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ETHNOBOTANICAL STUDY OF MEDICINAL FLORA IN BALODABAZAR-BHATAPARA DISTRICT OF CHHATTISGARH

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ABSTRACT

The present ethnobotanical study was to record and describe the local and tribal medicinal plant knowledge of local and tribal community of the Balodabazar-Bhatapara district, Chhattisgarh, India. The focus of the study was to name and document the medicinal flora, their use in treatment, parts of the plants used, mode of preparation and mode of administration. The 20 villages were sampled using structured questionnaires and 55 informants (such as traditional healers, farmers, and the elderly residents) were interviewed to gather ethnobotanical data. The total number of medicinal plant species identified was 73 species of 67 genera and 37 families with Fabaceae, Euphorbiaceae and Lamiaceae being the most predominant families. Most of the species recorded were trees (46.58%), then herbs (27.40%), climbers (15.07%) and shrubs (10.96%). The most commonly used parts of the plants were the bark (19.23%), leaves (17.95) and roots (16.67). The major ways of preparation were decoctions (28.77%) and pastes (23.29%) and the most common administration routes were oral (42.47%) and topical (26.03%). Conservation evaluation showed that 60.27 percent of the species were defined as Not Evaluated (NE), and ecological and conservation research is in dire need. The results highlight the abundance of ethnomedicine and biodiversity of the area, which signifies a strong culture that depends on plants as medicine. Nevertheless, the threat to this traditional knowledge and biodiversity is produced by the growing levels of modernization and unsustainable harvesting actions. The paper identifies the necessity of community-based conservation practices, planting of medicinal species that are in demand and scientific validation of the traditionally used plants. The ethnobotanical data recorded makes a valid basis towards further pharmacological/phytochemical studies in the future to find new bioactive substances and enhance sustainable use of local medicinal plants.

INTRODUCTION

Plants that contain medicinal properties have been a commonly acknowledged constituent of human health systems especially in rural and tribal societies when access to modern medicine is usually a problem. The science of ethnobotany is an overview of how humans relate to plants since it provides a path between the older knowledge and the newer science (Radha et al. 2025). Plant-

based medicines are a primary source of healthcare needs to the population of developing countries worldwide (almost 80%), as suggested by the World Health Organization (Waghule, 2025). Traditional plant use documentation does not only safeguard precious indigenous knowledge but also forms a basis of pharmacological and phytochemical research that could result in the creation of new therapeutic agents El Alaa et al. 2025).

It is well known that India has a high level of biological and cultural diversity, resulting in the abundance of traditional knowledge regarding the medicinal use of plants (Singh et al. 2025). More than 7,500 medicinal vegetative species are present in the Indian subcontinent, where tribal and non-urban inhabitants retain a high level of reliance on the native plants to cure minor infections as well as chronic illnesses (Panda et al., 2020; Singh and Jain, 2022). Ethnomedicinal diversity is especially abundant in the state of Chhattisgarh commonly known as the Herbal State of India. Its rich forestation and tribal populations of Gond, Baiga and Kanwar have a rich traditional knowledge about medicinal plants, which has been passed down orally over the generations (Shukla et al., 2021; Ahirwar et al. 2024; Bisen et al. 2025).

Balodabazar-Bhatapara district is a region in the central part of Chhattisgarh and is an ecologically diverse and culturally rich region. Though the area has potential in terms of ethnobotany, the area is comparatively under-explored in comparison with other parts of the state (https://balodabazar.gov.in). The laws in the area primarily rely on forest materials as a source of traditional medicine to treat simple illnesses like wounds, fever, stomach disorders and skin diseases by the local people especially the tribal and rural healers. But most of this traditional knowledge is either threatened to disappear by the process of modernization, deforestation and waning interest by the younger generations. Although the ethnobotanical studies were performed in the neighboring districts, there is little systematic literature on the Balodabazar-Bhatapara medicinal flora, which indicates a gap in the literature (Chandrakar et al. 2024; Naik et al. 2024).

The need to document and analyze the indigenous knowledge of medicinal plants in this area is therefore important in a number of reasons. These studies do not only help to preserve the traditional knowledge systems and cultural heritage but also assist in the discovery of plant species with pharmacological potential in the future development of medicines (Ishtiaq et al. 2024). In addition, they encourage the use of local biodiversity in a sustainable manner which is crucial to the ecology and the lives of the communities. Ethnobotanical surveys in this respect serve as the

basis of integrative research combining ethnomedicine and phytochemistry with pharmacology (Thakur and Puri, 2025).

Therefore, the objective of the current research is to report and describe the ethnomedicinal knowledge of both the local communities and tribal groups that are settled in the Balodabazar-Bhatapara district of the state of Chhattisgarh. The study aims at documenting the species of medicinal plants in traditional healthcare, vernacular names, parts of the plants which are used, preparation methods, and the uses of the plant in medicine. The study also aims at identifying species that are of good ethnomedicinal value which could be used as a starting point in future pharmacological research and conservation efforts.

MATERIALS AND METHODS

STUDY AREA

The present ethnobotanical survey was done in 20 villages of Baloda Bazar-Bhatapara district of the Chhattisgarh state. The figure 1 shows the geographical features of the chosen villages. The district is located in the eastern region of the state and has an area of about 3638.70 square kilometers and its climate is subtropical. Chhattisgarh Basin is the main source of its landform which has geomorphological structural hills and valleys that are formed due to dissected pediplain. Large rivers like the Mahanadi, Shivnath and Jonk is important in meeting the irrigation needs of the area.

DATA COLLECTION AND AUTHENTICATION

The present ethnobotanical study of plant species performed by this study was limited to ethnobotanical research. The systematic questionnaire was made up taking into consideration certain questions which touched the conventional use of plants as therapeutic agents (Jain, 1965; 1986; 1991). The ethnobotanical survey took place in 20 randomly chosen villages that were located in the study area. The prepared questionnaire was used to conduct the interviews on 55 informants representing different occupations. The formal and informal interviews were conducted so as to get all the data collected on various age groups with a specific focus on the elderly men and women who have a vast knowledge about the traditional way.

