

Wild Leafy Vegetables of the Munda Tribe

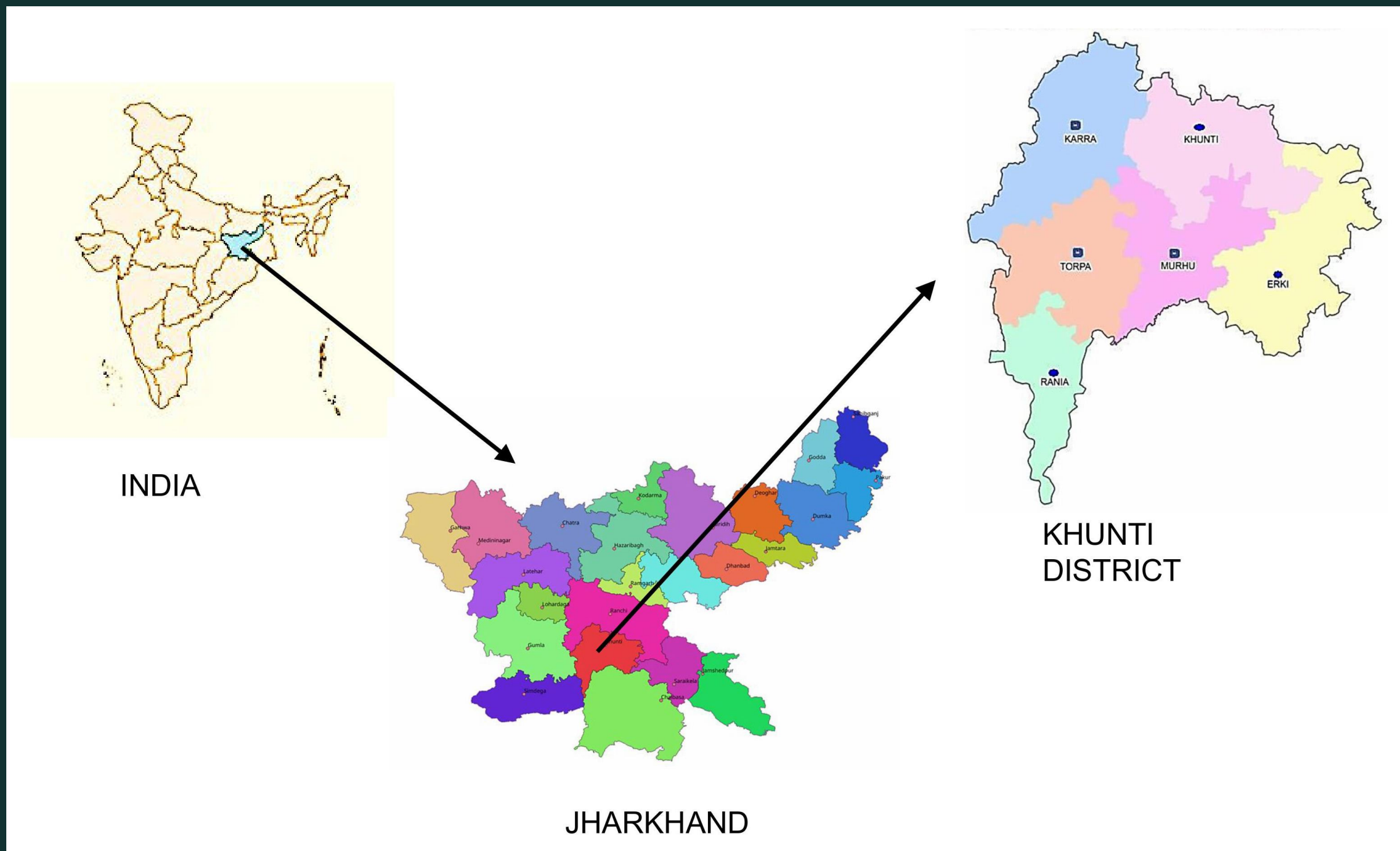
Ethnobotanical Knowledge and Nutritional Evaluation in Khunti District, Jharkhand (India)



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Study area: Map of Khunti district in Jharkhand (India)



The Munda People and Their Landscape

The Munda tribe represents one of prominent indigenous groups in Eastern India, residing predominantly in Jharkhand's forest-rich landscapes. – Khunti district, located on the South Chotanagpur plateau, features tropical monsoon climate, undulating terrain, and deciduous forests dominated by sal (*Shorea robusta*) trees.

Munda tribe belong to the Proto-Austroloid racial group, speaks the Mundari dialect. The Community maintain semi-subsistence lifestyles dependent on agriculture, forest gathering, and traditional practices—with WLVs forming a dietary staple especially during monsoon and early winter seasons.

Traditional Knowledge Under Threat



The Munda tribe of Khunti district sustains a rich tradition of utilizing wild leafy vegetables (WLVs) as integral to daily sustenance and healthcare. This time-tested ethnobotanical knowledge faces rapid decline due to changing lifestyles, biodiversity loss, and lack of documentation.

This study bridges the gap by documenting indigenous knowledge and evaluating nutritional content of these vital food sources.

