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Ethnobotanical documentation and use of wild edible plants among tribal communities in the Chilphi Range, Kawardha Forest Division, India

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Wild Edible Plants (WEPs) are nutritionally dense plant resources thriving in the wild which serve as beneficial food supplements to the local communities and help in eradicating malnutrition and promoting food security. The present investigation entitled "Ethnobotanical documentation and use of wild edible plants among tribal communities of Chilphi Range, Kawardha Forest Division, India" was carried out in the eight villages of Chilphi Range to document the ethnobotanical wisdom of local communities regarding WEPs diversity, plant parts utilised, and modes of consumption. Semi-structured interviews were conducted with indigenous informants leading to the documentation of 77 WEPs species belonging to 54 genera and 38 families with trees being the most represented life form (40%) and fruits being the most commonly used part (47%). Quantitative ethnobotanical indices, including Relative Frequency of Citation (RFC) and Jaccard Index (JI) were calculated to evaluate cultural significance. The species with highest RFC values were *Diospyros melanoxylon* (0.94), *Aegle marmelos* (0.93), *Buchanania lanzan* (0.92) and *Bauhinia purpurea* (0.91), whereas species with least RFC values were *Alangium salviifolium* (0.08), *Basella rubra* (0.09) and *Alternanthera pungens* (0.14). Threats from overharvesting, deforestation, and erosion of traditional knowledge exists, highlighting the need for documentation and conservation of WEPs for promoting sustainable livelihood. This study provides baseline information to support community-based conservation planning, enhance nutritional evaluation of priority species, and promote the sustainable use and value addition of WEPs.

Keywords: Food security, Food supplements, Traditional knowledge, Wild edible plants

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Globally, around 350,386 flowering plant species have been identified, yet only a fraction have been studied for their nutritional or medicinal potential[1]. Forests, grasslands, and wetlands are not merely ecosystems but living libraries of genetic wealth, holding compounds with immense pharmaceutical and nutraceutical potential[2]. Since time immemorial, plants have sustained humanity by providing food, medicine, and cultural significance. However, today humanity faces multiple crises in the form of population upsurge, pollution, biodiversity loss, and disease epidemics. Malnutrition remains a persistent challenge with about 870 million people being undernourished worldwide, and nearly 2 billion suffering from micronutrient deficiencies[3]. This paradox exists despite having the potential of nearly 20,000 edible plants, yet only about 20 staple crops account for 90% of the human diet[4]. This growing dietary homogenization has renewed scientific interest in climate-resilient and nutrient-dense neglected and underutilized plant species (NUS) as wild organic resources for food and nutrition security[5,6].

Wild edible plants (WEPs), though often overlooked, forms a substantial part of NUS. They are nutrient-rich, resilient, and locally adapted alternatives which can enhance dietary diversity, support health care, generate income, and provide food security, especially during seasonal food shortages and emergencies[7-9]. The incorporation of these wild plants into the mainstream can contribute to the fulfilment of the United Nations' Sustainable Development Goal of eradicating hunger[10].

India is home to one of the world's largest indigenous populations, with approximately 104 million people belonging to 705 distinct ethnic groups, including 75 Particularly Vulnerable Tribal Groups (PVTGs). These groups maintain deep ecological ties, relying on wild plants and products for their essential needs[11,12]. Chhattisgarh, known as the "Herbal State," has 44.2% forest cover and a significant tribal population, making it a hotspot of ethnobotanical knowledge and biodiversity[13,14]. The

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tropical dry deciduous forests of the Chilphi Range situated within the Maikal range of the Satpura Hills in Chhattisgarh reflects this rich heritage of the state very well. The region is characterized by its rich floral diversity and serves as a habitat for the Baiga tribe, a Particularly Vulnerable Tribal Group (PVTG) recognized for their profound dependence on forest resources and symbiotic relationship with nature, hence depicting the presence of deep ethnobotanical wisdom. Such human–nature relationships represent the biocultural systems where ecological knowledge, cultural identity, and biodiversity conservation evolve together leading to climate adaptation and sustainable resource governance[15].

Yet, this wealth is threatened by habitat destruction, over utilization, climate change, and erosion of cultural traditions. Tribal knowledge of plants is often passed down orally through songs, rituals, and stories[16] and has not been systematically documented which further aggravates the cultural erosion process. The present study documents the wild edible plant utilization by tribal and local communities of the Chilphi Range, hence contributing to conservation of ethnobotanical wisdom.

Materials and Methods

Study area

The present study was conducted in the Chilphi range of Bhoramdev Wildlife Sanctuary, located in Kawardha Forest Division of Chhattisgarh, India. The study area, covering 192 km², is situated between latitudes 21°57'N and 22°15'N and longitudes 80°53'E and 81°10'E (Fig. 1). It lies approximately 148 km from the state capital, Raipur. Geographically, the range forms a part of the Maikal hills in the Satpura range, which is a component of the Central Indian Highlands and a critical part of the Central Indian Satpuda-Maikal Landscape. The elevation varies from 320 to 925 meters above mean sea level. The climate is sub-tropical, with a mean annual maximum and minimum temperature of 33.6°C and 21.6°C, respectively, with occasional mild frost during winter. The area is rich in biodiversity, characterized by three major forest types: Dry Teak Forest (5A/C1b), Moist Peninsular High-Level Sal Forest (3C/C2e(i)), and Southern Dry Mixed Deciduous Forest (5A/C3). It also serves as a habitat for indigenous communities, including the Baiga (a Particularly Vulnerable Tribal Group), Gond, and Aghariya.

Field research and data collection

Eight villages (Duldula, Sarodhadadar, Benda, Loop, Rajadhar, Turaiya bahra, Salhewara, and Bhothi) with a dominant tribal population were selected within the Chilphi Range. To ensure appropriate spatial representation, two villages were chosen from each direction (north, south, east, west) of the Range following thorough discussions with forest officials (Table 1).

