary
- Rehti forest range
- Both bank of Betwa river
- Nasullahganj range
- Sironj forest

The objective of writing this research paper is to provide an overview of the extensive reconnaissance surveys conducted in the natural habitats of the Vindhya Plateau in Madhya Pradesh. Here aim is to highlight the importance of perennial vegetative cover in this region, specifically focusing on the diversity of species and their roles in soil conservation, groundwater augmentation, and cultivation herbs of medicinal and aromatic properties. The information presented in this study aims to create awareness about the valuable resources present in the Vindhya Plateau and their significance for sustainable agriculture, environmental conservation and potential economic opportunities for the local communities dwelt areas.

### Material and Method

The materials and methods used for the reconnaissance survey conducted in the Vindhya Plateau of Madhya Pradesh can be outlined as follows:

- **Funding:** The project was funded by the World Bank and administered by the PICU WRD (Project Implementation and Coordination Unit, Water Resources Department) of the Madhya Pradesh Government in Bhopal.
- **Coordination:** The survey was coordinated by the Department of Soil & Water Engineering at Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV) in Jabalpur, Madhya Pradesh.
- **Study Area:** The survey covered the natural habitats of the Central Vindhya Plateau, including districts such as Sehore, Bhopal, Raisen, Vidisha, Damoh, Sagar, and parts of Ashok Nagar.

- **Timeframe:** The reconnaissance surveys were conducted over a period of three years, from 2012 to 2015.
- **Survey Approach:** The survey employed a systematic approach to assess the diversity of vegetative cover and soil conservation practices in the region. It likely involved both field observations and data collection.
- **Species Identification:** Experts and researchers familiar with the local flora and vegetation were involved in identifying and cataloging the different species encountered during the survey.
- **Data Collection:** Data regarding the occurrence, frequency, and distribution of the identified plant species were collected systematically throughout the study area.
- **Analysis:** The collected data were likely analyzed to determine the diversity of species, their rarity, and their potential roles in soil conservation, groundwater augmentation, and medicinal properties.
- **Report Generation:** The findings of the reconnaissance survey were compiled inprehensive report, which likely included details on the identified species, their significance, and recommendations for conservation and sustainable agricultural practices.

### Occurrence of Medicinal plants

After many surveys conducted systemically under the research project, in biodiversity rich pockets (habitats) in all the seven district of Vindhya Plateau zone. Surveys resulted that many species of valuable medicinal and aromatic plants were found in this agro-climatic zone of Madhya Pradesh. Further, the status of medicinal flora was also noted in their natural habitat to know the clear picture of status of existence of these species. Following plants were found their natural occurrence in the region with their status of regeneration and risk/ threat of their existence (Table 1) below:

### Afforestation and pasture development

Ongoing soil conservation work of watershed on the continuous contour trench CCTs which are suitably weathered and refilled, trees, grasses and shrubs are planted. These are usually local species of biomass which could meet household needs of the fuel, fodder, timber, fruits and fibre. Where the soil depth is not sufficient, pastures are developed. The trees, shrubs and grasses not only add organic matter to the soil but also control soil erosion, stop land degradation any further. These vegetations canopy cushion the “hammer effect” of the falling rain, slow runoff and accelerate infiltration into deeper soil layers. Moreover with the assured nutritious fodder, livestock upgradation, especially milch cattle has been facilitated which often resulted in higher income and less biotic pressure on grazing grounds thus protected land capability classes *insitu* there. Appropriate land use pattern also should be introduced in future according to the capability of the land as well as the considering the basic need of the farmers.

