



## Study of five wild edible plants and their comparison with cultivated plants in Chhindwara district of Madhya Pradesh

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### Abstract

Wild edible plants (WEPs) serve as valuable nutritional resources for tribal populations and contribute substantially to food security and traditional health care systems. The present study evaluates the nutritional composition of five wild edible plants, *Chenopodium album*, *Amaranthus viridis*, *Colocasia esculenta* (leaves), *Bauhinia purpurea* (flower buds), and *Dioscorea bulbifera* (tubers), collected from forest regions of Chhindwara district, Madhya Pradesh, India. These plants were analyzed for proximate composition (moisture, protein, crude fiber, ash, carbohydrates) and mineral content (iron and calcium) using standard AOAC (2019) methods. The nutritional values of these samples were compared with cultivated vegetables (*Spinacia oleracea* and *Brassica oleracea* var. *botrytis*). Results showed that wild plants had significantly higher protein (18.2–27.4%), crude fiber (9.1–14.5%), and ash content (8.8–12.5%) than cultivated vegetables. Mineral analysis revealed that wild plants contained 2–3 times greater concentrations of iron (10.3–18.2 mg/100 g) and calcium (130–220 mg/100 g) compared to cultivated species. *Amaranthus viridis* exhibited the highest protein content, while *Chenopodium album* showed maximum calcium concentration. The study concludes that wild edible plants possess superior nutritional value and represent a sustainable, low-cost food resource suitable for improving dietary diversity and combating micronutrient deficiencies in tribal and rural populations. The findings encourage the promotion and conservation of wild edible plants as part of community nutrition programs.

**Keywords:** Wild edible plants, tribal food, nutritional analysis, Chhindwara, Madhya Pradesh, ethnobotany, food security

### Introduction

Wild edible plants (WEPs) are naturally occurring plant species that are consumed by local and tribal communities either as regular food sources or during periods of food scarcity. They include leaves, flowers, fruits, seeds, and tubers that are harvested from forests, grasslands, and uncultivated agricultural fields. These plants have been an integral part of traditional diets across rural India, especially in tribal regions where access to cultivated crops is limited. According to the Food and Agriculture Organization (FAO), more than one billion people globally rely on wild plants to supplement their daily nutrition and health requirements.

India is regarded as a biodiversity hotspot, with more than 9,500 species of wild food plants, out of which nearly 1,500 are commonly consumed by indigenous communities. Madhya Pradesh, particularly the Chhindwara district, is known for its dense forests and rich floristic diversity. The district is predominantly inhabited by Gond, Bharia, and Pradhan tribes, who possess deep ethnobotanical knowledge passed down through generations. These communities traditionally harvest seasonal wild vegetables and use them as sources of essential nutrients, especially during the monsoon and winter when cultivated crops are limited. Despite their significance, wild edible plants remain underutilized and are often overlooked due to the growing dominance of high-yield, commercially cultivated crops. Modern agricultural practices and market dependency have gradually reduced the diversity of wild plant consumption, leading to a loss of traditional knowledge and dietary diversity. At the same time, malnutrition and micronutrient deficiencies remain major public health issues in rural and tribal regions of India. Previous studies indicate that several wild plants contain higher levels of micronutrients,

antioxidants, and dietary fiber than popular cultivated vegetables. Scientific evaluation and documentation of nutritional properties of WEPs are therefore essential. Such studies can highlight their potential for combating malnutrition, encourage sustainable utilization, and support conservation efforts. In Chhindwara district, many wild plants are consumed but not scientifically analyzed or compared with cultivated vegetables that are commonly marketed and used in daily diets.

### Rationale of the Study

Although research exists on wild edible plants in different parts of India, limited literature is available on the nutritional composition of wild species specifically consumed in the Chhindwara district. Comparative analysis with cultivated vegetables is required to verify their nutritional superiority and promote their inclusion in local diets and government nutrition schemes.

### Objectives

The present study was conducted with the following objectives:

1. To identify five commonly used wild edible plant species in Chhindwara district.
2. To assess their nutritional composition using standard analytical methods.
3. To compare these values with nutritionally equivalent cultivated vegetables.

### Materials and Methods

#### Study Area

The present study was conducted in the Chhindwara district of Madhya Pradesh, India. Chhindwara lies between 21.28°

N latitude and 79.33° E longitude, and is characterized by tropical dry deciduous forests dominated by *Tectona grandis* and *Boswellia serrata*. The region receives an average annual rainfall of 1,000–1,200 mm. Tribal communities such as Gond, Bharia, and Pradhan inhabit villages located near forest zones and depend on wild plants for food and medicinal purposes. Wild plant samples were collected from forest ranges located in the Tamia, Pataalkot valley, Harrai and Amarwada. These locations were selected

based on accessibility, dominance of tribal habitation, and availability of wild edible plants.