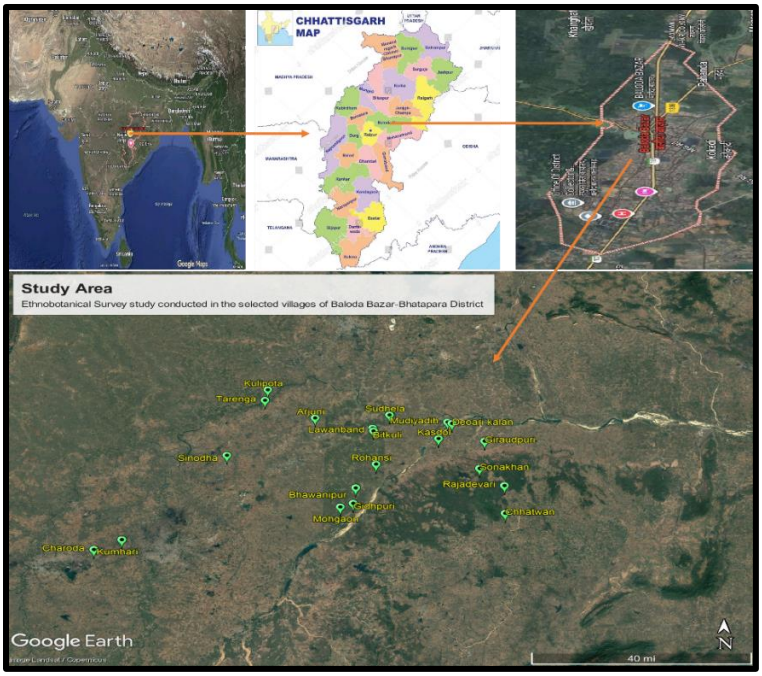

Figure 1 Geographical mapping of the survey locations of the Balodabazar-Bhatapara district of Chhattisgarh state.

Plant collection and identification were done according to the standard ethnobotanical procedures and literature (Subramanyam, 1974; Jain and Rao, 1977; Jain and Mudgal, 1999; Pal and Jain, 1999). The majority of plant specimens were identified at the field, whereas the other species were identified later, using the regional floras (Verma et al., 1985). All the data recorded were put in a systematic tabular format, and the data recorded were the local name, botanical name, family, habit, part of the plant used, mode of preparation and ethnomedicinal use.

DEMOGRAPHIC DATA

A total of 238 informants, most of them men (76.05%), and women (23.95%), took part. The respondents were aged between 20-80 years, the largest proportion of them was 51-60 years (26.89%), 31-40 years (24.37%), and 41-50 years (24.37%). Lower frequencies were found in 61-70 (14.71%), 71-80 (7.14%), and 20-30 (2.52%) ages. In terms of educational background, the highest percentage of the respondents was uneducated (30.25%), then primary education (29.41%), graduate education (16.81%), intermediate level (10.08%), matric level (9.66%) and postgraduate education (3.78%). Occupation wise, informants were mostly farmers (28.57%), traditional healers (21.85%), homemakers (15.97%), and Vaidyas (7.56%). Other occupational groups included of Baigas (6.30%), plant gatherers (5.46%), hunters (5.46%), Ayurvedic doctors (3.36%),

salespersons (3.36%), and dealers (2.10%). All in all, the demographic analysis shows that most of the informants were middle-aged or older people that had a limited level of formal education and whose jobs were mainly traditional and agricultural.

Table 1 Demographic information of sampled villages in the Balodabazar-Bhatapara district of Chhattisgarh state.

Parameters	Classes	Number of Informants	Percentage
Gender ratio	Men	181	76.05
	Women	57	23.95
Age	20-30	6	2.52
	31-40	58	24.37
	41-50	58	24.37
	51-60	64	26.89
	61-70	35	14.71
	71-80	17	7.14
Educational background	Uneducated	72	30.25
	Primary	70	29.41
	Matric	23	9.66
	Intermediate	24	10.08
	Graduate	40	16.81
	Post graduate	9	3.78
Profession	Ayurvedic doctor	8	3.36
	Baiga	15	6.30
	Dealer	5	2.10
	Farmer	68	28.57
	Homemaker	38	15.97
	Hunter	13	5.46
	Plant Gatherers	13	5.46
	Salesperson	8	3.36
	Traditional healer	52	21.85
	Vaidya	18	7.56
	Total	238	

CONSERVATION STATUS

The conservation status of every plant species was documented on the basis of the occurrence of the same in the study area, according to the criterion set by the International Union of Conservation

of Nature (IUCN). Table 2 shows the classification of the reported species according to IUCN Red Data Book (2001).

STATISTICAL ANALYSIS

The obtained ethnobotanical data were compiled and analyzed in order to measure the diversity, distribution, and relative value of the identified plant species and their traditional applications. The data collected with the help of informants was also tabulated and analyzed with the help of the quantitative and descriptive statistics. Demographic variables like gender, age, education level, and occupation of the informants have been summarized with descriptive statistics like the frequency, percentages and proportion in the sample of informants. Data were analyzed using Microsoft Excel 2016 and Sigma Plot 12.0 version using to obtain graphical representations.

RESULTS

TAXONOMY AND GROWTH FORMS OF MEDICINAL PLANTS

A total of 73 plant species commonly used by the local people and traditional medicine practitioners in the treatment of various ailments was recorded in the study. The ethnobotanical records consist of 37 families, 67 genera and 73 species. All the species except *Lygodium flexuosum* are angiosperms (flowering plants). Table 2 presents the detailed list of the species, their botanical names, local names, their families, growth forms, parts of plants that are useful, and the route of using them.

In terms of dominance of families in terms of number of species, the most dominant families were Fabaceae (10 species), Euphorbiaceae (5 species), and Lamiaceae (4 species). There were three species of families Acanthaceae, Combretaceae, Moraceae, Phyllanthaceae, Piperaceae, Rutaceae and Solanaceae. Similarly, Apocynaceae, Boraginaceae, Meliaceae, Menispermaceae, and Rubiaceae were also represented by 2 species each. The other 21 families were characterized by one species. Table 2 and figure 2 gives comprehensive data.

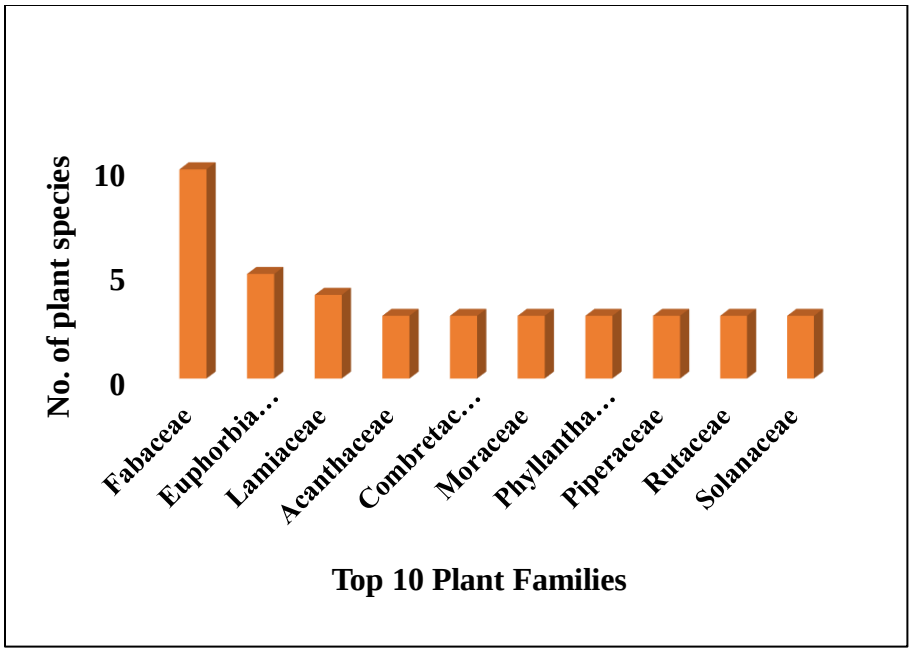

Figure 2 Top 10 plant families reported with the highest No. of plant species.