Data were collected by interviewing the local respondents using pre-tested, semi-structured interview schedule. Out of the total households present in each selected village, a representative sample of 10% respondents was selected using the snowball technique or chain referral sampling method[17,18], hence a total of 88 respondents (42 males and 46 females) were selected from all the villages. The selected sample size ensured the representation of households across different geographical directions of this study, allowing documentation of variation in traditional knowledge across villages. Before conducting interviews, respondents were briefed on the study's purpose, and informed consent was obtained from each individual. Interviews were conducted in the local language in an informal setting, and all responses were documented in English. The observations on wild edible plants including their season of availability and consumption patterns were recorded based on the information

Table 1 — Villages and respondents selected for the study in Chilphi Range

Direction	Name of village	Geographical coordinates	Total no. of households	No. of respondents selected
East	Duldula	Lat: 22.19; Long: 81.06	95	10
	Sarodhadadar	Lat: 22.18; Long: 81.08	60	6
West	Benda	Lat: 22.18; Long: 81.03	138	14
	Loop	Lat: 22.16; Long: 81.04	127	13
North	Rajadhar	Lat: 22.23; Long: 81.05	180	18
	Turaiya bahra	Lat: 22.20; Long: 81.03	54	6
South	Salhewara	Lat: 22.13; Long: 81.05	135	14
	Bhothi	Lat: 22.15; Long: 81.06	71	7
	TOTAL			88

provided by the local communities. Field visits in the nearby forest area with locals and forest officials were made and plant species were identified using standard field guides and digital applications such as iNaturalist, Flora Incognita, and eFlora of India. Plant identification was further cross verified using standard regional floras and online botanical databases, and species names were confirmed through comparison with authenticated taxonomic records. Photographic documentation of species was maintained for reference.

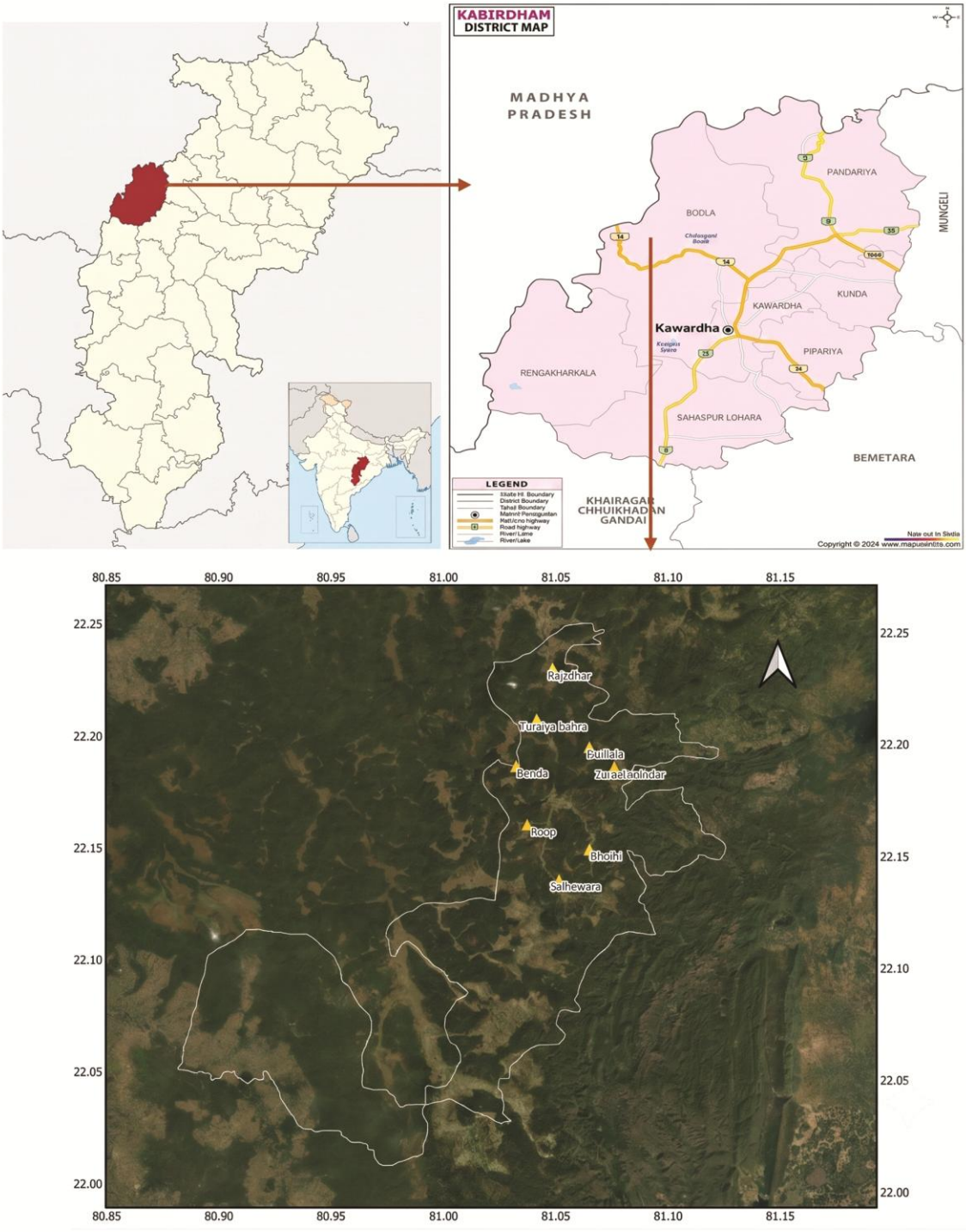

Fig. 1 — Study Area Map of Chilphi Range, CG, India; (Source: Map of CG and Kabeerdham district retrieved from Maps of India and Map of Chilphi Range prepared using QGIS software with base layers derived from Google Earth imagery and Forest Department maps)

Quantitative analysis

To know the cultural significance of wild edible plants in the local community and ethnobotanical knowledge sharing between the communities, data was quantitatively analysed as follows:

***Relative Frequency of Citation* (*RFC*)**

RFC is an index which indicates how widely known and used a particular plant is among the people interviewed in a study. It was calculated following Tardio & Pardo-de-Santayana (2008)[19].

$$RFC = FC/N \qquad (0 < RFC < 1)$$

Where, FC = number of informants mentioning the use of wild edible species and N = total number of informants.