**Table 1:** List of Wild Medicinal and Aromatic Plants of Vindhya Plateau

S. No.	Scientific Name and Family	Common Name	Medicinal Uses	Area of existence	Risk/ threat of their existence	Status of natural regeneration
<b>Herbs:</b>						
1	<i>Abrus precatorious</i> (Papilionaceae)	Ratti (red& black)	Contraceptive	Basoda, Silwani, Sagar	H D H E	Endangered
2	<i>Abrus precatorious</i> (Papilionaceae)	Ratti (white)	Contaceptive	Basoda, Silwani, Sagar	H D H E	Endangered
3	<i>Asparagus racimosus</i> (Liliaceae)	Satavar	Tonic, galactogouge	Raisen	H D H E	Rare
4	<i>Curcuma amada</i> (Zingiberaceae)	Ama Haldi	Blood purifier	Raisen	H D	E
5	<i>Gymnema sylvestre</i> (Asclepiadaceae)	Gurmar	Diabetes,	Raisen	H E	Rare
6	<i>Tinospora cordifolia</i> (Menispermaceae)	Giloe	Dibetes, Liver tonic	Basoda, Sironj	H D H E	Rare
7	<i>Caesalpinia crista</i> (Caesalpinaceae)	Gataran	Intermitant fever	Sironj	H D H E	Rare
8	<i>Caesalpinia digyna</i> (Caesalpinaceae)	Bakeri	Intermitant fever	Sironj, Lateri	H D H E	E
9	<i>Ocimum basilicum</i> (Lamiaceae)	Sweet basil/ Ban tulsi	Cough, cold, fever	Sehore, Nasirullhganj, Rehti, Silwani, Vidisha	H D H E	R
10	<i>Ocimum sanctum</i> (Lamiaceae)	Tulsi (Green and Black type)	Cough, cold, fever	Basoda	Cultivated	R
11	<i>Ocimum gratissimum</i> (Lamiaceae)	Ramtulsi	Cough, cold, fever	Raisen	H D H E	R
12	<i>Tylophora ashthamatica/T. indica</i> (Asclepiadaceae)	Antamool	Ashthma	Basoda, Sironj	H D	E
13	<i>Hemidesmus indicus</i> (L.) Schult. (Periplocaceae)	Anantamool	Blood purifier	Raisen	H D	E
14	<i>Hygrophilla indica</i> (Acanthaceae)	Talmakhana	Sex tonic, diseases of urinary tract	Basoda	HD	R
15	<i>Eclipta indica</i> (Asteraceae)	Bhringaraj	Liver and Hair tonic	Basoda	S H	Abundnt
16	<i>Tridax procumbense</i> (Asteraceae)	Bhangra	Wound healer	Basoda	S H	Abundant
17	<i>Phyllanthus amarus</i> (Euphorbiaceae)	Bhui amla	Jaundice, dibetes	Basoda	S H	A
18	<i>Chlorophytum borivilianum</i> (Liliaceae)	Safed musli	General and Sex Tonic	Silwani	HD,HE	Rare
19	<i>Chlorophytum tuberosum</i> (Liliaceae)	Safed musli	General and Sex Tonic	Silwanii	HD,HE	Rare
20	<i>Datura stramonium</i> (Malvaceae)		Asthma, Scopolamine as pre-anaesthetic in surgery	Basoda	HE	Sufficient
21	<i>Solanum xanthocarpum</i> (Solanaceae)	Bhatkateri	Cough, asthma,	Basoda	HE	S
22	<i>Solanum nigrum</i> (Solanaceae)	Makoi	Liver cirrhosis	Basoda	SH	R
23	<i>Momordica dioca</i> (Cucurbitaceae)	Kakora/ Parora	Anti-diabetic	Basoda	HD HE	EN
24	<i>Momordica charantia</i> (Cucurbitaceae)	Wild Karela/ Kareli	Anti-diabetic	Basoda	HD HE	EN
25	<i>Coccinia indica</i> (Cucurbitaceae)	Kundaru (Mitha)	Anti-diabetic	Basoda	HD HE	EN
26	<i>Coccinia indica</i> (Cucurbitaceae)	Kundaru (katua)	Anti-diabetic	Basoda	HD HE	EN
27	<i>Luffa cylindrica</i> (Cucurbitaceae)	Bitter gilki	Anti-diabetic	Basoda	HD HE	EN
28	<i>Lycopersicum esculentum</i> (Solanaceae)	Tamater (small fruits)	Rich source of Vit-C	Basoda	S P	EN
29	<i>Cissus quadrangularis</i> (Vitaceae)	Hadjora	Fractured bones	Sironj	HD HE	En
30	<i>Withania somnifera</i> (Solanaceae)	Asgandh	Hyper-tension	Basoda	HE	En
31	<i>Cymbopogon martini</i> (Poaceae)	Palmarosha grass	Lumbago and skin diseases	Basoda, Budhni	HD	R
32	<i>Leucas lavandulaefolia</i> Rees. (Lamiaceae)	Guma	Loss of appetite	Raisen	-	S
33	<i>Leucas aspera</i> (Lamiaceae)	Chhota Halkusa	Cough and cold	Basoda	-	S
34	<i>Evolvulus alsinoides</i> (Convolvulaceae)	Blue morning glory/Vishnukanta/ Shankhapushpi	Brain-tonic	Sehore	HE	R
35	<i>Convolvulus virgatus</i> (Convolvulaceae)	White flowered Shankhapushpi	Brain-tonic	Basoda	HE	R
36	<i>Anagalis arvensis</i>	Krishnanil	Liver tonic	Basoda	SP	S
37	<i>Tribulus terrestris</i> L. (Zygophyllaceae)	Gokhuru	Urinary caculi	Raisen	HD	R
38	<i>Aloe vera</i> (Liliaceae)	Gwarpatha	Burn, liver problems	Basoda	HD HE	R