### Selection of Plant Species

Five wild edible plant species traditionally consumed by the local tribal communities were selected for study, based on field survey, literature review, and frequent consumption reports.

Plant Species (Wild)	Local Name	Part Used
<i>Chenopodium album</i>	Bathua	Leaves
<i>Amaranthus viridis</i>	Chaulai	Leaves
<i>Colocasia esculenta</i>	Arbi ke patte	Leaves
<i>Bauhinia purpurea</i>	Kachnar	Flower buds
<i>Dioscorea bulbifera</i>	Ratalu/Air potato	Tuber

For comparison, two widely consumed cultivated vegetables were selected

Plant Species (Cultivated)	Name	Part Used
<i>Spinacia oleracea</i>	Spinach	Leaves
<i>Brassica oleracea var. botrytis</i>	Cauliflower	Flower head

### Sample Collection and Identification

Plant samples were collected during their peak edible season (Nov–Feb). Samples were collected early in the morning using clean gloves and sterilized knives. Each plant was assigned a sample code and stored in pre-labeled sterile polyethylene bags. Plants were identified using the *Flora of Madhya Pradesh* (Botanical Survey of India), and Crossverification at the Department of Botany, Government Narmada Postgraduate College, Narmadapuram (M.P.)

### Sample Preparation

Parameter Analyzed	Method Used	AOAC Reference
Moisture content	Hot air oven method	AOAC 925.10
Ash content	Muffle furnace method (550°C)	AOAC 923.03
Crude protein	Kjeldahl method (N × 6.25)	AOAC 960.52
Crude fat	Soxhlet extraction	AOAC 920.39
Crude fiber	Digestion and filtration method	AOAC 962.09
Carbohydrates (%)	By difference:	—

Carbohydrates (%) = 100 – (Protein + Fat + Fiber + Ash + Moisture)

### Mineral Analysis

Mineral content (Iron, Calcium) was analyzed using the Atomic Absorption Spectrophotometer (AAS) for iron (Fe) and calcium (Ca). Results expressed in mg/100 g of dry weight

### Data Analysis

All analyses were performed in triplicate (n = 3). Results were calculated as mean ± standard deviation (SD). Statistical comparison between wild and cultivated plants

- Cleaning:** Fresh plant parts were washed with running tap water, followed by distilled water to remove dust and soil.
- Drying:** Samples were shade-dried for 5–7 days to preserve nutrients and then oven-dried at 50°C for 2 hours.
- Grinding:** Dried samples were ground into fine powder using a laboratory grinder.
- Storage:** Powdered samples were stored in airtight containers at room temperature for further analysis.

### Proximate Analysis

Nutritional analysis was performed following Standard AOAC Methods (AOAC, 2019).

was performed using One-way ANOVA ( $p < 0.05$  considered significant).

### Results and Discussion

#### Proximate Composition of Wild and Cultivated Plants

The proximate composition (moisture, protein, fat, ash, crude fiber, and carbohydrates) of five wild edible plants and two cultivated plants was analyzed. Results are summarized in Table 1.

**Table 1:** Proximate composition of wild edible plants and cultivated plants (mean ± SD, % dry weight basis)

Plant species	Protein (%)	Carbohydrates (%)	Crude fiber (%)	Moisture (%)	Ash (%)	
<i>Chenopodium album</i> (wild)	22.6 ± 0.5	48.4 ± 0.8	13.5 ± 0.4	70.2 ± 1.1	10.2 ± 0.2	
<i>Amaranthus viridis</i> (wild)	27.4 ± 0.7	42.7 ± 0.6	14.5 ± 0.3	76.3 ± 0.9	9.8 ± 0.3	
<i>Colocasia</i> (wild)	<i>esculenta</i>	18.2 ± 0.6	32.5 ± 1.0	11.2 ± 0.5	82.1 ± 1.2	12.5 ± 0.4
<i>Bauhinia</i> (wild)	<i>purpurea</i>	20.5 ± 0.4	40.3 ± 0.9	12.7 ± 0.6	72.8 ± 1.5	9.1 ± 0.3
<i>Dioscorea</i> (wild)	<i>bulbifera</i>	15.4 ± 0.5	62.0 ± 1.3	9.1 ± 0.3	55.6 ± 1.0	8.8 ± 0.4
<i>Spinacia</i> (cultivated)	<i>oleracea</i>	19.3 ± 0.4	34.1 ± 0.7	6.7 ± 0.3	88.5 ± 2.0	6.5 ± 0.2
<i>Brassica</i> (cultivated)	<i>oleracea</i>	12.5 ± 0.6	33.2 ± 0.8	3.4 ± 0.2	89.4 ± 1.9	5.3 ± 0.2

### Key findings

Wild plants showed significantly higher protein content compared to cultivated vegetables ( $p < 0.05$ ). *Amaranthus viridis* had the highest protein content (27.4%). Crude fiber levels were 2–3 times higher in wild plants than in cultivated ones. Higher ash values indicate the presence of more minerals in wild plants. These findings agree with earlier studies indicating wild edible plants as richer nutrient sources (Arya *et al.*, 2022)<sup>[1]</sup>.