The higher the RFC, more popular the plant species is within the studied community.

***Jaccard Index* (*JI*)**

JI was calculated to find out the similarity of use reports of wild edible plants with previously published findings by using the following formula:

$$JI = c \times 100 \div a + b - c$$

Where, a = number of wild edible species of the area A, b = number of wild edible species of the area B, and c = number of species common to area A and B[20]

Results

Ethnobotanical richness

The study recorded a total of 77 wild edible plant species (75 plant species and 2 fungi) belonging to 54 genera and 38 families. The information involving botanical names, vernacular names, family, plant habit, season of availability, part used and nature of consumption along with RFC are listed in (Table 2). Trees were the most represented life form (40%), followed by herbs (21%), shrubs (17%), climbers (15%), fungi (3%), straggling shrub (3%), and grass (1%) (Fig. 2). The family with maximum number of species was Fabaceae (9 species), followed by Moraceae (6 species), Dioscoreaceae, Malvaceae and Rhamnaceae with 5 species each. Other dominant families were Amaranthaceae, Anacardiaceae, Rubiaceae and Solanaceae (Fig. 3).

Table 2 — Wild edible plant species utilized by the local communities of Chilphi Range

S. No.	Botanical Name	Vernacular Name	Family	Habit of plant	Season of availability	Part used	Nature of consumption	RFC
1	*Abelmoschus ficulneus* (L.) Wight & Arn.	Jangli Bhindi/ Ran Bhendi	Malvaceae	S	Sep-Mar	F	Unripe fruits are cooked as vegetable	0.25
2	*Aegle marmelos* (L.) Corr.	Bael	Rutaceae	T	Apr-Jun	F	Fruit pulp is consumed directly or made into a drink (Sharbat)	0.93
3	*Alangium salviifolium* (L.f.) Wang	Akola/ Dhela	Cornaceae	S	Apr-Jul	F	Ripe fruits are edible	0.08
4	*Alternanthera pungens* Kunth.	Guri Bhaji/ Pathri Bhaji	Amaranthaceae	H	Jul-Sep	L & St	Leaves and tender stems are cooked as vegetable	0.14
5	*Amaranthus spinosus* L.	Kateli Chaulai	Amaranthaceae	H	Sep-Dec	L & St	Leaves and tender stems are cooked as vegetable	0.25
6	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Zimikand	Araceae	H	Oct-Dec	C & St	Corms, cormels and tender stem are cooked as vegetables. Sun dried 'Vadi' of tender stem is also made with black gram. Sometimes corms are also pickled.	0.68
7	*Annona reticulata* L.	Ramphal	Annonaceae	T	Feb-Apr	F	Ripe fruits are edible	0.7
8	*Annona squamosa* L.	Sitafal	Annonaceae	S	Sep-Dec	F	Ripe fruits are edible	0.76
9	*Astraeus hygrometricus* L.	Boda	Diplocystaceae	F	Jun-Aug	B	Cooked as vegetable	0.28
10	*Bambusa arundinacea* (Retz.) Willd.	Bans Kareel	Poaceae	G	Mar-May	Cu	Youn culms are cooked as vegetable or pickled	0.5
11	*Basella rubra* L.	Poin Bhaji	Basellaceae	C	Apr-Oct	L & St	Leaves and tender stems are cooked as vegetable	0.09
12	*Bauhinia malabarica* Roxb.	Amti	Fabaceae	T	Mar-Apr	L, SP & S	Fresh flush of leaves and seed pods cooked as vegetable. The seeds are also edible.	0.2

… *Contd.*

Table 2 — Wild edible plant species utilized by the local communities of Chilphi Range (Contd.)