39	<i>Achyranthus aspera</i> (Acanthaceae)	Adhasishi	Migraine	Basoda	-	S
40	<i>Adhatoda vasica</i> (Acanthaceae)	Vasaka	Asthma, cough	Basoda	HD	R
41	<i>Solanum nigrum</i> (Solanaceae)	Kakmachi	Liver tonic	Basoda	SP	S
42	<i>Cuscuta reflexa</i>	Dodder	Skin diseases	Raisen	-	R
43	<i>Clitorea ternatea</i> (Papilionaceae)	Aparajita (Blue flowered)	Seed purgative, root-diuretic	Sironj	HD	R
44	<i>Clitorea ternatea</i> (Papilionaceae)	Aparajita (white flowered)	Seed purgative, root-diuretic	Sironj	HD	R
45	<i>Sphaeranthus indicus</i> (Asteraceae)	Gorakhmundi	Liver and gastric disorder	Raisen	-	R
46	<i>Trianthema monogyna</i> (Aizoaceae)	Vishkhapra/Sanathi/Lalsabuni	Urinary infection	Basoda	SH	S
47	<i>Boerhaavia diffusa</i> L. (Nyctaginaceae)	Horse-parslane/Hogweed/Punarnava/Sant/Sanathi	Urinary infection	Basoda	HE	En
48	<i>Ricinus communis</i> (Euphorbiaceae)	Caster/Arandi	Contipation	Basoda	HD	S
49	<i>Costus speciosus</i> (Costaceae)	Keokand	Steroidal hormones	Raisen	HE	R
50	<i>Catharanthus roseus</i> (Apocynaceae)	Sadasuhagan	Diabetes, cancer	Basoda	-	S
51	<i>Enicostema littorale</i> (Gentianaceae)	Indian gentian, Chota-chirayata	Malarial fever, tonic and luxative	Basoda	HD	R
52	<i>Cyperus rotundus</i> (Cyperaceae)	Motha/ Nagarmotha	Hair-tonic	Basoda	SP	S
53	<i>Psoralea coryllifolia</i> (Papilionaceae)	Babchi	Leucoderma	Raisen	HD	R
54	<i>Urginia indica</i> (Roxb.) Kunth./ <i>Scilla indica</i> Roxb. (Liliaceae)	Eng-White squill, Indian drug Squill, Sea Onion Hindi- Ban Piyaji, Jangli Pyaj, Sufaid Khus	Cancer, bronchitis, cardio-tonic	Basoda	HD HE	En
55	<i>Sida acuta</i> (Malvaceae)	Bariara/Kharenta	Rheumatic joint pain	Basoda	HD	R
56	<i>Sida cordifolia</i> (Malvaceae)	Country mallow/Kugyi	Rheumatic joint pain	Basoda	HD	R
57	<i>Sida rhombifolia</i> (Malvaceae)	Sehdevi/Sweta-barela	Rheumatic joint pain	Basoda	HD	R
58	<i>Lepidium sativum</i> (Cruciferae)	Asaliya/ Chandrasur	Rheumatic joint pain	Basoda	Cultivated	S
59	<i>Cassia tora</i> (Caesalpinaceae)	Chakoda	Skin diseases	Basoda	Replaced by <i>Parthiniu</i>	S
60	<i>Citrullus colocynthis</i> (L.) Syn: <i>Cucumis colocynthis</i> L./ <i>Colocynthis vulgaris</i> Schrad. (Cucurbitaceae)	Eng- Colocynthis, Bitter apple Hindi- Indrayan	Bitter fruits as purgative, roots-jaundice	Basoda	HD,SH	R
61	<i>Cissampelos pareira</i> L. (Menispermaceae)	Eng-False Pareira root Hindi-Aknadi/Patal ki Bel/Harjori	Roots-in diarrhea, dysentery, cough, urinary troubles	Raisen	HE	En
62	<i>Agave sisalana</i> (Agavaceae)	Sisal	Manufacturing of cortisone and sex hormones	Kurwai	-	-
63	<i>Cleome viscosa</i> (Cruciferae)	Hurhur	carminative	Kurwai	SH	S
64	<i>Abelmoschos manihot</i> (Malvaceae)	Jangli Bhindi	carminative	Raisen	SH	S
65	<i>Amorphophallus companulatus</i> (Araceae)	Van Suran	Acute rheumatism	Basoda	HD	R
66	<i>Curculigo orchioides</i> Gaertn. (Hypoxidaceae)	Kali musli	Tonic	Silwani	HE	R
67	<i>Tephrosia purpurea</i> (Papilionaceae)	Sarhunkha/ Ban -nil	Asthma and cough	Vidisha	HD	R
68	<i>Hyptis suaveolens</i> (L.) Poit. (Labiatae)	Vilayati Tulsi	Appetizer and stomachic	vidisha	-	S
69	<i>Gloriosa superb</i> (Liliaceae)	Kalihari	anthelmintic	Kurwai	HD HE	En
70	<i>Mucuna prurita</i> (Papilionaceae)	Kewanch (Black seeded)	Seed as nervine tonic	Vidisha	HD HE	R
71	<i>Mucuna prurita</i> (Papilionaceae)	Kewanch (white seeded)	Seed as nervine tonic	Vidisha	HD HE	R
72	<i>Mucuna prurita</i> (Papilionaceae)	Kewanch (Jangli)	Seed as nervine tonic	Vidisha	HD HE	En
73	<i>Curcuma angustifolia</i> (Zingiberaceae)	Tikhur	carminative	Raisen	HD HE	R
74	<i>Marremia emarginated</i> (Convolvulaceae)	Musakarni	Diuretic used in rheumatism	Basoda	-	R
75	<i>Cocculus hirsutus</i> (Menispermaceae)	Jaljamni/Patalgarudi	Roots in chronic rheumatism and venereal diseases	Basoda	HD	R
76	<i>Blumia lacera</i> DC (Asteraceae)	Kukrondha	Anthelmintic, diuretic, stimulant, febrifuge	Basoda	SH	S
77	<i>Vetiveria zizanioides</i> (Poaceae)	Khus grass	Oil is stimulant, refrigerant	Basoda	-	R
78	<i>Argemone mexicana</i> L. (Papaveraceae)	Swarnakshiri/satyanashi	Skin diseases	Basoda	-	S
<b>Shrubs:</b>						
79	<i>Abutilon indicum</i> (Malvaceae)	Kanghi	Demulcent, luxative	Basoda	HD	R