The ethnomedicinal flora recorded was very diverse in terms of growth habit (Figure 3). The highest percentage of the total flora was recorded among the trees, which registered 46.58%. This was succeeded by herbs (27.40%), which were usually used because they have great aerial and underground portions that are easily accessible. The highest proportion of species was 15.07% climbers, with shrubs as the lowest with the percentage of 10.96% (Table 2). The trees and herbs are mostly predominant, meaning they played an important role in the traditional medicinal practices, probably because of their abundance, accessibility and because of the large variety of therapeutic properties they have been attributed with.

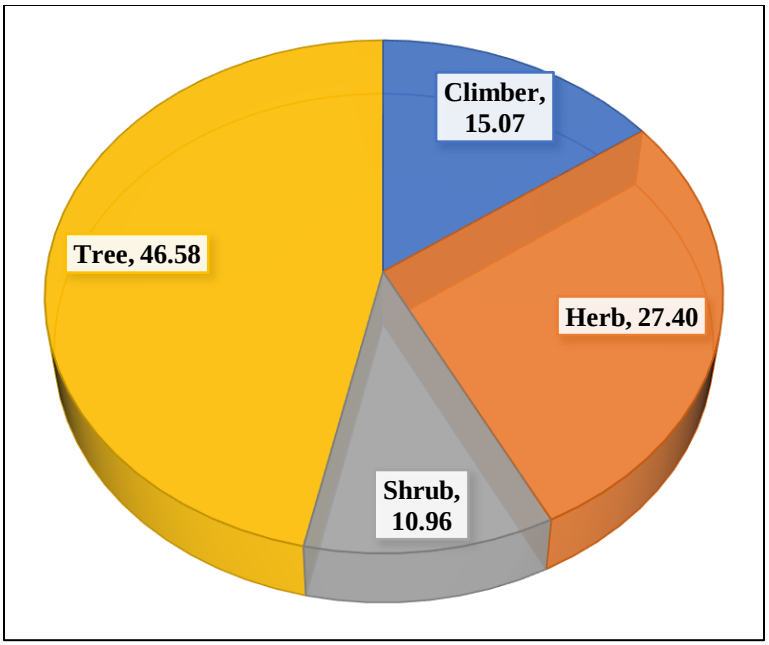

Figure 3 Plant Habit percentage of reported medicinal plants by the local people of Balodabazar-Bhatapara District Chhattisgarh.

PLANT PART UTILIZATION

Ethnobotanical survey showed that different parts of the plants are used as medicine, which evidences the richness of knowledge of the locals. The most regularly used part was the bark, with 19.23 percent of the usage. Leaves and roots followed closely at 17.95 and 16.67 percent respectively, showing that they would be an important part of the traditional remedies. Fruits were also commonly used and formed 12.82 percent of the parts of the plants utilized. Whole plant (6.41%), seeds (5.13%), and tubers (5.13%), etc., had a smaller yet significant proportion. Other minor components were rhizomes and stem (each 3.85%), flowers and latex (each 2.56%), and spines (1.28%). This variety of parts used illustrates how widely and diversified the use of botanical resources in local medicinal practice can be.

FORMULATION OF REMEDIES

The ethnomedicinal preparations that were reported in the current study have indicated various approaches that thus were adopted by the traditional healer in the formulation of remedies. The most commonly prepared form was decoction which contributed 28.77% of the total remedies. This was succeeded by paste formulations (23.29%), which were primarily applied topically, to treat skin wounds and skin infections. Juice preparations made up 19.18 which were usually used orally to treat internal conditions. Oil-based remedies constituted 15.07% and are frequently used

either in the form of a massage or external application where there is inflammation and pain. The most uncommon were powder formulations (13.70%), mostly treated orally. These results suggest that liquid and semi-solid preparations are more preferred due to the ease of preparation, quick-absorbing properties and practicality of the preparation in traditional therapeutic practice.

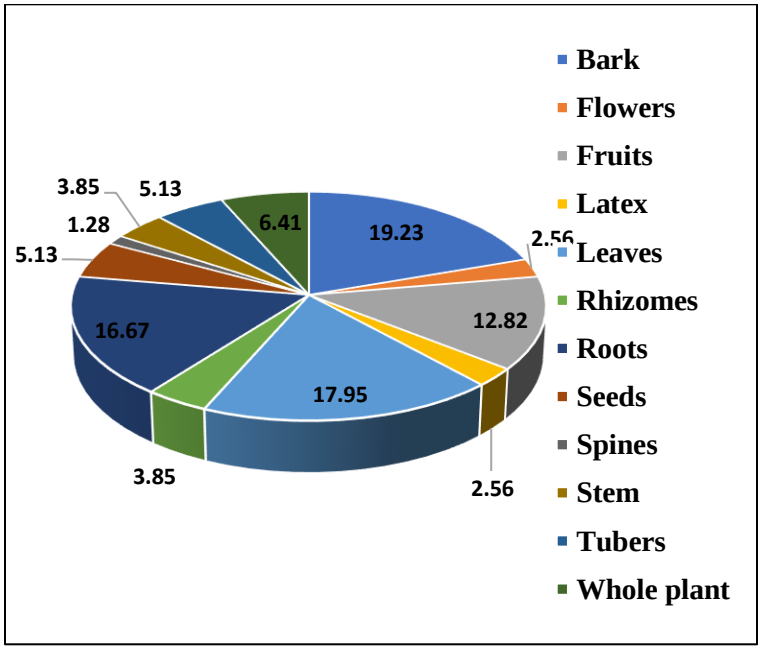

Figure 4 Plant part utilization percentage of medicinal plants by the local people of Balodabazar-Bhatapara District Chhattisgarh.