S. No.	Botanical Name	Vernacular Name	Family	Habit of plant	Season of availability	Part used	Nature of consumption	RFC
13	*Bauhinia purpurea* Linn.	Koilar, Koliyari	Fabaceae	T	Feb-Apr	L	Fresh flush of leaves is cooked as vegetable	0.91
14	*Bauhinia vahlii* Graham	Mulain Beeja/ Mahul seed/ Siyar	Fabaceae	C	Mar-May	S	Seed pods are roasted in fire and then seeds are consumed.	0.16
15	*Buchanania lanzan* Spr.	Char	Anacardiaceae	T	Apr-May	F & S	Ripe fruits are eaten, and the seeds (Chironji) are roasted and consumed and also used to prepare laddoo.	0.92
16	*Carissa carandas* L.	Karonda	Apocynaceae	S	Jun-Sep	F	Consumed directly, made into pickles and chutney, cooked with jaggery and eaten.	0.22
17	*Cassia fistula* L.	Dhanbaher Bhaji	Fabaceae	T	Mar-Jul	L	Fresh flush of leaves cooked as vegetable	0.15
18	*Cassia tora* L.	Charota	Fabaceae	H	Jun-Sep	L	Leaves cooked as vegetable	0.85
19	*Chenopodium album* L.	Bathua bhaji	Amaranthaceae	H	Dec-Mar	L	Cooked as vegetable	0.23
20	*Cissus adnata* Roxb.	Dhotho bela/ Dodo bela	Vitaceae	C	Feb-May	L	Leaves used in place of curd to cook vegetables	0.18
21	*Cleome viscosa* L.	Hurhuriya	Cleomaceae	H	Oct-Nov	S	Seeds are used as condiments	0.22
22	*Colocasia esculenta* Schott.	Kochai	Araceae	H	Sep-Jan	L & C	Cooked as vegetable	0.75
23	*Corchorus olitorius* L.	Chench Bhaji	Malvaceae	H	TOY	L	Cooked as vegetable	0.67
24	*Cordia dichotoma* Forst. f.	Bohar Bhaji	Boraginaceae	T	Mar-May	L & Fl	Fresh flushes of leaves and flowers are cooked as vegetable.	0.66
25	*Costus speciosus* (Koen.) Sm.	Keokanda	Costaceae	H	Jul-Sep	Rh	Rhizomes eaten as vegetable	0.18
26	*Curcuma angustifolia* Roxb.	Tikhur	Zingiberaceae	H	Jan-Mar	Rh	Rhizome is made into powdered starch, which is then cooked to make sweet jelly and cooling drinks.	0.23
27	*Dioscorea belophylla* Voigt.	Genthi kanda	Dioscoreaceae	C	Feb-Mar	T	Boiled tubers are eaten as vegetable.	0.26
28	*Dioscorea bulbifera* L.	Dang kanda	Dioscoreaceae	C	Jul-Oct	At & Rh	Both the tubers and rhizome are boiled or roasted and eaten or can be cooked into vegetable.	0.83
29	*Dioscorea deltoidea* Wall. ex Griseb.	Karu kanda	Dioscoreaceae	C	May-Sep	T	Cooked as vegetable	0.23
30	*Dioscorea hispida* Dennstd.	Baichandi	Dioscoreaceae	C	Apr-Sep	T	Rhizome is boiled and then put into flowing water of river overnight and then cooked as vegetable	0.32
31	*Dioscorea pentaphylla* L.	Jardha Kanda	Dioscoreaceae	C	Jul-Sep	T	Boiled and cooked as vegetable	0.4
32	*Diospyros melanoxylon* Roxb.	Tendu	Ebenaceae	T	Apr-Jun	F	Ripe fruits are consumed directly	0.94
33	*Diospyros peregrina* (Gaertn.) Gurke	Makad Tendu	Ebenaceae	T	Apr-Jun	F	Ripe fruits are edible	0.19
34	*Embelia robusta* auct. non Roxb.	Baibirang	Myrsinaceae	T	Nov-Dec	F	Fruits are edible	0.19
35	*Ficus benghalensis* L.	Bar	Moraceae	T	Mar-May	F	Ripe fruits are consumed	0.42
36	*Ficus racemosa* L.	Dumar/ Gular	Moraceae	T	Mar-Jul	F	Ripe fruits are consumed directly or made into Murraba	0.56
37	*Ficus religiosa* L.	Peepal	Moraceae	T	Mar-Apr	L & F	Fresh flush of leaves is cooked as vegetable. Ripe fruits are eaten directly or made into laddos after removing the seeds and consumed.	0.48

… *Contd*.

Table 2 — Wild edible plant species utilized by the local communities of Chilphi Range (Contd.)

S. No.	Botanical Name	Vernacular Name	Family	Habit of plant	Season of availability	Part used	Nature of consumption	RFC
38	*Ficus semicordata* Buch. ex J.E. Smith	Bhui dumar	Moraceae	T	May-Aug	F	Ripe fruits are edible	0.27
39	*Ficus lacor* L.	Pakri/ Pakar	Moraceae	T	Mar-Apr	L & F	Fresh flush of leaves is cooked as vegetable and ripe fruits are consumed directly	0.61
40	*Gardenia latifolia* Ait.	Kurlu/ Papra	Rubiaceae	T	TOY	F	Ripe fruits are edible	0.24
41	*Grewia hirsuta* Vahl.	Gursakri	Malvaceae	S	Sep-Dec	F	Ripe fruits are edible	0.41
42	*Grewia rothii* DC.	Bansulli	Malvaceae	S	Feb-Oct	F	Ripe fruits are edible	0.4
43	*Grewia tiliifolia* Vahl.	Dhaman	Malvaceae	S	May-Jun	F	Ripe fruits are edible	0.2
44	*Ipomoea acquatica* Forrsk.	Karmota Bhaji	Convolvulaceae	C	TOY	L, St	Leaves, young shoots and tendrils are cooked as vegetable.	0.63
45	*Leucas cephalotes* Spreng.	Gumi Bhaji	Lamiaceae	H	Jul-Sep	L	Cooked as vegetable	0.28
46	*Limonia acidissima* L.	Kait	Rutaceae	T	Nov-Mar	F	Ripe fruits are eaten directly or made into chutney	0.43
47	*Madhuca longifolia* (Koen.) Macbr.	Mahua	Sapotaceae	T	Mar-Jun	Fl, F & S	Flowers are consumed directly, made into liquor, or boiled and eaten. Ripe fruits are consumed, and seeds are used to extract oil which is used in cooking food and applying on skin.	0.9
48	*Mangifera indica* L.	Aam	Anacardiaceae	T	Apr-Jul	F	Unripe fruits are dried and used in vegetables, pickled or made into chutney and also cooked with jaggery and consumed. Ripe fruits are consumed directly or made into juice and drink.	0.83
49	*Marsilea minuta* L.	Sunsuniya bhaji	Marsileaceae	H	Apr-Oct	L	Cooked as vegetable	0.44
50	*Momordica dioica* Roxb. ex Willd.	Kheksa	Cucurbitaceae	C	Sep-Nov	F	Unripe fruits are cooked as vegetable	0.43
51	*Morus alba* L.	Sehtut	Moraceae	T	Jun-Aug	F	Ripe fruits are consumed	0.52
52	*Mucuna pruriens* (L.) Dc.	Kewanch	Fabaceae	C	Jan-Mar	SP	Seed pods are carefully boiled and then cooked as vegetable	0.44
53	*Phoenix acaulis* Buch.	Chheend	Arecaceae	S	Apr-Jun	F	Ripe fruits are consumed	0.5
54	*Phyllanthus acidus* (L.) Skeels.	Shree Amla	Phyllanthaceae	S	Jun-Aug	F	Consumed directly or made into pickle	0.49
55	*Phyllanthus emblica* L.	Amla	Phyllanthaceae	T	Feb-May	F	Fruits are made into pickles, or dried and made into candy or cooked with jaggery to prepare Murabba	0.74
56	*Physalis angulata* L.	Chirpoti	Solanaceae	S	Oct-Jun	F	Ripe fruits are consumed directly	0.63
57	*Pithecellobium dulce* (Roxb.) Benth.	Ganga imli	Fabaceae	T	Feb-Apr	F	Fruits are edible	0.53
58	*Pueraria tuberosa* (Roxb.) DC.	Patal Kumda	Fabaceae	C	Apr-May	T	Cooked as vegetable	0.18
59	*Randia dumetorum* Lamk.	Mainhar	Rubiaceae	S	Oct-Jan	F	Unripe fruits are peeled and then boiled and cooked as vegetable	0.26
60	*Randia uliginosa* DC	Thelka	Rubiaceae	T	Aug-Mar	F	Unripe fruits boiled and then cooked as vegetable.	0.24
61	*Schleichera oleosa* Lour.	Kusum	Sapindaceae	T	Mar-Jun	F & S	Fruits are consumed directly, made into pickle or cooked as vegetables.	0.74