80	<i>Abutilon hirsutus</i> (Malvaceae)	Kanghi	Demulcent, laxative	Basoda	HD	R
81	<i>Carissa carandas</i> L. (Apocynaceae)	Jangli karonda	Diarrhoea	Basoda	HD HE	R
82	<i>Hibiscus rosa-sinensis</i> (Malvaceae)	Gurhal	Contraceptive	Basoda	-	A
83	<i>Lawsonia inermis</i> L. (Lythraceae)	Henna/ Mehdi	Boils, burns, skin inflammation	Basoda	-	A
84	<i>Premna obtusifolia</i> (Verbenaceae)	Arni	Root as one of Dashmula	Sironj	HD	R
85	<i>Helicteres isora</i> L. (Sterculiaceae)	Marorphali	Diarrhoea and dysentery	Sironj	HD HE	En
86	<i>Woodfordia fruticosa</i> (Lythraceae)	Dhai/Dhatki	Substitute of Gum-Tragacanth	Raisen	HE	R
87	<i>Calotropis procera</i> (Asclepiadaceae)	Safed Madar	Root bark in dysentery, asthma	Basoda	HD	R
88	<i>Calotropis gigantea</i> (Asclepiadaceae)	Raktark/ madar	Root bark in dysentery, asthma	Basoda	HD	R
89	<i>Vitex negundo</i> (Verbenaceae)	Nirgundi/Samhalu/Chinise chaste tree	Rheumatic swelling joints	Sironj	HE	R
90	<i>Vitex trifolia</i> L. (Verbenaceae)	Nirgundi/Samhalu/Chinise chaste tree	Rheumatic swelling joints	Sironj	HE	R
<b>Woody Climbers:</b>						
91	<i>Acacia concina</i> (Mimosaceae)	Shikakai	Hair tonic	Sironj	HE	R
92	<i>Butea frondosa</i>	Mahul	Heat eruption in children	Raisen	HE	S
93	<i>Celastrus paniculatus</i> (Celastraceae)	Malkagni	Beri-beri disease, gout, rheumatism	Sagar	HE, HD	En
94	<i>Argyrea speciosa</i> Sweet. (Convolvulaceae)	Vidhara/ Samudra shosh	Tonic, alterative, rheumatism	Sagar	HE HD	R
<b>Trees:</b>						
95	<i>Santalum album</i> (Santalaceae)	Safed Chandan	Cooling, diuretic, expectorant	Sironj	HE	R
96	<i>Cassia fistula</i> (Caesalpiniaceae)	Amaltas	Purgative	Basoda	-	S
97	<i>Azadirachta indica</i> (Meliaceae)	Neem	Skin diseases	Basoda	-	S
98	<i>Melia azadirach</i> (Meliaceae)	Bakain	Skin diseases	Basoda	-	R
99	<i>Ailanthus exelsa</i> (Simaroubaceae)	Arlu/Mahanim/ Ghoranim/Ghorakaran j/Maharukh	Obesity	Basoda	-	R
100	<i>Holoptelea integrifolia</i> Planch. (Ulmaceae)	Chilbil	Obesity	Basoda	-	R
101	<i>Butea monosperma</i> (Papilionaceae)	Palash	Against round worms	Basoda	-	R
102	<i>Polyalthia longifolia</i> (Annonaceae)	Ashok	Fever	Basoda	-	R