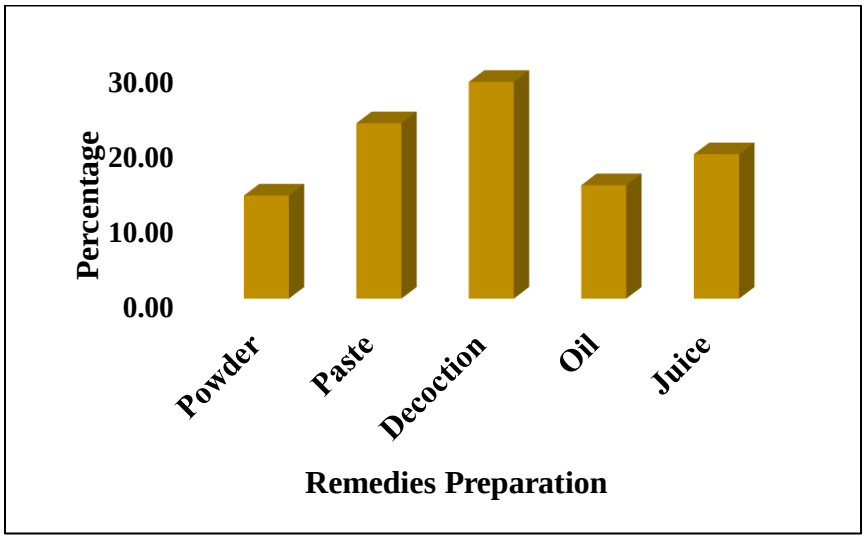

Figure 5 Preparation of remedies from medicinal plant by local people of Balodabazar-Bhatapara District Chhattisgarh.

Table 2 A compilation of traditional medicinal plants and the parts utilized for different health conditions.

SN	Botanical name	Local name	Family	Habit	Part used	Application	ROA	Conservation status
1.	*Achyranthes aspera* L.	Ban jeera Chirchita	Amaranthaceae	Herb	Roots, Fruits	Root paste with oil applied for body pain; fruit pudding consumed to suppress hunger.	Topical , Oral	LC
2.	*Acorus calamus* L.	Devnashan	Acoraceae	Herb	Rhizomes	Rhizome paste applied on body or used in exorcism; paste with water also applied in fever.	Topical	LC
3.	*Aegle marmelos* (L.) Corrêa	Bel	Rutaceae	Tree	Fruits	Fruit pulp diluted with water taken to relieve jaundice.	Oral	NE
4.	*Andrographis paniculata* (Burm.f.) Wall. ex Nees	Bhui neem	Acanthaceae	Herb	Whole plant	Juice with water for body ache; powder with water for diabetes; paste for fever; decoction for stomach pain.	Oral	NE
5.	*Aristolochia indica* L.	Chanairi	Aristolochiaceae	Climber	Roots	Ground roots taken for fever; warm root paste in oil applied on body to reduce fever.	Oral, Topical	RET
6.	*Asparagus racemosus* Willd.	Dashmool	Asparagaceae	Climber	Tubers	Crushed tubers given in fever; paste with milk applied on forehead; powdered roots with	Oral, Topical	EN

						milk taken as tonic and digestive aid.		
7.	*Azadirachta indica* A.Juss.	Neem	Meliaceae	Tree	Leaves, Roots	Leaf juice used for fever; heated root paste in oil applied externally; leaves chewed in jaundice; paste used for skin problems.	Oral, Topical	NE
8.	*Bauhinia variegata* L.	Kachnar	Fabaceae	Tree	Bark	Bark decoction taken for stomach ailments.	Oral	LC
9.	*Bombax ceiba* L.	Semal	Malvaceae	Tree	Spines	Combined with Hinglaj bark to manage malaria.	Oral	LC
10.	*Butea monosperma* (Lam.) Taub.	Palash	Fabaceae	Tree	Flowers	Ground flowers applied on skin to heal boils.	Topical	LC
11.	*Caesalpinia bonduc* (L.) Roxb.	Karanjwa	Fabaceae	Climber	Seeds, Roots	Seed paste used for skin eruptions; root decoction for fever and skin issues.	Topical , Oral	NE
12.	*Calotropis procera* (Aiton) W.T.Aiton	Aak / Madar	Apocynaceae	Shrub	Leaves	Leaves mixed with jaggery consumed for dog bite treatment.	Oral	LC
13.	*Carica papaya* L.	Papita	Caricaceae	Tree	Leaves	Leaf juice taken daily to treat jaundice.	Oral	NE
14.	*Chloroxylon swietenia* DC.	Bhirra	Rutaceae	Tree	Leaves	Dried leaves burnt to repel mosquitoes.	Topical	VU

15.	*Cissampelos pareira* L.	Karmota	Menispermaceae	Climber	Roots	Powdered roots administered for digestive disorders.	Oral	NE
16.	*Citrus* × *limon* (L.) Osbeck	Neebu	Rutaceae	Tree	Fruits	Lemon juice with milk used for constipation; also used with Hinglaj bark for malaria.	Oral	NE
17.	*Cleistanthus collinus* (Roxb.) Benth. ex Hook.f.	Hardu	Phyllanthaceae	Tree	Bark	Bark powder taken with water to relieve stomachache.	Oral	VU
18.	*Clerodendrum indicum* (L.) Kuntze	Balraj	Lamiaceae	Shrub	Roots	Root juice used as a blood purifier.	Oral	NE
19.	*Cochlospermum religiosum* (L.) Alston	Galgala	Bixaceae	Tree	Bark	Boiled bark given to patients suffering from cancer.	Oral	NE
20.	*Cordia macleodii* (Griff.) Hook.f. & Thomson	Dahiman	Boraginaceae	Tree	Bark	Ground bark taken to overcome drug dependence.	Oral	EN
21.	*Curculigo orchioides* Gaertn.	Kali musli	Hypoxidaceae	Herb	Tubers	Roasted tubers consumed to relieve sore throat.	Oral	EN
22.	*Cynodon dactylon* (L.) Pers.	Dhub grass	Poaceae	Herb	Whole plant	Juice used in bleeding disorders; paste applied to heal wounds.	Oral, Topical	NE
23.	*Datura metel* L.	Dhatura	Solanaceae	Shrub	Seeds	Seed paste applied externally on boils and swellings.	Topical	NE

24.	*Dendrophthoe falcata* (L.f.) Ettingsh.	Bandha	Loranthaceae	Herb	Stem outgrowth	Paste mixed with oil used in love or attraction rituals.	Topical	NE
25.	*Diospyros melanoxylon* Roxb.	Tendu	Ebenaceae	Tree	Seeds	Seeds mixed with water used as eyedrops or as lampblack.	Topical	NE
26.	*Euphorbia hirta* L.	Dudhi	Euphorbiaceae	Herb	Whole plant	Juice with sugar administered to children for stomach pain.	Oral	NE
27.	*Euphorbia neriifolia* L.	Dudhi	Euphorbiaceae	Shrub	Latex	Latex blended with mustard oil applied externally for stomach ache.	Topical	NE
28.	*Euphorbia thymifolia* L.	Chhoti dudhi	Euphorbiaceae	Herb	Whole plant	Juice with sugar taken to relieve indigestion.	Oral	LC
29.	*Ficus benghalensis* L.	Bargad	Moraceae	Tree	Leaves	Young leaves eaten with puffed rice to relieve constipation.	Oral	NE
30.	*Ficus racemosa* L.	Gular	Moraceae	Tree	Fruits	Fruit decoction used in the treatment of jaundice.	Oral	LC
31.	*Ficus religiosa* L.	Peepal	Moraceae	Tree	Bark	Bark decoction taken to treat jaundice.	Oral	LC
32.	*Flemingia bracteata* (Roxb.) Wight	Sabarbhanj	Fabaceae	Herb	Roots	Roots boiled with jaggery used for cold and cough.	Oral	NE