### Mineral Content (Iron and Calcium)

Mineral concentrations (mg/100g) of wild and cultivated samples are shown in Table 2.

**Table 2:** Mineral content of wild edible plants and cultivated plants (mg/100 g dry weight basis)

Plant species	Iron (mg/100 g)	Calcium (mg/100 g)
<i>Chenopodium album</i>	14.8 ± 0.6	220 ± 4.2
<i>Amaranthus viridis</i>	18.2 ± 0.5	190 ± 3.6
<i>Bauhinia purpurea</i>	10.3 ± 0.4	130 ± 2.4
<i>Spinacia oleracea</i>	6.7 ± 0.3	110 ± 3.0

### Key observations

Iron content in *Amaranthus viridis* (18.2 mg/100g) was nearly 2.7 times higher than that of cultivated spinach. Calcium content was highest in *Chenopodium album* (220 mg/100g). These results confirm that wild leafy plants are excellent sources of micronutrients, supporting their ethnobotanical use in treating anemia and bone-related ailments.

### Ethnobotanical Relevance and Local Utilization

Interviews with tribal communities revealed that the Leaves of *Chenopodium album* and *Amaranthus* are used as seasonal vegetables. *Bauhinia purpurea* flower buds are consumed as pickles and curries. *Dioscorea bulbifera* tubers are roasted and eaten during food shortages. These plants are cost-free food sources rich in health-promoting phytochemicals.

### Comparative Nutritional Advantage of Wild Plants

Overall, wild plants are demonstrated in Table 3

**Table 3:** Comparative Nutritional Advantage of Wild Plants

Parameter	Wild plants	Cultivated plants
Protein	Higher	Lower
Minerals (Fe, Ca)	2–3× higher	Lower
Crude Fiber	Higher	Lower

Higher nutrient values may be attributed to slow growth in natural habitats, the lack of chemical fertilizers, and greater accumulation of secondary metabolites. Similar conclusions have been drawn by FAO (2018) and Pandey (2021)<sup>[7]</sup>, highlighting wild plants as promising sources in reducing micronutrient malnutrition.

### Discussion Summary

The results clearly show that wild edible plants possess superior nutritional qualities when compared with commonly consumed cultivated vegetables. This suggests that promoting wild plant consumption can improve dietary diversity, reduce dependency on market vegetables and

strengthen tribal food security and health. Thus, wild edible plants represent a valuable, underutilized resource that can help combat micronutrient deficiencies in rural and tribal regions.

### Conclusion

The present study evaluated the nutritional composition of five commonly consumed wild edible plants (*Chenopodium album*, *Amaranthus viridis*, *Colocasia esculenta* leaves, *Bauhinia purpurea* flowers, and *Dioscorea bulbifera* tubers) collected from the Chhindwara district of Madhya Pradesh, and compared them with two cultivated vegetables (*Spinacia oleracea* and *Brassica oleracea var. botrytis*). The study revealed that the selected wild edible plants contained significantly higher levels of protein, crude fiber, and minerals (iron and calcium) than cultivated vegetables. Among the wild plants, *Amaranthus viridis* showed the highest protein content, while *Chenopodium album* contained the highest calcium concentration. *Dioscorea bulbifera* exhibited the highest carbohydrate content, making it an excellent energy source. The higher nutritional value of wild plants can be attributed to their growth in natural ecosystems without chemical fertilizers or pesticides, resulting in greater bioaccumulation of essential phytochemicals and micronutrients. In addition, ethnobotanical surveys confirmed that local tribal communities have longstanding traditional knowledge regarding the preparation and use of these plants. The findings highlight that wild edible plants are nutritionally superior, freely available, and culturally significant, and they play a crucial role in enhancing household food security, especially in rural and tribal-dominated areas like Chhindwara. Therefore, these plants should be promoted in local diets, community health programs, and government nutrition schemes as sustainable, low-cost alternatives to cultivated vegetables. Encouraging awareness, conservation practices, and further phytochemical studies will help preserve indigenous knowledge while improving nutritional status and reducing micronutrient malnutrition among vulnerable populations.

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