103	<i>Terminalia arjuna</i> (Combretaceae)	Arjun	Cardiac tonic	Basoda	HE	R
104	<i>Jatropha curcas</i> (Euphorbiaceae)	Ratanjot	Purgative	Basoda	-	R
105	<i>Emblica officinalis</i> (Euphorbiaceae)	Aonla	Hair tonic,	Basoda	HE	R
106	<i>Terminalia chebula</i> (Combretaceae)	Harra	Gastric problems	Basoda	HE	R
107	<i>T.bellerica</i> (Combretaceae)	Baheda	Cough	Basoda	HE	R
108	<i>Putranjeeva roxburghii</i> (Euphorbiaceae)	Putrajivak	Pre-mature abortion	Basoda	-	R
109	<i>Commiphora wightii</i> (Bursaceae)	Guggal	Rheumatic pain	Basoda	HE	En
110	<i>Sapindus pinnatus</i> (Sapindaceae)	Reetha	Hair shampoo	Basoda	-	R
111	<i>Bombax ceiba</i> (Bombacaceae)	Semal	Tonic	Basoda	-	R
112	<i>Madhuca indica</i> (Sapotaceae)	Mahua	Rheumatic pain	Basoda	-	R
113	<i>Mangifera indica</i> (Anacardiaceae)	Aam	Rheumatic pain	Basoda	-	R
114	<i>Syzygium cumuni</i> (Myrtaceae)	Jamun	Diabetes	Basoda	-	R
115	<i>Aegle marmelos</i> (Rutaceae)	Bel	Diabetes, diarrhoea, dysentery	Basoda	-	R
116	<i>Nerium indicum</i> (Apocynaceae)	Lal kaner	Against ring-worms	Basoda	-	R
117	<i>Nerium indicum</i> (Apocynaceae)	Safed kaner	Against ring-worms	Basoda	-	R
118	<i>Thevetia peruviana</i> (Asclepiadaceae)	Pili Kaner	Heart-diseases	Basoda	-	R
119	<i>Nyctanthus arbor-tristis</i> L. (Nyctanthaceae)	Harsingar	Sciatic nerve pain	Basoda	-	R
120	<i>Murraya coenigii</i> (Rutaceae)	Meethi Nim	Diabetes	Basoda	-	R
121	<i>Pterospermum acerifolium</i> (Papilionaceae)	Kanak Champa	Small-pox eruptions	Basoda	-	R
122	<i>Oroxylum indicum</i> (Bignoniaceae)	Sheonak/ Sonapatha	Liver tonic	Basoda	HD, HE	En
123	<i>Limonia acidissima</i> (Rutaceae)	Kaitha/ kavitha	Gum as substitute of gum-arabica	Basoda	-	R
124	<i>Sterculia urens</i> (Sterculiaceae)	Kullu/ Katira Gum	Gum	Basoda	-	R
125	<i>Acacia nilotica</i> (Mimosaceae)	Babool	Urino-genital troubles	Basoda	-	R
126	<i>Acacia catechu</i> (Mimosaceae)	Khair	Urino-genital troubles	Basoda	HE	R
127	<i>Acacia leucopholia</i> (Mimosaceae)	Rimjha	Urino-genital troubles	Basoda	-	R
128	<i>Bauhinia variegata</i> (Caesalpiniaceae)	Kachnar	Mentruel problems	Basoda	-	R
129	<i>Dalbergia sissoo</i> (Papilionaceae)	Shisham		Basoda	-	R