… *Contd*.

Table 2 — Wild edible plant species utilized by the local communities of Chilphi Range (Contd.)

S. No.	Botanical Name	Vernacular Name	Family	Habit of plant	Season of availability	Part used	Nature of consumption	RFC
62	*Scirpus grossus* (L.f.)	Kaseru Kand	Cyperaceae	H	Sep-Nov	T	Tubers are boiled and eaten	0.24
63	*Semecarpus anacardium* L.	Bhelwa	Anacardiaceae	T	Dec-Mar	F	Ripe accessory fruit (apple) is consumed	0.45
64	*Shorea robusta* Gaertn.	Sal beej	Dipterocarpaceae	T	May-Jun	S	Seeds are cooked into porridge and eaten	0.25
65	*Solanum nigrum* L.	Makoya	Solanaceae	H	Aug-Oct	F	Fruits are boiled and then cooked as vegetable	0.39
66	*Solanum xanthocarpum* Schrad. & H.Wendl.	Bhaskatiya	Solanaceae	H	Feb-Nov	F	Unripe fruits are cooked as vegetable	0.51
67	*Syzygium cumini* (L.) Skeels.	Jamun	Myrtaceae	T	Jun-Sep	F	Ripe fruits are consumed directly	0.76
68	*Tamarindus indica* L.	Imli	Fabaceae	T	Mar-Apr	L & F	Fresh flush of leaves is cooked as vegetable. Fruit pulp is made into chutney, added to certain vegetables and also made into candy	0.86
69	*Terminalia bellirica* (Gaertn.) Roxb.	Bahera	Combretaceae	T	Nov-Mar	F	Fruit is either consumed directly or used to prepare Triphala	0.72
70	*Terminalia chebula* Retz.	Harra	Combretaceae	T	Nov-Mar	F	Fruit is roasted and consumed	0.74
71	*Termitomyces spp.*	Bhimbhora Pihri/ Phutu	Lyophyllaceae	F	Sep-Dec	B	Cooked as vegetable	0.51
72	*Urginea indica* Kunth.	Jangli Pyaj	Liliaceae	H	Jul-Aug	Bb	Cooked as vegetable	0.24
73	*Zizyphus mauritiana* Lam.	Ber	Rhamnaceae	T	Feb-Apr	F	Fresh ripe fruits are consumed directly or dried and made into candy or powdered	0.77
74	*Zizyphus nummularia* W. & A.	Jharberi	Rhamnaceae	S	Feb-Apr	F	Ripe fruits are edible	0.47
75	*Zizyphus oenoplia* (L.) Mill.	Mukaiyya/ Makoh	Rhamnaceae	SS	Oct-Jan	F	Ripe fruits are edible	0.64
76	*Zizyphus rugosa* Lamk.	Sur	Rhamnaceae	SS	Apr-Jun	F	Ripe fruits are edible	0.43
77	*Zizyphus xylopyrus* (Retz.) Willd.	Ghont	Rhamnaceae	S	Jun-Dec	F	Ripe fruits are edible	0.34

Note: Habit: T= Tree, S= Shrub, H= Herb, C= Climber, G= Grass, SS= Straggling Shrub, F= Fungi
Part Used: F= Fruit, L= Leaves, St= Stem, C= Corm, B= Basidiocarp, Cu= Culm, SP= Seed Pod, S= Seed, Fl= Flowers, Rh= Rhizome, T= Tuber, At= Air tubers, Bb= Bulbs
Season of Availability: TOY= Throughout the Year
RFC: Relative Frequency of Citation

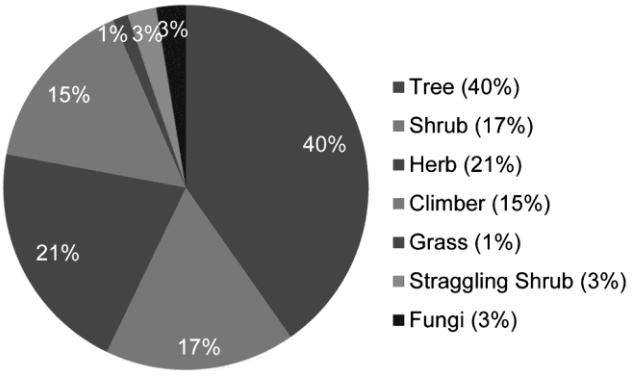

Fig. 2 — Distribution of wild edible plants of the study area in different life forms