33.	*Gloriosa superba* L.	Kalihari	Colchicaceae	Herb	Tubers	Tubers believed to induce quarrels when used ritually.	Oral / Ritual	LR/NTR/R
34.	*Heliotropium indicum* L.	Hatisundhi	Boraginaceae	Herb	Leaves	Leaf juice with black pepper taken for stomach disorders.	Oral	NE
35.	*Hellenia speciosa* (J. Koenig) S.R. Dutta	Keu kand	Costaceae	Herb	Rhizomes	Rhizome paste given to treat gastric ailments.	Oral	LC
36.	*Holarrhena pubescens* Wall. ex G.Don	Koriya / Kutaj	Apocynaceae	Tree	Bark	Bark paste given for dysentery; decoction taken for jaundice.	Oral	LC
37.	*Hygrophila auriculata* (Schumach.) Heine	Mokhla	Acanthaceae	Herb	Roots	Root paste mixed with ghee or honey administered for fever.	Oral	LC
38.	*Hymenodictyon orixense* (Roxb.) Mabb.	Bhanwarmaal	Rubiaceae	Tree	Roots	Juice of young roots used to relieve body ache.	Oral	NE
39.	*Jatropha curcas* L.	Dudhi	Euphorbiaceae	Shrub	Latex	Latex blended with oil applied externally for gastric pain.	Topical	NE
40.	*Justicia adhatoda* L.	Basan	Acanthaceae	Shrub	Leaves	Leaf decoction administered to treat fever.	Oral	LC
41.	*Lygodium flexuosum* (L.) Sw.	Mahajaal	Schizaeaceae	Climber	Roots	Root paste with water given for body pain.	Oral	NE
42.	*Madhuca longifolia* (L.) J.F.Macbr.	Mahua	Sapotaceae	Tree	Oil, Flowers	Oil warmed and applied on nails for cold; fermented flowers used	Topical , Oral	NE

						as tonic and in skin disorders.		
43.	*Mirabilis jalapa* L.	Gulal	Nyctaginaceae	Herb	Roots	Root paste with milk for gastric trouble; powdered root with water used for dyspepsia.	Oral	NE
44.	*Moringa oleifera* Lam.	Munga	Moringaceae	Tree	Bark	Bark boiled with water given to malaria patients.	Oral	NE
45.	*Nyctanthes arbor-tristis* L.	Khirsali	Oleaceae	Tree	Bark	Ground bark mixed with spider web applied on bone fractures.	Topical	NE
46.	*Ocimum tenuiflorum* L.	Tulsi	Lamiaceae	Herb	Leaves	Leaves with *Calotropis* and jaggery for dog bite; leaf juice with honey for cough and cold; applied on insect bites.	Oral, Topical	NE
47.	*Phanera vahlii* (Wight & Arn.) Benth.	Siyalu / Mahul	Fabaceae	Climber	Roots	Root decoction taken to treat cough.	Oral	NE
48.	*Phyllanthus amarus* Schumach. & Thonn.	Bhuiaaonla	Phyllanthaceae	Herb	Whole plant	Crushed plant taken in fever and malaria; decoction used for jaundice and digestive disorders.	Oral	NE
49.	*Phyllanthus emblica* L.	Aonla	Phyllanthaceae	Tree	Fruits	Fruit powder with water used for gastric issues;	Oral	LC

						juice with honey taken for jaundice.		
50.	*Piper betle* L.	Pan	Piperaceae	Climber	Leaves	Chewed with areca nut to aid digestion.	Oral	NE
51.	*Piper longum* L.	Pipar	Piperaceae	Climber	Fruits	Powdered fruits with sugar consumed for stomach complaints.	Oral	EN
52.	*Piper nigrum* L.	Kali mirch	Piperaceae	Climber	Fruits	Mixed with tuber decoctions to relieve cough.	Oral	NE
53.	*Pongamia pinnata* (L.) Pierre	Karanja	Fabaceae	Tree	Seed oil	Oil applied externally for skin diseases.	Topical	LC
54.	*Pterocarpus marsupium* Roxb.	Beeja	Fabaceae	Tree	Stem, Bark	Stem piece soaked overnight in water; water drunk for diabetes; bark decoction also taken for diabetes.	Oral	NE
55.	*Pueraria tuberosa* (Roxb. ex Willd.) DC.	Patalkumhada	Fabaceae	Climber	Tubers	Crushed tubers with pepper given for cough with mucus.	Oral	NE
56.	*Ricinus communis* L.	Arandi	Euphorbiaceae	Tree	Leaves	Warm leaves applied on body during fever.	Topical	NE
57.	*Semecarpus anacardium* L.f.	Bhelwa	Anacardiaceae	Tree	Seeds	Boiled seeds with milk taken for chest pain; roasted seed powder with honey used for stomach issues.	Oral	LC

58.	*Senna alata* (L.) Roxb.	Hinglaj	Fabaceae	Shrub	Bark	Bark paste with jaggery and porcupine intestine administered in malaria.	Oral	NE
59.	*Solanum nigrum* L.	Makoi	Solanaceae	Herb	Leaves	Boiled leaves eaten with food to treat stomach problems.	Oral	NE
60.	*Solanum virginianum* L.	Bhatkataiya	Solanaceae	Herb	Roots	Root decoction with honey given thrice for cough and fever.	Oral	NE
61.	*Soymida febrifuga* (Roxb.) A.Juss.	Rohina	Meliaceae	Tree	Bark	Bark boiled with oil applied externally to relieve waist pain.	Topical	NE
62.	*Spondias pinnata* (L.f.) Kurz	Amera	Anacardiaceae	Tree	Bark	Crushed bark used in treating dysentery.	Oral	LC
63.	*Syzygium cumini* (L.) Skeels	Jamun	Myrtaceae	Tree	Bark	Bark decoction used to treat gastric problems.	Oral	NE
64.	*Tagetes erecta* L.	Genda	Asteraceae	Herb	Leaves	Leaf juice instilled into the ear to relieve earache.	Topical	NE
65.	*Tectona grandis* L.f.	Sagon	Lamiaceae	Tree	Fruits	Boiled fruits with jaggery and horse stool used for cold and cough.	Oral	LC
66.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Arjun	Combretaceae	Tree	Bark	Bark boiled with water consumed to enhance blood levels.	Oral	NE