130	<i>Tamarindus indica</i> (Caesalpinaceae)	Imali	Fruit pulp as refrigerant, carminative and laxative	Basoda	-	R
131	<i>Moringa oleifera</i> (Moringaceae)	Munga/Sahijana	Rheumatism	Basoda	-	R
132	<i>Euphorbia nerifolia</i> (Euphorbiaceae)	Sehund	Milky juice as purgative	Basoda	-	R
133	<i>Manilkara hexandra</i> (Sapotaceae)	Khirmi	Bleeding gums	Basoda	-	R
134	<i>Anogeissus latifolia</i> (Combretaceae)	Dhaura	Medicinal gum	Basoda	-	R
135	<i>Albizia lebbbeck</i> (Mimosaceae)	Kala Sirish	Against obesity	Basoda	-	R

### Mechanism of Soil erosion control by Vegetative Measures

Where crop cultivation is incapable to check the erosion mostly practiced over high sloppy loose binded alluvial soil mostly found near to river bank or nalas. Vegetative afforestation practiced, not only checked the soil erosion it stopped the gully advancement, checked the gully erosion, stabilized it and allow conserved the soil and augmentation of ground water for dryland as well as rainfed farming agro ecosystem. Fibrous roots of grasses hold the soil particles aggregates against the severity of gully and landslide erosion hazards. The side slopes of the gully streams channels can be protected by vegetation afforestation, grass cover or legumes on bunds. Beating power or kinetic energy of falling rain drops dissipated and amount of rainfall is intercepted over the

vegetative canopy cover and rain water infiltration, percolation enhanced *insitu* field conditions. Characteristics of good grass cover have always been serve the purpose of fodder if vegetative propagation allowed more that fought against drought/ waterlogging and thus good vegetative cover over the surface intercept precipitation effectively. Study indicted the following variety of trees/ shrubs provide shelter belt and allowed surface water flow (runoff rate) at non-erosive velocity. Even these vegetation variety of trees can survive under water scarcity condition provide more root depth, fibrous root canopy, more vegetative propagation, frost drought resistant and insect pest resistant found in the study area.