62

WLV Species

Documented across 35 plant families

85%

Medicinal Uses

Species with therapeutic applications

Research Methodology

01

Ethnobotanical Survey

Participatory rural appraisal with 30 informants through semi-structured interviews, focus groups, and guided field walks

02

Plant Collection

Specimens collected, preserved using herbarium techniques, and identified using standard floras

03

Nutritional Analysis

34 species analyzed for macronutrients, micronutrients, vitamins, and minerals using AOAC standard procedures

04

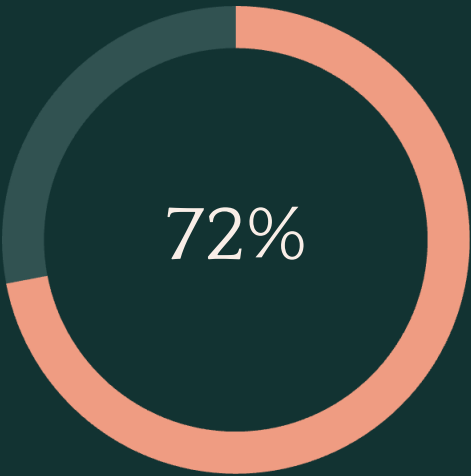
Medicinal and Cultural Significance

Documented through semi-structured interviews.

Remarkable Biodiversity

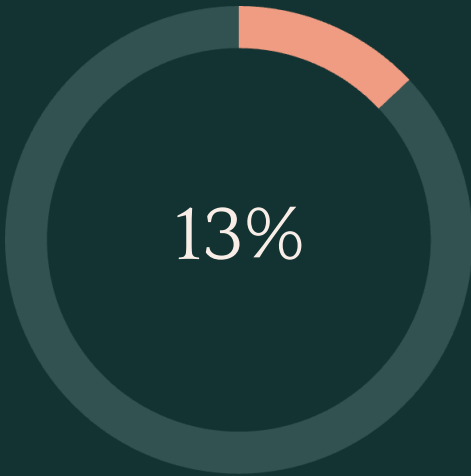
62 species · 35 families · Multiple life forms

Diversity of Wild Leafy Vegetables



Herbs

Primary source of leafy greens



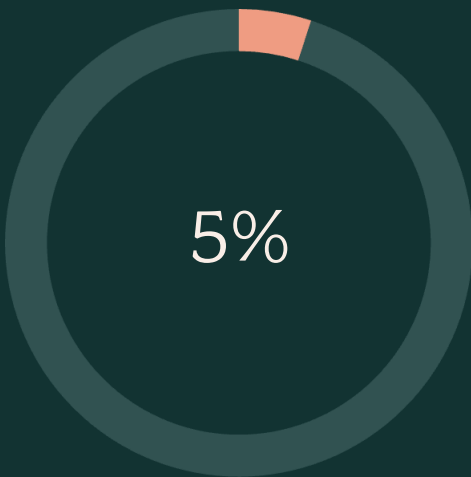
Shrubs

Secondary contributors



Trees

Seasonal leaf buds



Climbers

Tender shoots and leaves

Herbaceous flora form the primary source of green leafy vegetables, reflecting ecological availability and ease of collection from forests, fallow lands, and wetlands.

Table 1: Wild leafy vegetables (WLVs) traditionally used as green leafy vegetables (GLVs) by the Munda tribe of Khunti District, Jharkhand

S.N.	Botanical Name	Family	Mundari Name	Life-form	Parts Used	Months of Availability	Season of Availability
1.	<i>Aerva lanata</i> (L.) Juss. Ex Schult.	Amaranthaceae	Lupu Ara	Herb	Tender leaves and tender shoots	Whole Year	Whole Year
2.	<i>Alternanthera paronychioides</i> A. St. – Hil.	Amaranthaceae	Garundi Ara	Herb	Tender leaves and tender shoots	Whole Year	Whole Year
3	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Amaranthaceae	Gara Ara	Herb	Tender leaves and tender shoots	Whole Year	Whole Year
4	<i>Alternanthera sessilis</i> (L.) R. Br.	Amaranthaceae	Garundi Ara	Herb	Tender leaves and tender shoots	Whole Year	Whole Year
5	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Leper Janum Ara	Herb	Tender leaves and tender shoots	Whole Year	Whole Year
6	<i>Amaranthus viridis</i> L.	Amaranthaceae	Leper Ara	Herb	Tender leaves and tender shoots	Whole Year	Whole Year
7	<i>Antidesma acidum</i> Retz.	Euphorbiaceae	Mata Ara	Shrub	Tender leaves	February – October	Spring, Summer and Rainy
8	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem daru	Tree	Tender leaves	February – March	Spring
9	<i>Basella alba</i> L.	Chenopodiaceae	Utu ara	Climber	Tender leaves and tender shoots	Whole Year	Whole Year
10	<i>Bauhinia purpurea</i> L.	Caesalpiniaceae	Sing Ara	Tree	Tender leaves	March – May	Summer
11	<i>Bauhinia variegata</i> L.	Caesalpiniaceae	Jantai	Tree	Tender leaves	July – August	Rainy
12	<i>Begonia picta</i> Sm.	Begoniaceae	Mukri Ara	Herb	Tender leaves	July – October	Rainy
13	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Kecho Ara	Herb	Tender leaves	Whole Year	Whole Year
14	<i>Butomopsis latifolia</i> (D. Don) Kunth.	Alismataceae	Lundi Ara	Herb	Tender leaves	July – October	Rainy
15	<i>Celosia argentea</i> L.	Amaranthaceae	Sirgiti Ara	Herb	Tender leaves	July – October	Rainy
16	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Choke Ara	Herb	Tender leaves	Whole Year	Whole Year