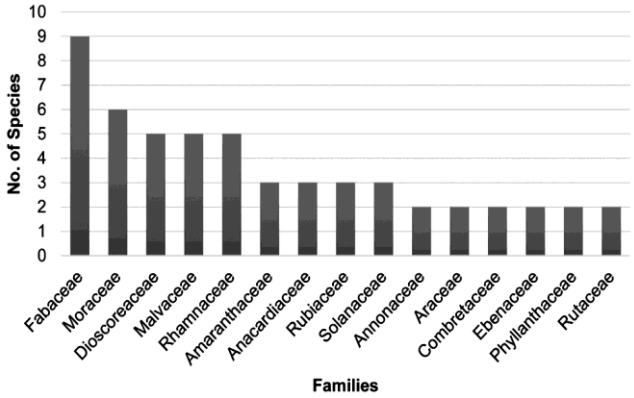

Fig. 3 — Dominant families of wild edible plants found in the study area

Amongst the various plant parts utilized for consumption, fruits dominated the list with 47%, followed by leaves (19%), seeds (8%), tubers (7%), stem (5%), rhizome (3%), flowers (2%), pods (2%), corm (2%), basidiocarp (2%), bulb (1 %), culm (1%), and air tubers (1%) (Fig. 4). Among the recorded plant species, 62 species were used for a single part (80.5%), followed by 13 species (16.9%) utilized for two parts and only 2 species (2.6%) utilized for more than two parts for consumption purpose. All the edible parts are used in different forms *viz.*, vegetable, eaten as raw or after ripening, pickle, roasted, juice, murabba, laddoo, chutney, liquor, etc. Some commonly utilized WEPs recorded during the study are shown in (Fig. 5 & Fig. 6).

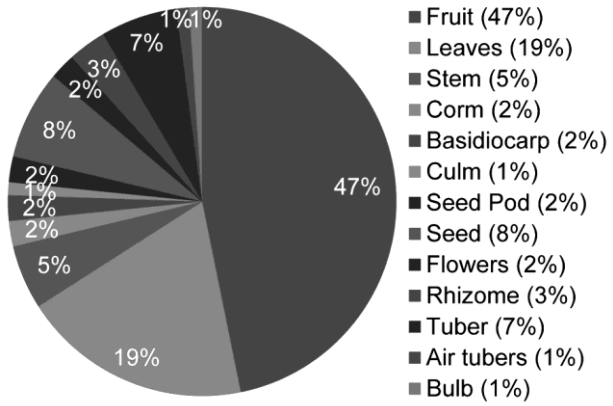

Fig. 4 — Plant parts utilized by local communities

Citation values and JI

The Relative Frequency of Citation (RFC) values ranged from 0.08 to 0.94. The highest RFC value was found for *Diospyros melanoxylon* (0.94) followed by *Aegle marmelos* (0.93), *Buchanania lanzan* (0.92), *Bauhinia purpurea* (0.91), *Madhuca longifolia* (0.9), *Tamarindus indica* (0.86), *Cassia tora* (0.85), *Dioscorea bulbifera* (0.83) and *Mangifera indica* (0.83), indicating their frequent use and high recognition among the community members. The lowest RFC was found for *Alangium salviifolium* (0.08) followed by *Basella rubra* (0.09),