**Table 2:** List of trees/ shrubs found useful for soil water conservation and groundwater augmentation

S. No.	Trees/shrubs local name	Botanical name
1.	Anjan grass	<i>Cenchrus ciliaris</i>
2.	Sudan grass	<i>Sorghum vulgare Sudanesis</i>
3.	Napier grass	<i>Panicum polyastachayi</i>
4.	Doob grass	<i>Cynodon dactylon</i>
5.	Lemon grass	<i>C. pendulous</i>
6.	Babool	<i>Acacia arabica</i>
7.	Neem	<i>Azadirachta indica</i>
8.	Shisham	<i>Dalbergia sissoo</i>
9.	Jamun	<i>Eugenia jambolana</i>
10.	Eucalyptus species	<i>Eucalyptus</i>
11.	Mango	<i>Mangifera indica</i>
12.	Karanj (ratanjot)	<i>Pongamia pinnata</i>
13.	Aomla	<i>Phyllanthus emblica</i>
14.	Gulmohor	<i>Phynux resia</i>
15.	Imali	<i>Tamarindus indica</i>
16.	Ber	<i>Zizyphus zuzuba</i>
17.	Bamboo	<i>Dendrocalamus Strictus</i>

### Abbreviation

S-Sufficient, R-Rare, En-Endangered, HD-Habitat Destruction, HE-Heavy Exploitation,

SP- Selection Pressure, SH- Selective Herbicide

Further, during these surveys, cultivated medicinal plant were also noted in different part of the zone. They were as follows:-

1. Sweet basil (*Ocimum basilicum*, Lamiaceae): more than 4 strains of this crop is commercially cultivated by few farmers of the region in kharif season. It can suitably be cultivated in Vindhya Plateau.
2. Sacred basil (*Ocimum sanctum*, Lamiaceae): It is cultivated by few farmers and grown by almost all farmers for sacred reason and for medicinal purposes in kharif season.
3. Chandrasur (*Lepidium sativum*, Brassicaceae): It is a potential crop of region due to low cost of cultivation, low water requirement, but fetch more price than other crops. It is commercially cultivated in rabi season by some farmers.
4. Kalonji (*Nigella sativa*, Ranunculaceae): Due to suitability and higher sale price, this crop is also

commercially cultivated by some progressive farmers of the region during rabi season.

5. Arand (*Ricinus communis*, Euphorbiaceae): It may proved to be the potential crop for crop diversification in region in kharif in low rainfall and rainfed crop.
6. Ramtil (*Guizotia abyssinica*, Compositae): it is one the best option for crop diversification in kharif particularly in Rainfed areas of Damoh.
7. 7.Til [*Sesamum indicum* (Pedaliaceae)]: It is grown by many farmers of Damoh as early maturing rainfed kharif crop and fetch best price out of other kharif crops
8. Alsi (*Linum usitatissimum*, Linaceae): Due better price and low water requirement is again going popular alternative in rabi season on residual moisture.
9. Ashwagandha (*Withania somnifera*, Solanaceae): Due to increasing demand in international market with better prices, it also popularizing as an alternatives to rainfed late kharif crops.

### Conclusion

In conclusion, the extensive reconnaissance surveys

conducted in the natural habitats of the Vindhya Plateau, Madhya Pradesh study revealed a rich diversity of 135 important species of medicinal plants and 17 species dedicated to soil conservation and groundwater augmentation & recharge the potential zones of aquifers. However, many of these species are rare in their occurrences of natural habitat and face the threat of heavy exploitation. It is imperative to conserve these species to ensure their existence, as well as to promote soil conservation, groundwater augmentation, and sustainable agriculture, which are vital for the prosperity of our nation.

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