17	<i>Chenopodium album</i> L.	Chenopodiaceae	Bhatua Ara	Herb	Tender leaves	October - March	Winter and Spring
18	<i>Cissus auriculata</i> Roxb.	Vitaceae	Burlai Ara	Climber	Tender leaves	June - October	Rainy
19	<i>Cleome monophylla</i> L.	Capparidaceae	Charmani Ara	Herb	Tender leaves	July - November	Rainy
20	<i>Colocasia esculenta</i> (L.) Schott.	Araceae	Saru	Herb	Tender leaves	June - October	Rainy
21	<i>Commelina benghalensis</i> L.	Commelinaceae	Kena Ara	Herb	Tender leaves	September - January	Winter
22	<i>Commelina cyanea</i> R. Br.	Commelinaceae	Undku Ara	Herb	Tender leaves	September - January	Winter
23	<i>Corchorus olitorius</i> L.	Tiliaceae	Chench Ara	Shrub	Tender leaves	July - October	Rainy
24	<i>Cordia macleodii</i> (Griff.) Hook. f. & Thomson	Boraginaceae	Bhaduli Ara	Tree	Tender leaves	April - May	Summer
25	<i>Cordia myxa</i> L.	Boraginaceae	Boonch Ara	Tree	Tender leaves	May - June	Summer
26	<i>Croton persimilis</i> Mull. Arg.	Euphorbiaceae	Kuti	Tree	Tender leaves and leaf buds	March - August	Summer and Rainy
27	<i>Dentella repens</i> (L.) J.R. Forst. & G. Forst.	Rubiaceae	Kantha Ara	Herb	Tender leaves	March - September	Summer and Rainy
28	<i>Enhydra fluctuans</i> Lour.	Asteraceae	Muchri Ara	Herb	Tender leaves	Whole Year	Whole Year
29	<i>Ficus virens</i> Aiton	Moraceae	Putkul	Tree	Leaf buds	February - March	Summer
30	<i>Gymnopetalum chinense</i> (Lour.) Merr.	Cucurbitaceae	Kaubutki	Climber	Tender leaves	July - August	Rainy
31	<i>Hibiscus cannabinus</i> L.	Malvaceae	Kotle	Shrub	Tender leaves	July - October	Rainy
32	<i>Hibiscus sabdariffa</i> L.	Malvaceae	Epil Ara, Jojo ara	Shrub	Tender leaves	July - October	Rainy

33	<i>Hygrophila auriculata</i> Heine.	Acanthaceae	Koila Khari, Koila Ara	Herb	Tender leaves	Whole Year	Whole Year
34	<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	Kalmi Ara	Climber	Tender leaves	Whole Year	Whole Year
35	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	Gomha Ara	Herb	Tender leaves	June - January	Except Summer
36	<i>Leucas cephalotes</i> (Roth.) Spreng.	Lamiaceae	Marang Gomha	Herb	Tender leaves	June - January	Except Summer
37	<i>Limnophila aromatica</i> (Lam.) Merr.	Scropulariaceae	Loson Ara, Losodh Ara	Herb	Tender leaves	June - January	Except Summer
38	<i>Limnophila repens</i> (Benth.) Benth.	Scrophulariaceae	Uli ara	Herb	Tender leaves	June - January	Except Summer
39	<i>Limnophila rugosa</i> (Roth.) Merr.	Scropulariaceae	Loson Ara, Losodh Ara	Herb	Tender leaves	June - January	Except Summer
40	<i>Lobelia alsinoides</i> Lam.	Campanulaceae	Bari Ara	Herb	Tender leaves	July - October	Rainy
41	<i>Marsilea minuta</i> L.	Marsiliaceae	Chatom Ara	Herb	Tender leaves	Whole Year	Whole Year
42	<i>Medicago denticulata</i> Willd.	Fabaceae	Piring Ara	Herb	Tender leaves	December - February	Winter
43	<i>Meyna pubescens</i> (Kurz.) Robyns	Rubiaceae	Serali Ara	Shrub	Tender leaves	March - August	Summer and Rainy
44	<i>Monochoria vaginalis</i> (Burm. f.) C. Presl.	Pontederiaceae	Sadom Lochkor Ara	Herb	Tender leaves	July - January	Rainy and Winter
45	<i>Moringa oleifera</i> Lam.	Moringaceae	Munga	Tree	Tender leaves	June - December	Rainy - Winter
46	<i>Olax scandens</i> Roxb.	Olacaceae	Rimil Ara	Shrub	Tender leaves	April - September	Summer and Rainy
47	<i>Ophioglossum reticulatum</i> L.	Ophioglossaceae	Kyan Ara, Meru Ara	Herb	Tender leaves	August - January	After Rainy and in Winter