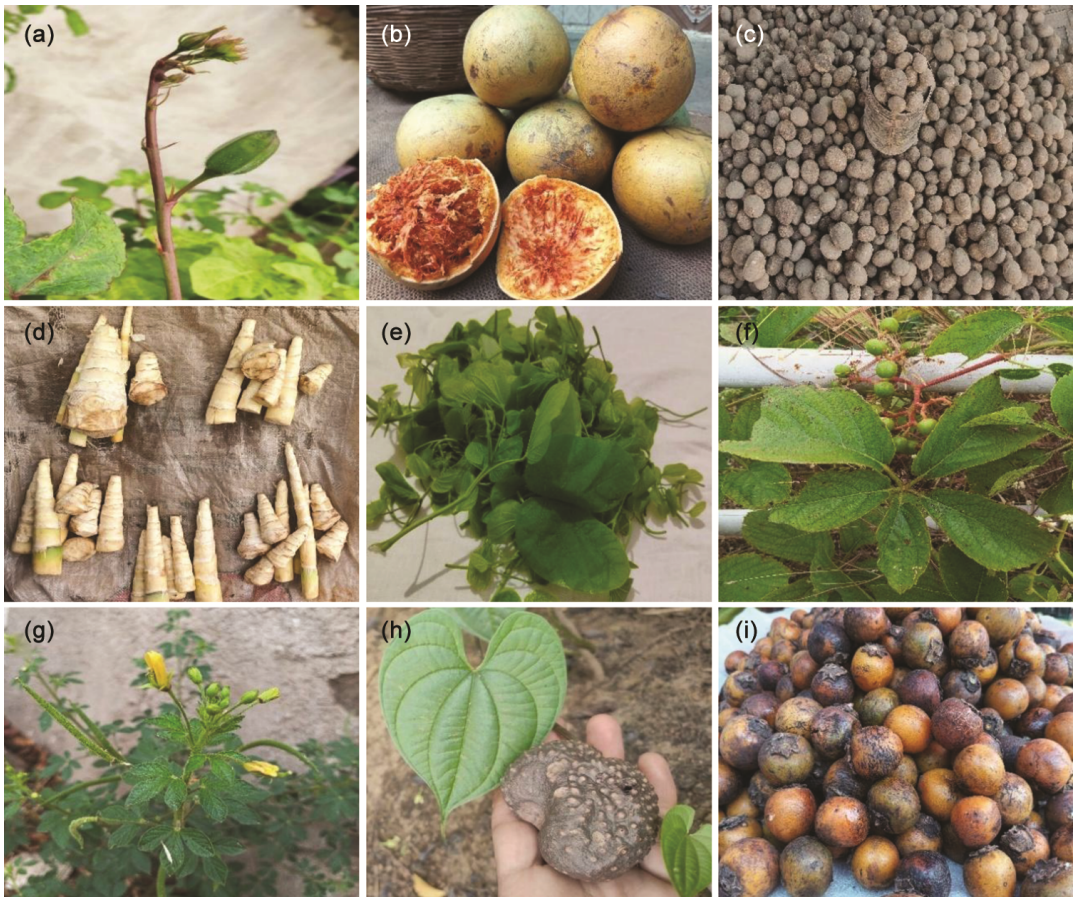

Fig. 5 — Some wild edible plants utilized by the local communities in the study area. (a) *Abelmoschus ficulneus*, (b) *Aegle marmelos*, (c) *Astraeus hygrometricus*, (d) *Bambusa arundinacea*, (e) *Bauhinia purpurea*, (f) *Cissus adnata*, (g) *Cleome viscosa*, (h) *Dioscorea bulbifera*, (i) *Diospyros melanoxylon*; Wild edible plants photo by Kanchan Verma, 2025; Chilphi Range, CG, India

Alternanthera pungens (0.14), *Cassia fistula* (0.15), *Bauhinia vahlii* (0.16), *Cissus adnata* (0.18), *Costus speciosus* (0.18) and *Pueraria tuberosa* (0.18), indicating that the species is less preferred due to taste, scarce in nearby villages of the study area, or have fallen out of favour because of modernization.

The Jaccard index of similarity was used to compare the current study from the previous studies in and around Chhattisgarh (Table 3). The value of the index ranged from 12.20 to 25.51, indicating varying degrees of overlap in wild edible plant usage. The maximum similarity (25.51) was reported in the study conducted

Fig. 6 — Some wild edible plants utilized by the local communities in the study area. (a) *Ficus racemosa*, (b) *Ficus lacor*, (c) *Leucas cephalotes*, (d) *Limonia acidissima*, (e) *Madhuca longifolia*, (f) *Morus alba*, (g) *Physalis angulata*, (h) *Schleichera oleosa*, (i) *Termitomyces* spp.; Wild edible plants photo by Kanchan Verma, 2025; Chilphi Range, CG, India

Table 3 — Comparison of similarity of uses of wild edible plants between the present study and published literature from adjoining region

Study Area	Study Year	Number of plants reported (b)	Total common species in both areas (c)	Plants with similar use (X)	Plants with dissimilar use (Y)	% of common plant species (c/b*100)	% of Plants with similar uses	% of plants with dissimilar uses	Jaccard index	Reference
Dhamtari, Chhattisgarh	2016	46	25	20	5	54.35	43.48	10.87	25.51	Toppo *et al.*[21]
Sarguja district, Chhattisgarh	2022	26	20	15	5	76.92	57.69	19.23	24.10	Panda *et al.*[23]
Bastar Region, Chhattisgarh	2019	35	21	20	1	60.00	57.14	2.86	23.08	Dandsena and Nema[24]
Odisha, India	2020	193	50	45	5	25.91	23.32	2.59	22.73	Mallick *et al.*[25]
Jalna, Maharashtra	2022	32	16	15	1	50.00	46.88	3.13	17.20	More & Dhabe[26]
Salem, Tamil Nadu	2015	56	19	16	3	33.93	28.57	5.36	16.67	Kannan *et al.*[27]
Ramnagar, Uttarakhand	2016	51	18	14	4	35.29	27.45	7.84	16.36	Pandey & Pande[28]
Bilaspur, Hamirpur and Una district, Himachal Pradesh	2017	107	20	19	1	18.69	17.76	0.93	12.20	Bhardwaj & Seth[22]

at Dhamtari district[21], and minimum similarity (12.20) was found with the study conducted at Bilaspur, Hamirpur and Una district of Himachal Pradesh[22].

Local collection dynamics and population status of WEPs in the study region

Women and children collectively accounted for the majority of WEPs gathering (43.18%), followed by all household members (27.27%), and women alone (19.32%). Meanwhile, children only (6.82%) and men only (3.41%) played minimal roles in WEP collection (Table 4). According to the feedback received from the respondents, the population status of wild edible plants is influenced mainly by overharvesting (40.91%), deforestation (23.86%), and the erosion of traditional knowledge (12.5%). The other threats included climate change (9.09%), forest fire (7.95%) and over grazing (5.68%). The respondents highlighted that the reduced availability in the production of *Buchanania lanzan* and presence of *Phyllanthus emblica* trees in the forest in the recent past can be largely attributed to premature overharvesting and the indiscriminate felling of trees. These practices disrupt natural regeneration, ultimately leading to diminished populations and a decline in overall production within forest ecosystems.

Discussion

Ethnobotanical richness

The documented wild edible plants in the present study shows great taxonomic diversity at species level, including 77 species from 54 genera and 38 families, depicting diverse range of alternative supplementary food available to the local community of the region. Similar studies on WEPs in other regions of the country show similar results with a wide range of wild plants being utilised for consumption purpose[29,27].

In the present study, a higher proportion of wild edible plants (40%) were sourced from trees, which is similar to the study conducted in Kalrayan hills, Tamil Nadu but differs from the study conducted at Manipur[27,30]. Also, the dominant family in the present study was Fabaceae, but in the study conducted at Manipur, Zingiberaceae was reported to be the dominant family[30]. Such variation can be attributed to differences in forest types, with Manipur having moist temperate and subtropical forests supporting dense herbaceous undergrowth and climbers, whereas the dry conditions of deciduous forests in central India and Kalrayan hills supporting more diverse tree growth. The ecological context significantly shapes the type of wild edible plants utilized by local communities.