67.	*Terminalia bellirica* (Gaertn.) Roxb.	Bahera	Combretaceae	Tree	Fruits	Fruit powder with water taken for gastric issues and jaundice.	Oral	LC
68.	*Terminalia chebula* Retz.	Harra	Combretaceae	Tree	Fruits	Ground fruits with water taken for gastric and liver disorders.	Oral	LC
69.	*Tinospora cordifolia* (Willd.) Hook.f. & Thomson	Giloy	Menispermaceae	Climber	Leaves, Stem	Juice from leaves and stem used for fever and jaundice.	Oral	NE
70.	*Vachellia nilotica* (L.) P.J.H. Hurter & Mabb.	Babul	Fabaceae	Tree	Bark	Bark decoction used as mouthwash for toothache.	Oral, Topical	NE
71.	*Vitex negundo* L.	Nirgundi	Lamiaceae	Shrub	Leaves	Leaf decoction taken to reduce fever.	Oral	NE
72.	*Wendlandia heynei* (Schult.) Santapau & Merchant	Tilai	Rubiaceae	Tree	Bark	Bark decoction consumed to improve blood formation.	Oral	LC
73.	*Zingiber roseum* (Roxb.) Roscoe	Ban sonthi	Zingiberaceae	Herb	Rhizomes	Rhizome paste taken for dysentery; juice instilled in nostrils to counter fear of spirits (exorcism use).	Oral, Nasal	NE
Abbreviation key: ROA, Route of administration; EN, Endangered; NE, Not Evaluated; VU, Vulnerable; LC, Least Concern; LR, Lower Risk; NTR, Near Threatened; R, Rare; RET, Rare, Endangered and Threatened.								

ROUTE OF ADMINISTRATION

The ethnomedicinal evidence identified that traditional healers had numerous routes of administration depending on the type of the ailment and a particular preparation. The most common route of administration was via oral, with a percentage of 42.47% that is the highest percentage of all the remedies, due to its convenience and systemic action of treating internal ailments. Remedies applied as oral and topical agents made second rank (28.77%) and hence show dual healing power in diseases that need both internal and external treatment. Third in rank (26.03%), but most commonly used in wounds, skin infections, and inflammation, was topical application. Ritual and nasal applications by comparison were the least popular (1.37% each), and tended to be related to traditional spiritual practices or respiratory ailments. These notes point to how oral and topical routes of administration are prevalent in indigenous healing practices, which points to their low cost, ease of use, and ability to treat various health disorders.

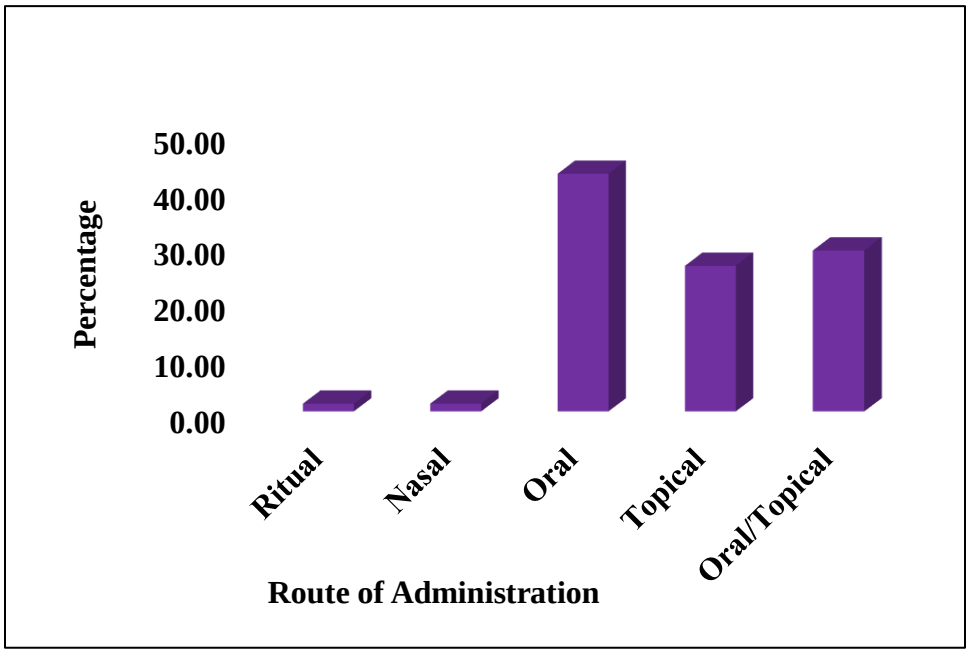

Figure 6 Route of administration of remedies prepared by local people of Balodabazar-Bhatapara District Chhattisgarh.

CONSERVATION STATUS

The conservation status of the listed ethnomedicinal plant species was determined, and most of the species were listed as Not Evaluated (NE) 60.27% of the total species. It would mean that there is a severe deficiency in conservation information on numerous traditionally important plants, and

more ecological and conservation research is required. Least Concern (LC) species represented 28.77% percent of the total indicating that a significant percentage of the documented flora is reasonably stable in their natural environment. Less percentage of species was detected under threatened groups such as Endangered (EN), species (5.48%) and Vulnerable (VU) species (2.74%), under the influence of overharvesting and habitat degradation. Also, there were Lower Risk/Near Threatened/Rare (LR/NTR/R) and Rare, Endemic, or Threatened (RET) species (1.37% and 1.37%, respectively). These results highlight the significance of sustainable use and conservation efforts in order to preserve ethnobotanically valuable species especially those who are threatened with extinction owing to man-made and environmental forces.

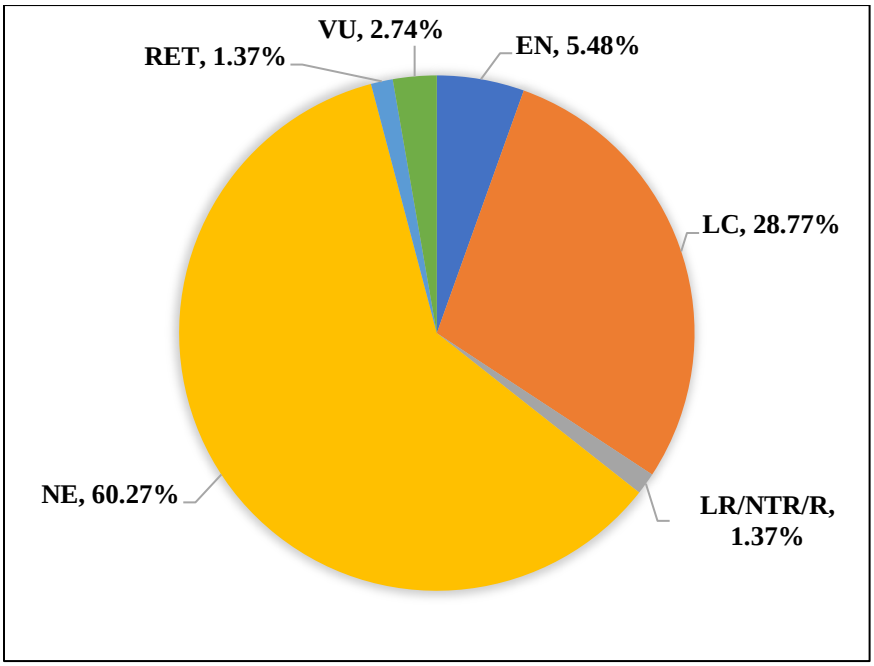

Figure 7 Conservation status of medicinal plants reported from the Balodabazar-Bhatapara District Chhattisgarh.