48	<i>Oxalis corniculata</i> L.	Oxalidaceae	Piri Chatom Ara	Herb	Tender leaves	Whole Year	Whole Year
49	<i>Oxalis debilis</i> Kunth.	Oxalidaceae	Piri Chatom Ara	Herb	Tender leaves	Whole Year	Whole Year
50	<i>Oxalis latifolia</i> Kunth.	Oxalidaceae	Piri Chatom Ara	Herb	Tender leaves	Whole Year	Whole Year
51	<i>Paederia foetida</i> L.	Rubiaceae	Guhi Gandhari	Climber	Tender leaves	Whole Year	Whole Year
52	<i>Polygonum plebeium</i> R.Br.	Polygonaceae	Mooiin Ara	Herb	Tender leaves	October - March	Winter and Spring
53	<i>Portulaca oleracea</i> L.	Portulacaceae	Dali ara	Herb	Tender leaves	Whole Year	Whole Year
54	<i>Portulaca quadrifida</i> L.	Portulacaceae	Nuni Ara, Uri-Alang-Ara	Herb	Tender leaves	July - November	Rainy and Winter
55	<i>Rivea hypocrateriformis</i> Choisy.	Convolvulaceae	Harlu Ara	Climber	Tender leaves	June - October	Rainy
56	<i>Rungia quinqueangularis</i> Koen.	Acanthaceae	Kauwa Ara	Herb	Tender leaves	July - October	Rainy
57	<i>Sagittaria sagittifolia</i> L.	Alismataceae	Lochkor	Herb	Tender leaves	July - January	Rainy and Wiinter
58	<i>Senna tora</i> (L.) Roxb.	Caesalpinaceae	Chakor Ara	Herb	Tender leaves	June - September	Rainy
59	<i>Spergula pentandra</i> L.	Caryophyllaceae	Chari Ara	Herb	Tender leaves	November - February	Winter
60	<i>Tamarindus indica</i> L.	Caesalpinaceae	Jojo	Tree	Tender leaves	April - July	Summer
61	<i>Vicia hirsuta</i> (L.) Gray	Fabaceae	Masuri Ara	Herb	Tender leaves	October - January	Winter
62	<i>Vicia sativa</i> L.	Fabaceae	Chirgi	Herb	Tender leaves	October - January	Winter



Dominant Plant Families

Amaranthaceae

Six species documented, including *Amaranthus spinosus* and *Alternanthera sessilis*

Fabaceae

Multiple species valued for protein content and adaptability

Lamiaceae

Aromatic herbs with medicinal properties

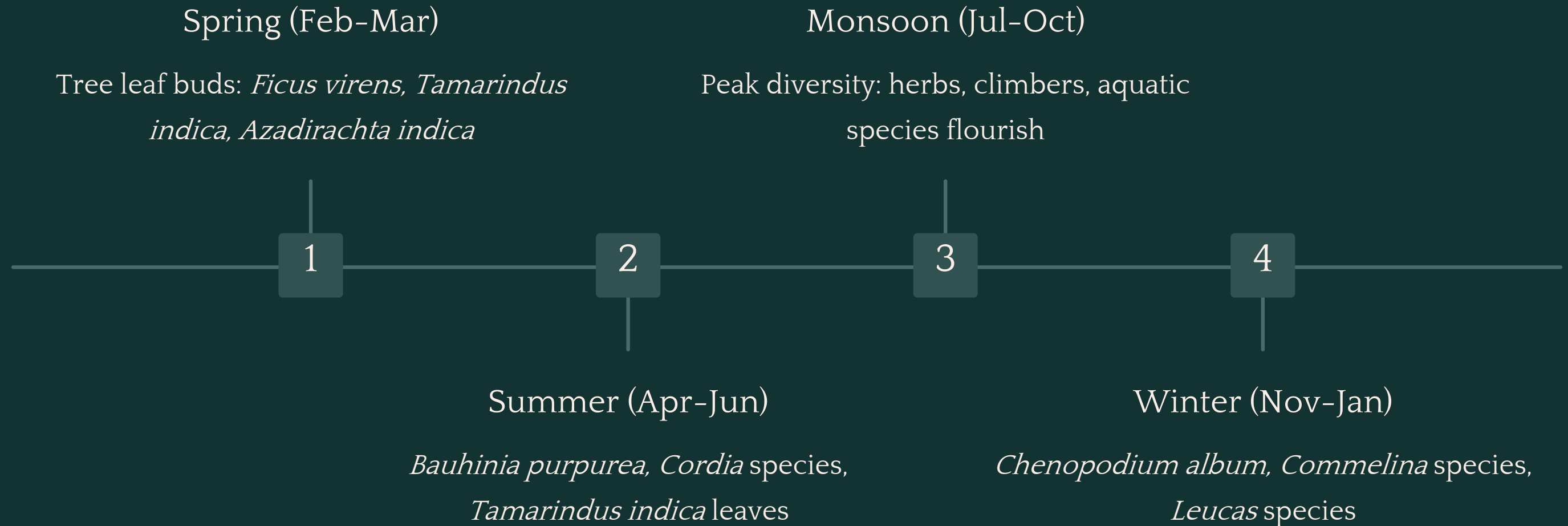
Year-Round Availability

Ten species provide continuous nutrition throughout all seasons, serving as dependable sources when cultivated vegetables are scarce:

- *Aerva lanata*
- *Alternanthera sessilis*
- *Amaranthus spinosus*
- *Boerhavia diffusa*
- *Enhydra fluctuans*
- *Hygrophila auriculata*
- *Ipomoea aquatica*
- *Marsilea minuta*
- *Oxalis corniculata*
- *Portulaca oleracea*



Seasonal Harvesting Pattern



Nutritional Powerhouses

34 species analyzed • Exceptional micronutrient content

Table 2: Nutritional composition of selected wild leafy vegetables traditionally used by the Munda tribe.