Table 4 — Involvement of local population in the gathering operation of WEPs

Gender	No. of respondents	Percentage of respondents
Women only	17	19.32
Children only	6	6.82
Men only	3	3.41
Women and Children	38	43.18
Everyone	24	27.27
Total	88	100.00

The WEPs in the present study were utilized mainly for their edible fruits, followed by leaves and seeds which is comparable with several other studies[14,27]. This trend aligns with the dominance of tree species in the regional forest composition and the availability of fruit-bearing flora. In contrast, Vasavas of Gujarat and Bhangali people of Himachal Pradesh mostly utilize wild edible leaves for consumption[8,31]. It indicates that the plant part utilized for food varies from region to region depending on the availability of specific flora and taste preference of specific community.

A maximum similarity in the use report of WEPs in the present study was found with Dhamtari district, followed by Sarguja and Bastar region of CG. It suggests a significant exchange of ethnobotanical knowledge among the tribal and local communities of the regions. Least similarity was found with the Himachal Pradesh suggesting that the considerable geographical distance between the two regions and the unavailability of similar plant species restricts cultural exchange, resulting in low Jaccard Index[23].

Nutritional and medicinal significance of WEPs

WEPs possess significant nutritional and therapeutic importance for tribals. The high RFC species documented in the present study such as fruits of *Diospyros melanoxylon* and seeds of *Buchanania lanzan* are reported to contain proteins, minerals, phenolics and antioxidant compounds that contribute to immunity enhancement and nutritional supplementation among forest-dependent communities[32,33]. Similarly, *Aegle marmelos* possesses diverse bioactive phytochemicals exhibiting antidiabetic, antimicrobial and gastroprotective properties, supporting its long-standing use in traditional healthcare systems[34]. The edible tubers of *Dioscorea bulbifera* provide carbohydrates, vitamins and essential minerals alongside pharmacological activities such as antioxidant and anti-inflammatory effects[35]. Although comprehensive biochemical evaluation of all recorded species is beyond the scope

of the present investigation, the continued reliance by local communities on these plants indicates their role as nutritionally dense and climate-resilient food–medicine resources contributing to dietary security and traditional health systems.

Socio-demographic drivers and threats to WEPs

The traditional knowledge regarding WEPs was possessed more by elderly women of the community than men and also, their involvement in collection operation was higher. Perhaps it's due to their association with domestic tasks like cooking, market errands and nurturing roles, whereas men are primarily engaged in agricultural works, labour/ daily wage works, or other occupations[36,37]. Also, the low literacy rate, lower infrastructure availability and primary involvement of locals into low-income agriculture and labour works makes them more dependent on forest and wild edible resources in the studied region[37]. Yet, a decline in the population status of WEPs was observed in the Chilphi Range owing to overharvesting, deforestation and decline in traditional knowledge which aligns with the results obtained in similar studies from other regions[29,36], but the reasons for decline are region specific and can vary from one region to another. At some places, overharvesting could be the main driver but at other, increased invasive species population or changing land use pattern could be responsible.

Implications for conservation and sustainable utilisation of WEPs

The decline in WEPs population recorded in this study represents not only an ecological concern but also a socio-cultural challenge. Addressing it requires moving beyond species-focused protection towards integrated approaches that recognize the interdependence between ecological sustainability and community livelihoods. Community-based resource management (CBRM) offers a practical pathway for promoting sustainable use of WEPs. Locally regulated harvesting practices, including rotational collection, seasonal restrictions, and protection of reproduction stages like seeds and rhizomes, have been shown to reduce extraction pressure while maintaining continued access for dependent communities[38]. Encouraging enrichment planting of frequently utilized species within community lands and agroforestry systems may further enhance in situ conservation while reinforcing local stewardship over biological resources.

Systematic documentation and intergenerational transmission of indigenous knowledge is also crucial[36]. Initiatives that involve youth engagement, community documentation programmes, and inclusion of local communities in conservation planning acts as bottom-up approach to sustainable development[36]. Community regulated commercialization of selected WEPs through development of small-scale value addition and market linkages can provide livelihood incentives while checking unsustainable harvesting of species, hence leading to long term conservation. Further, supportive policies incorporating ethnobotanical knowledge in forest management plans, biodiversity conservation and rural livelihood initiatives can help achieve the conservation objectives, thereby safeguarding both biological resources and cultural heritage of tribes.

Conclusion

The diversity of WEPs documented in the Chilphi Range highlights their importance as supplementary food resources supporting local nutrition and livelihoods beyond conventional cereals. However, seasonal availability, perishability, and modernization are gradually weakening traditional food practices and leading to decline of associated knowledge systems among younger generations. Conservation efforts should prioritize community-managed harvesting, value addition, and market-chain development supported by appropriate policies and institutional frameworks. Further research focusing on participatory documentation of indigenous knowledge, nutritional evaluation, and domestication of WEPs through agroforestry systems can strengthen biodiversity conservation while enhancing long-term socioeconomic resilience and food security for local communities.

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Author Contributions

KV carried out the field surveys, collected data and prepared the manuscript. ST and RK P outlined the experimental design and proforma for survey, read, edited and approved the final manuscript.

Conflict of Interest

The authors confirm no conflict of interest.

Prior Informed Consent and Ethics Statement

The ethical and legal guidelines for conducting ethnobotanical studies were followed, and prior informed consent from the village heads as well as the participants was obtained during the study.

Use of Artificial Intelligence (AI)

We declare that Grammarly AI was used only for language refinement and improvement of readability but other than that the AI tools were not used anywhere for data analysis, interpretation of results, generation of scientific content, figures, or conclusions. All content was critically reviewed and verified by all the authors and we take full responsibility for the accuracy, originality, and integrity of the manuscript.

Data Availability

The data used to support the findings of this study is included in the article.

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