DISCUSSION

The ethnomedicinal survey conducted in the current research paper reported 73 species of 67 genera from 37 families respectively, indicating the incredible botanical richness and accumulated traditional knowledge of the local populations. All the documented taxa were angiosperms except *Lygodium flexuosum*, as it complies with past ethnobotanical records that flowering plants are predominant in medicinal flora of various ecosystems (Pandey, 2021; Duche-Pérez et al., 2024).

The most prevalent ones were the families Fabaceae, Euphorbiaceae, and Lamiaceae, which is commonly seen in the ethnomedicinal inventories of the world (Meñiza et al. 2024). This can be explained by their abundance and extensive spread of the species in these families, and their established phytochemical richness and pharmacological potential.

The growth form composition showed that trees contributed to the highest percentage (46.58%), then herbs (27.40%), climbers (15.07%) and shrubs (10.96%). The prevalence of trees and herbs suggests that they are a very significant part of traditional medicines, which might be explained by the simple accessibility and their wide range of therapeutic agents. This has also been observed with other studies on ethnobotany, where it was reported that woody species were of preference due to their perennial accessibility and long-lasting medicinal constituents (Tugume and Nyakoojo, 2019). Instead, their soft tissues, quick growing and their ease of processing make herbs be commonly utilized to prepare quick remedies.

The variety of plant parts utilized in remedies production was very high, which indicates the strong ethnomedicinal knowledge of the area. The most commonly used were bark (19.23%), leaves (17.95%), and roots (16.67%), and fruits were also an important part (12.82%). The trend corresponds with the international results where the most common part is the leaves and roots since they have high metabolite concentration and are easy to collect (Abubakar, 2020). The relatively increased use of the bark in this research could be related to the abundance of tree species and the conventional wisdom of the potency of the bark used in treating systemic infections and inflammatory disorders. Nonetheless, the use of bark and roots is a serious issue of conservation impact since its extraction may cause the death of plants. These unsustainable harvesting methods have been pointed out as a primary cause of the depletion of medicinal-plants (Alum, 2025; Zaman et al. 2025). As such, high-demand species propagation and cultivation programs needs to be supported to ensure a balance of the ecology.

The manufacturing of herbal remedies was diverse to suggest the versatility of traditional healers when it comes to their ability to use the materials available to them locally. The most widespread form was decoction (28.77%), then there was paste (23.29%), juice (19.18%), oil (15.07%) and powder (13.70%). The use of decoctions is predominant because it is perceived as an effective therapeutic agent and easy to prepare as it is practiced to extract active constituents through boiling (Daswani et al. 2011; Bhoi et al. 2025). Tugume and Nyakoojo (2019) also mentioned that the

most common ethnomedicinal practice, in Ugandan practice, was the use of decoction. Formulations of paste and oil were applied to the wounds, skin infections, and inflammation mostly as external agents, whereas juice and powder were used as internal agents, usually orally administered. The popularity of liquid and semi-solid preparations implies an inclination towards readily soluble and promptly acting preparations which underlies the empirical and practical foundation of local healing systems.

These therapeutic considerations were also manifested in the route of administration. Most commonly used was the oral route (42.47%), then topical (26.03%), and a combination of the oral and topical use (28.77%). The prevalence of oral administration is in line with the overall ethnobotanical trend, as it enables a systemic impact and facilitates the tailoring of the dosage (Dean, 2024; Sharma and Sahu, 2024; Singh et al. 2025). Topical and dual mode of application also emphasizes on the composite mode of traditional healers when it comes to treating internal and external manifestations of diseases. The scarcity of nasal (1.37%) and ritual (1.37%) routes indicates that these methods are mainly applied to specific conditions or cultural settings, which is also common among the other regional ethnopharmacological studies (Soni and Shahi, 2021; Duche-Pérez et al., 2024).

Conservation evaluation showed that most of the species recorded (60.27%) were labeled as Not Evaluated (NE) and this showed a significant gap in conservation data. Least Concern (LC) species were 28.77%, Endangered (EN) and Vulnerable (VU) 5.48% and 2.74%, respectively. The conservation of threatened and rare species (LR/NTR/R – 1.37%; RET -1.37) is an indicator of the increased pressure on the wild medicinal flora of overharvesting and habitat loss. This has been observed in other ethnobotanically rich areas and therefore shows the dire need to have in-situ and ex-situ conservation plans (Patel, 2024; Duche-Pérez et al., 2024; Pandey et al., 2025). Recording the conservation status of medicinal species is thus fundamental in prioritizing to the management of the resource to direct towards sustainable use.

The current results offer a thorough insight into the ethnomedicinal use of plants and other related practices in the study region. The control of several major families and the popularity of tree and herbaceous plants, along with the use of roots, leaves and barks, make the abundance of traditional knowledge as well as the threat of overexploitation conspicuous. The preference to decoctions and oral route is reminiscent of ethnobotanical trends in the world, which supports adaptive and

experience-based character of the indigenous healthcare system. Notably, the large percentage of the species with no formal conservation assessment highlights the need to document, conserve and manage sustainably through urgent conservation and management efforts. Connection of ethnomedicinal documentation and ecological and pharmacological studies make the current study carried in the selected regions of Balodabazar-Bhatapara district not only contribute to the preservation of cultural heritage but also finding potential prospects in plant discovery and development of drugs in the future. Enhancing community-based conservation systems, advancing the cultivation of medicinal plants with high demand and the need of scientific validation of the traditional ones will guarantee that this invaluable native knowledge will remain to assist people and protect biodiversity.

CONCLUSION

To sum up, this ethnomedicinal research paper reveals the abundance of medicinal plants and the richness of the knowledge of traditional healing in the Balodabazar-Bhatapara district. The prevalence of angiosperms, in particular, such families as Fabaceae, Euphorbiaceae, or Lamiaceae is an indicator of their pharmacological significance. The cultural dependence on the nature of the remedies is shown through the preference of trees, herbs, and other commonly used parts of plants including the bark, leaves and roots, which require sustainable use. Global ethnobotanical tendencies are favored by the preponderance of decoctions and oral intake. The high percentage of the Not Evaluated species, however, emphasizes the necessity of conservation and scientific evaluation. In general, the research highlights the need to conserve the ethnic knowledge and enhance sustainable management of medicinal plants and scientific prove of medicinal plants to the future to enhance therapeutic and ecological values.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

[1] Abubakar, A.R. and Haque, M. 2020. Preparation of medicinal plants: Basic extraction and fractionation procedures for experimental purposes. Journal of Pharmacy and Bioallied Sciences, 12(1), 1-10.