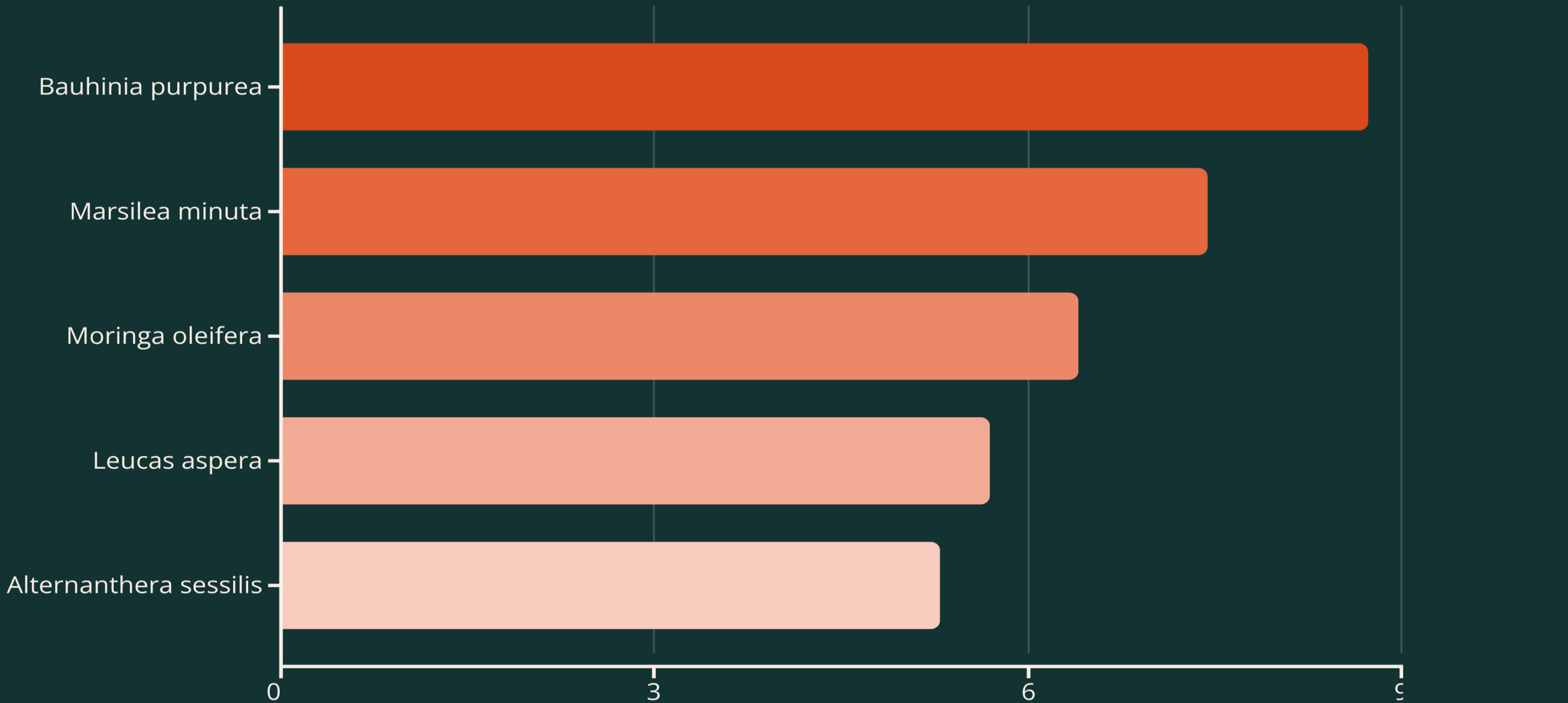
S.N.	Botanical Name	Mundari Name	Energy (Kcal/100g)	Protein (g/100g)	Carbohydrate (g/100g)	Fat(g/100g)	Dietary fibre (g/100g)	β-Carotene/Retinol(μg/100g)	Vit C(mg/100g)	Vit B1 (mg/100g)	Vit B2 (mg/100g)	Iron (mg/100g)	Zinc (mg/100g)	Calcium (mg/100g)	Folic acid (μg/100g)	Phosphorus (mg/100gm)
1	Aerva lanata (L.) Juss. Ex Schult.	Lupu Ara	56	4.6	9.5	ND	5.9	21760	12	ND	ND	22.1	0.7	202	41	ND
2	Alternanthera sessilis (L.) R. Br.	Garundi Ara	51	5.3	5.17	0.71	6.74	5288	103	0.02	0.1	3.9	1	388	48	53.2
3	Amaranthus spinosus L.	Leper Janum Ara	24	1.6	2.01	0.45	2.21	1594	77.3	0.01	0.13	6.3	1.6	359	41	72.4
4	Amaranthus viridis L.	Leper Ara	33	3.93	2.37	0.63	4.91	21449	86.2	0.01	0.26	7.2	1.3	245	82	75.9
5	Antidesma acidum Retz.	Mata Ara	109	4.79	22.38	ND	7.63	2871	1.2	13.87	2.62	5.2	0.7	474.2	ND	ND
6	Basella alba L.	Utu ara	21	3.17	2.03	ND	1.63	62	2.9	ND	ND	3.4	0.3	160.5	ND	25.2
7	Bauhinia purpurea L.	Sing Ara	85	8.73	12.52	ND	4.22	2935	2.6	15.34	0.71	4.33	1.3	146.5	ND	ND
8	Boerhavia diffusa L.	Kecho Ara	52	4.37	8.67	ND	2.47	2257	0.7	0.42	1.31	9.4	1.7	877.9	0.4	8.7
9	Celosia argentea L.	Sirgiti Ara	48	4.58	6.41	0.4	5.93	1157	ND	ND	0.34	7.7	0.2	202.6	0.3	40.1
10	Centella asiatica (L.) Urb.	Choke Ara	54	1.9	11	ND	7.5	500	5	Nil	Nil	55.7	1.9	231	NA	NA

11	Cissus auriculata Roxb.	Burlai Ara	26	2.65	3.73	ND	2.42	92	1.7	6.24	0.16	1.9	0.8	257.7	0.2	10.3
12	Cleome monophylla L.	Charmani Ara	42	4.71	5.89	ND	2.21	1128	3.2	0.14	0.57	29.2	0.9	458.7	ND	21.3
13	Colocasia esculenta (L.) Schott.	Saru	44	3.4	3.69	1.38	5.6	146	40.7	0.08	0.07	3.4	0.8	216	159	57.9
14	Commelina cyanea R. Br.	Undku Ara	42	3.43	6.99	ND	4.25	1800	1.5	1.79	3.15	21.9	0.7	121.2	ND	0.2
15	Dentella repens (L.) J.R. Forst. & G. Forst.	Kantha Ara	46	3.5	8	NA	7.1	11680	9	3.07	NA	81.1	1.0	425	7	NA
16	Ficus virens Aiton	Putkul	324	2.4	58.4	1.8	3.5	30	4	NA	NA	4.1	0.3	672	NA	NA
17	Hibiscus cannabinus L.	Kotle	42	1.54	9.07	ND	5.72	2665	ND	0.36	0.24	2.1	0.1	177.9	ND	10.9
18	Hibiscus sabdariffa L.	Epil Ara, Jojo ara	36	1.9	4.06	1.09	4.59	5285	29.7	0.13	0.06	7.7	0.7	145	75	42
19	Ipomoea aquatica Forssk.	Kalmi Ara	28	2.9	3.1	0.23	NA	1980	10	0.05	0.13	3.9	NA	110	NA	NA
20	Leucas aspera (Willd.) Link	Gomha Ara	67	5.7	11.1	NA	6.7	18460	8	NA	NA	20.0	0.8	236	11	NA
21	Marsilea minuta L.	Chatom Ara	113	7.44	20.76	ND	7.24	15333	1.2	2.3	2.6	16.6	3.5	90.1	ND	ND
22	Medicago denticulata Willd.	Piring Ara	67	1.37	15.5	ND	7.39	3124	ND	1.04	0.65	7.8	0.9	293.1	ND	10.4
23	Meyna pubescens (Kurz.) Robyns	Serali Ara	86	4	14.9	1.1	NA	NA	NA	NA	NA	NA	NA	127	NA	NA
24	Moringa oleifera Lam.	Munga	67	6.4	5.62	1.64	8.21	17542	108	0.06	0.45	4.6	0.7	314	43	109

25	O lax scandens Roxb.	Rimil Ara	98	4.63	19.83	ND	2.87	1186	3.1	0.33	3.59	7.7	2.0	115.9	0.4	14.3
26	Oxalis corniculata L.	Piri Chatom Ara	54	0.66	12.75	ND	7.94	2600	ND	1.61	0.93	2.8	2.3	192.4	6	ND
27	Portulaca oleracea L.	Dali ara	58	3.43	11.02	ND	5.62	249	ND	0.65	0.46	24.4	1.4	200.2	0.3	36.9
28	Portulaca quadrifida L.	Nuni Ara, Uri-Alang-Ara	19	3.57	1.19	ND	4.85	1015	1.6	0.17	0.73	31.2	0.8	10.8	ND	0.2
29	Rungia quinqueangularis Koen.	Kauwa Ara	42	4.69	5.91	ND	1.97	287	ND	ND	0.66	8.2	18.7	340.4	0.4	21.7
30	Sagittaria sagittifolia L.	Lochkor	51	2.95	12.43	ND	6.17	2561	ND	0.31	5.55	5.1	0.3	163.9	1	12.7
31	Senna tora (L.) Roxb.	Chakor Ara	49	5	5.5	0.8	NA	10512	82	0.08	0.19	12.4	NA	520	NA	NA
32	Spergula pentandra L.	Chari Ara	39	0.59	9.27	ND	6.97	83	ND	3.94	0.4	58.7	53.9	90.9	5	ND
33	Tamarindus indica L.	Jojo	71	5.8	10.04	0.49	10.7	168	28.2	0.12	0.03	2.8	0.9	66.9	92	86.8
34	Vicia sativa L.	Chirgi	64	0.71	15.21	ND	7.75	2694	ND	1.8	6.77	6.7	0.7	52.5	8	ND

NA= Not available; ND= Not detected

Protein Content Variation



Protein content ranged from 0.59 to 8.73 g/100g, with several species comparable to cultivated vegetables—crucial for predominantly vegetarian tribal diets.

Energy and Carbohydrate Range

Energy Content

Ranges from **19 Kcal/100g** (*Portulaca quadrifida*) to **324 Kcal/100g** (*Ficus virens*)

Tree species contribute significantly to caloric intake, while herbaceous greens provide low-calorie nutrient supplementation.

Carbohydrates

Ranges from **1.19 g/100g** to **58.4 g/100g**

Variable energy potential reflects functional diversity—from light digestible greens to energy-dense leaves consumed occasionally.