[2] Ahirwar, R.K. Bhoi, D.K. and Jangde, R. 2024. The study of the variety of ethnobotanical plants and spices used in the cuisine of the Indian tribes of Bilaspur, Chhattisgarh. Plant Sci. Today, 11, 123-135.

[3] Alum, E.U. 2025. Sustainable harvesting of medicinal plants: balancing therapeutic benefits with environmental conservation. Agroecology and Sustainable Food Systems, 49(3), 380-385.

[4] Bhoi, D.K. Jangde, R. and Ahirwar, R.K. 2025. Unveiling the ethnomedicinal plant wisdom of the ethnic people of the Surguja district, Chhattisgarh, India. Genetic Resources and Crop Evolution, 1-50.

[5] Bisen, N.K. Sarvade, S. Gaur, V.S. and Gautam, K. 2025. Ethnobotany of Valuable Medicinal Plants Available in Chhattisgarh Plain Region of Balaghat District, Madhya Pradesh. Indian Journal of Agricultural Research, 59(1).

[6] Chandrakar, M. Sarwa, K.K. Suryawanshi, V.K. and Pramila, K. 2024. A therapeutic potentiality and toxicity concern of nutrient plant Annona squamosa Linn. Tradit Med Res, 9(3), 18.

[7] Daswani, P.G. Ghadge, A.A. Brijesh, S. and Birdi, T. J. 2011. Preparation of decoction of medicinal plants: a self-help measure?. Journal of Alternative and Complementary Medicine, 17(12), 1099.

[8] Dean, M. 2024. Exploring ethnobotanical knowledge: Qualitative insights into the therapeutic potential of medicinal plants. Golden Ratio of Data in Summary, 4(2), 154-166.

[9] Duche-Pérez, A. Gutiérrez Aguilar, O.A. Valero Quispe, J.L. Serruto Castillo, A. and Mamani Daza, L.J. 2024. Systematic review of ethnomedicinal knowledge: Documentation, evaluation, and conservation of medicinal plants and their therapeutic applications. F1000Research, 13, 1324.

[10] El Alaa, R.S. A. Al-Jaber, H. Chokor, F.A.Z. Shaito, A.A. and Al-Mansoori, L. 2025. Ethnobotanical survey of medicinal plants used in management of breast cancers in Qatar. *Heliyon*, *11*(4).

[11] Government of Chhattisgarh. BalodaBazar-Bhatapara. https://balodabazar.gov.in.

[12] Ishtiaq, M. Sardar, T. Hussain, I. Maqbool, M. Mazhar, M.W. Parveen, A. and Sridhara, S. 2024. Traditional ethnobotanical knowledge of important local plants in Sudhnoti, Azad Kashmir, Pakistan. Scientific Reports, 14(1), 22165.

[13] Meñiza, J.F. Pasco, M.M. and Alimbon, J.A. 2024. A review of ethnobotanical studies reveals over 500 medicinal plants in Mindanao, Philippines. Plant Diversity, 46(5), 551-564.

[14] Naik, M.L. Patel, S.K. and Kanungo, V.K. 2024. Ethnomedicines of Barnawapara Wildlife Sanctuary, Chhattisgarh, India. INTERNATIONAL JOURNAL OF PLANT AND ENVIRONMENT, 10(03), 59-68.

[15] Radha, P. Udhayavani, C. Nagaraj, R. and Sivaranjani, K. 2025. Medico-ethnobotanical survey of medicinal plants used in the treatment of skin diseases in Tiruppur District, Tamil Nadu, India. *Phytomedicine Plus*, *5*(1), 100692.

[16] Singh, S.S. Ralte, L. Sailo, H. Pinokiyo, A. Devi, M.R. Khomdram, S.D. and Singh, Y.T. 2025. Ethnobotanical study of medicinal plants used by Lois community of Kakching district, Manipur, India. Trees, Forests and People, 19, 100765.

[17] Singh, S.S. Ralte, L. Sailo, H. Pinokiyo, A. Devi, M.R. Khomdram, S.D. and Singh, Y. T. 2025. Ethnobotanical study of medicinal plants used by Lois community of Kakching district, Manipur, India. Trees, Forests and People, 19, 100765.

[18] Thakur, N. and Puri, R. 2025. Diplocyclos palmatus (L.) C. Jeffrey-An important medicinal plant: A review on taxonomy, ethnobotany, and pharmacological prospects.

[19] Tugume, P. and Nyakoojo, C. 2019. Ethno-pharmacological survey of herbal remedies used in the treatment of paediatric diseases in Buhunga parish, Rukungiri District, Uganda. BMC Complementary and Alternative Medicine, 19(1), 353.

[20] WAGHULE, A.N. 2025. Ethnobotanical study of Medicinal plant Indian Sarsaparilla Hemidesmus indicus (l.) used to various diseases and disorder in Pune district Maharashtra. International Journal of Scientific Development and Research, 10(5), ISSN:2455-2631.

[21] Zaman, W. Ayaz, A. and Park, S. 2025. Climate change and medicinal plant biodiversity: conservation strategies for sustainable use and genetic resource preservation. Genetic Resources and Crop Evolution, 1-34.

[22] Pandey, A.K. 2021. An ethnobotanical study of medicinal plants in Atal Nagar (New Raipur) of Chhattisgarh, India. International Research Journal of Plant Science, 12(1), 1-18.

[23] Soni, D.K. and Shahi, S.K. 2021. Ethnobotanical data documentation of Keshkal, Chhattisgarh, India. Journal of Traditional and Folk Practices, 9(1 & 2).

[24] Patel, R. 2024. Ethnobotanical Insights on Andrographis paniculata (Burm. f.) Wall. ex Nees in select villages of Narharpur Block, Uttar Bastar Kanker, Chhattisgarh. Innovation and Integrative Research Center Journal, 2(6), 184-95.

[25] Sharma, S.D. and Sahu, K. 2024. Ethno-medicinal importance and ecological impact of invasive plant species of Durg District of Chhattisgarh. Sustainability, Agri, Food and Environmental Research, 12(2). https://doi.org/10.7770/safer-V13N1-art517

[26] Pandey, R.K. Jain, P. Shukla, S.S. Gidwani, B. Jain, A. and Ajazuddin. 2025. Ethnomedicinal value of medicinal plants found in chhattisgarh: Recent scenario and advancement. Current Traditional Medicine, 11(4), e020224226679.