Exceptional β -Carotene Content

21,760

Aerva lanata

$\mu\text{g}/100\text{g } \beta\text{-carotene}$

21,449

Amaranthus viridis

$\mu\text{g}/100\text{g } \beta\text{-carotene}$

18,460

Leucas aspera

$\mu\text{g}/100\text{g } \beta\text{-carotene}$

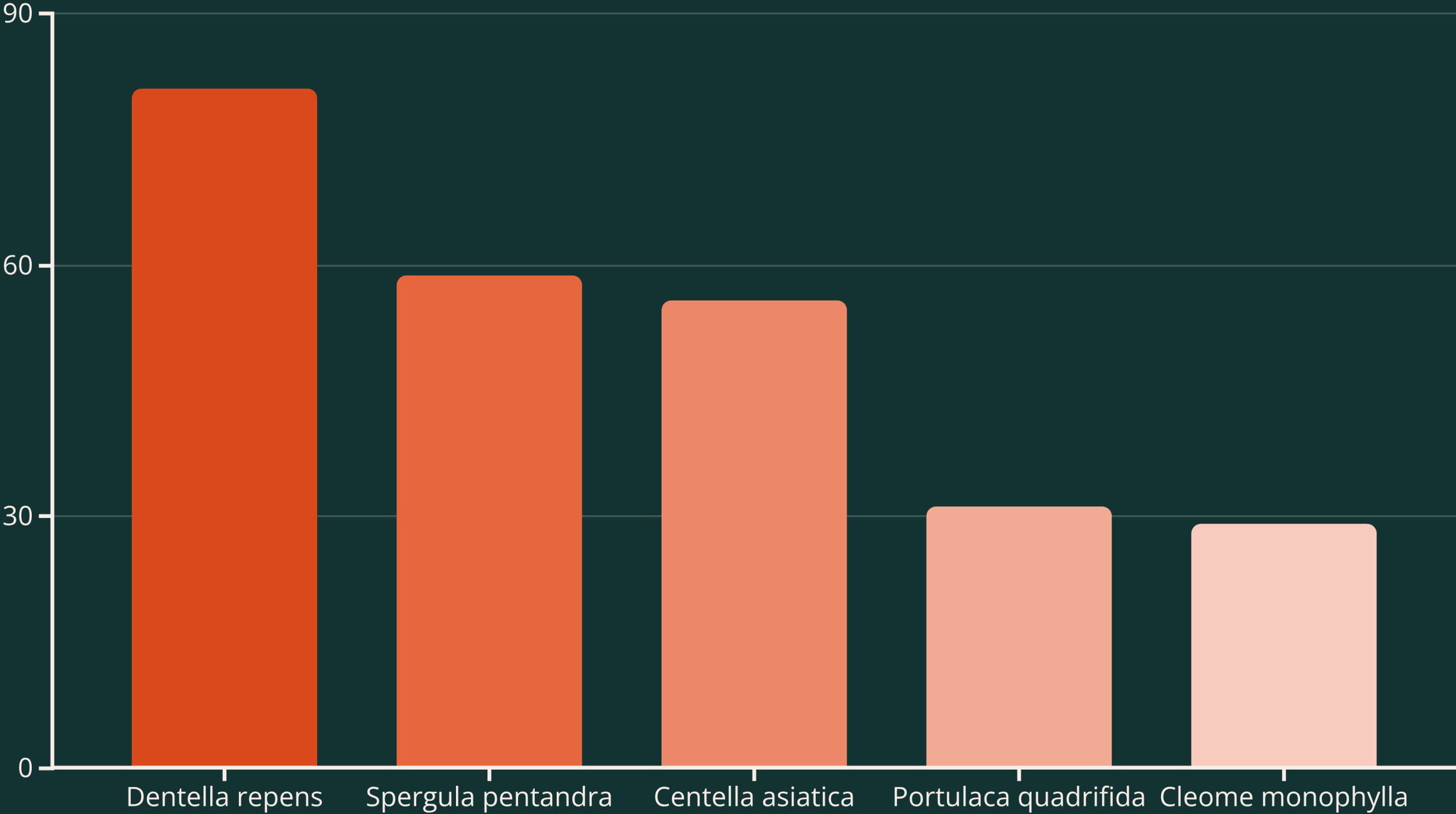
17,542

Moringa oleifera

$\mu\text{g}/100\text{g } \beta\text{-carotene}$

These concentrations are comparable to or exceed many cultivated vegetables, playing a vital role in combating vitamin A deficiency prevalent in rural populations.

Iron: Fighting Anemia



Iron content ranged from 2.1 to 81.1 mg/100g—addressing micronutrient malnutrition in tribal households.

Calcium-Rich Species



Boerhavia diffusa

877.9 mg/100g calcium content



Ficus virens

672 mg/100g calcium content



Senna tora

520 mg/100g calcium content

High mineral concentrations support bone health and address calcium deficiency common in rural diets.



Vitamin C and Antioxidants

Several species showed appreciable vitamin C content, enhancing antioxidant value and immune-supporting properties:

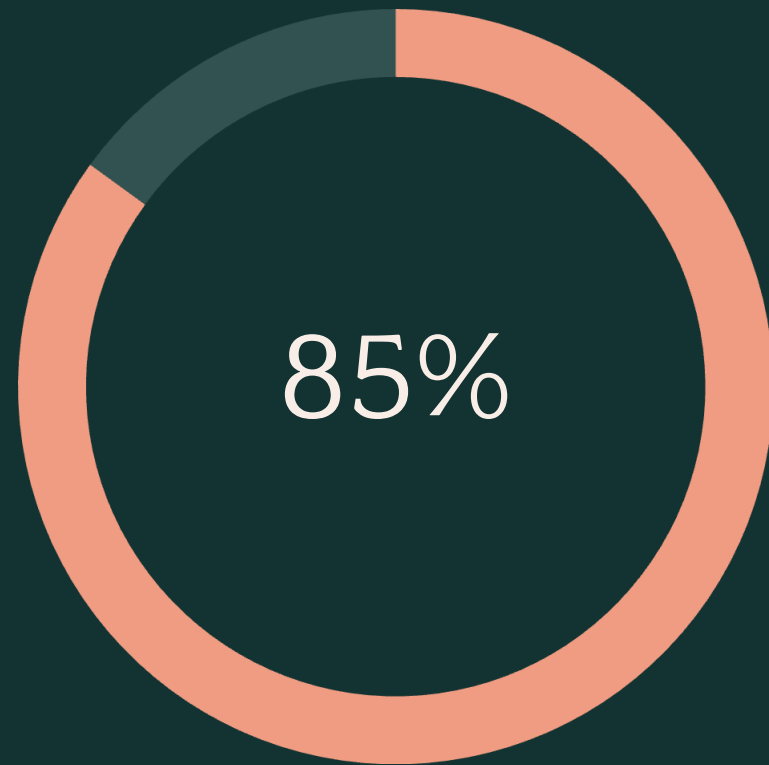
- **Moringa oleifera:** 108 mg/100g
- **Alternanthera sessilis:** 103 mg/100g
- **Amaranthus viridis:** 86.2 mg/100g
- **Senna tora:** 82 mg/100g
- **Amaranthus spinosus:** 77.3 mg/100g

Combined presence of essential vitamins and minerals indicates these wild species serve as affordable, sustainable sources of balanced nutrition.

Food as Medicine

Dual role in nutrition and healthcare

Ethnomedicinal Significance



Medicinal Species

53 of 62 species with therapeutic uses

The majority of documented species possess one or more therapeutic applications, demonstrating the community's holistic approach where food and medicine are interlinked.

Tender leaves and young shoots are most commonly used, consumed as cooked pot-herbs or in medicinal preparations.

Primary Health Applications



Digestive Health

Most species used to treat constipation, reflecting emphasis on dietary therapy for gastrointestinal disorders



Anemia Treatment

High iron content species consumed regularly to address blood-related disorders



General Wellness

Species used to enhance appetite, relieve weakness, and improve overall vitality

Multifunctional Medicinal Plants

Aerva lanata

Dysentery treatment and peripheral edema relief

Boerhavia diffusa

External application for pain and edema during pregnancy

Paederia foetida

Massage oil ingredient for rheumatism and paralysis

Azadirachta indica

Blood purifier, antiseptic, treatment for jaundice



Specialized Therapeutic Uses

Appetite Enhancement

- *Enhydra fluctuans*
- *Leucas aspera*
- *Leucas cephalotes*

Memory & Cognition

- *Centella asiatica*
- *Marsilea minuta (insomnia)*

Chronic Conditions

- *Moringa oleifera (hypertension)*
- *Senna tora (diabetes)*

Culinary Traditions

Simple preparation methods preserving nutrition

Diverse Preparation Methods



Fresh Cooking

Steam-cooked with mustard oil, spices, and local condiments



Traditional Roasting

Wrapped in *Shorea robusta* leaves, roasted over low heat



Drying & Storage

Sun-dried, powdered, stored for year-round use



The *Shorea robusta* Leaf Technique

A unique cultural feature involves wrapping fresh leaves in *Shorea robusta* (sal) leaves arranged in crisscross layers. The packet is tied securely and roasted over low heat, then mashed with crushed garlic, salt, and mustard oil.

A hot charcoal piece is placed on the mixture and covered to retain smoky aroma—representing a sustainable, zero-waste cooking practice that minimizes utensil and fuel use while imparting distinctive flavor.



1



2



3



4



5



6



7



8



9



10



11



12



13



14



15

Chutneys and Pickles



Fresh Chutneys

Leaves of *Centella asiatica*, *Limnophila* species, and *Oxalis* species ground with green chillies, garlic, ginger, and tamarind pulp.

Mixed with mustard oil and salt—serving as tangy, aromatic condiments valued for digestive properties.

Pickled Preparations

Ficus virens leaf buds blanched, dried, mixed with mustard oil, spices, and stored in sunlight for 15 days.

Ensures availability of nutritious greens beyond fresh harvest periods.

Holistic Food System

These preparation techniques illustrate the Munda community's culinary innovation and ethnobotanical wisdom, ensuring year-round access to nutritious greens while enhancing taste, palatability, and medicinal value.

Food, medicine, and environment are deeply interlinked in this traditional knowledge system.

Path Forward: Integration and Conservation



Documentation

Systematic recording of traditional knowledge and species diversity



Program Integration

Including WLVs in public nutrition and rural development initiatives



Community Awareness

Strengthening recognition of WLVs' nutritional and cultural value



Biodiversity Conservation

Sustainable harvesting practices and habitat protection

Key Findings



Rich Biodiversity

62 WLW species across 35 families demonstrate remarkable ethnobotanical diversity and deep ecological awareness



Dual Functionality

85% of species serve both nutritional and medicinal purposes, embodying "food as medicine" philosophy



Nutritional Excellence

High contents of proteins, iron, calcium, β -carotene, and vitamins—comparable to or exceeding cultivated vegetables



Cultural Heritage

Simple preparation methods reflect culinary innovation and sustainable resource management



Conclusion

Integrating traditional ecological knowledge with modern nutritional science can enhance community health, promote biodiversity-based food systems, and guide future bioprospecting and public health policies.

Conservation of these species, along with promotion of their sustainable use, is urgently needed to preserve this invaluable heritage.

“When an elder dies, a library burns”

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