

Nutritional evaluation of selected wild edible plants from the Akot–Wadner Gangai region, Maharashtra, India

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Abstract

Wild edible plants represent an important yet underutilized resource for improving nutritional security and traditional healthcare in rural regions. The present study evaluates the nutritional composition and ethnomedicinal significance of selected wild edible plant species from the Akot–Wadner Gangai region of Maharashtra, India. Fifteen edible species were selected based on their local use. Nutritional data were compiled from published literature, while ethnomedicinal information was obtained through field observations and interactions with local inhabitants.

The species exhibited significant nutritional potential, being rich in proteins, vitamins, minerals, dietary fiber, and bioactive compounds. Notably, *Moringa oleifera* showed high protein and mineral content, *Psidium guajava* was rich in vitamin C, and *Amaranthus deflexus* and *Cleome gynandra* were important sources of iron. Several plants were also traditionally used to treat digestive disorders, inflammation, and skin diseases.

The findings highlight the dual role of wild edible plants as food and medicine and their potential in enhancing dietary diversity and addressing micronutrient deficiencies. The study emphasizes the need for scientific validation, conservation, and sustainable utilization of these valuable plant resources.

Keywords

Wild edible plants, Biodiversity, Roadside vegetation, Nutritional value, Maharashtra.

1. Introduction

Wild edible plants have been an integral component of human diets since ancient times, particularly in rural and tribal communities where they supplement conventional food sources. These plants are known to provide essential nutrients and contribute significantly to food security, especially in regions with limited agricultural resources (Bharucha & Pretty, 2010).

In addition to their nutritional value, many wild plants possess medicinal properties and are widely used in traditional healthcare systems. Rural populations often rely on plant-based remedies for the treatment of common diseases due to accessibility, affordability, and cultural acceptance (Maikhuri et al., 2004). India is rich in plant biodiversity and traditional knowledge systems, which include the use of wild edible plants for both dietary and therapeutic purposes. However, modernization, habitat degradation, and declining traditional knowledge pose threats to the continued use and conservation of these resources.

The present study aims to evaluate the nutritional and ethnomedicinal importance of wild edible plants documented along the Akot–Wadner Gangai roadside area, providing insights into their role in supporting rural livelihoods. In Vidarbha, the increasing urbanization and intensification of land-use patterns are contributing to the degradation of these roadside ecosystems, threatening both the biodiversity they support and the traditional knowledge associated with the use of wild plants (Pieroni et al., 2002). As urbanization spreads, traditional farming practices are often abandoned, and the communities that once relied on these plants for food, medicine, and cultural practices are increasingly disconnected from them. This disconnect between people and their environment leads to the erosion of indigenous knowledge systems, particularly the knowledge of wild plants that have been integral to local food and health practices (Kala, 2005).

2. Materials and Methods

2.1 Study Area

The study was conducted along the Akot–Wadner Gangai road located in the Vidarbha region of Maharashtra, India. The area is characterized by semi-arid climatic conditions, seasonal rainfall, and roadside vegetation influenced by both natural and anthropogenic factors.

2.2 Data Collection

Field surveys were conducted to document wild edible plant species growing along the roadside. Plant specimens were collected and identified using standard floras and taxonomic references. Information regarding edible parts, nutritional importance, and medicinal uses was gathered through observation and interaction with local people.

2.3 Data Analysis

The collected data were analyzed qualitatively to assess:

Nutritional significance

Ethnomedicinal uses

Role in local livelihoods

3. Results

3.1 Nutritional Importance of Wild Edible Plants

The documented plant species exhibited significant nutritional potential. Many species were rich in essential nutrients such as vitamins, minerals, and dietary fiber. For example, leafy vegetables like *Amaranthus deflexus* and *Cleome gynandra* are known to be good sources of iron and vitamins, while fruits such as *Psidium guajava* and *Ziziphus mauritiana* provide vitamin C and antioxidants.

The consumption of these plants contributes to dietary diversity and helps in addressing micronutrient deficiencies in rural populations.

3.2 Ethnomedicinal Uses

Several plant species documented in the study were traditionally used for medicinal purposes. Leaves, roots, fruits, and seeds were utilized in the treatment of various ailments. For instance:

Cassia tora was used for skin diseases

Moringa oleifera was used for boosting immunity

Ficus drupacea was used for digestive issues

These findings indicate the strong link between traditional knowledge and plant-based healthcare systems.

1. Bamboo (*Bambusa vulgaris* Schrad. Ex J.C. Wendl)

Bamboo shoots are highly nutritious and form a traditional food item across Asia. Fresh bamboo shoots contain 1.49–4.04 g/100 g of protein (fresh weight) and 21.1–25.8 g/100 g (dry weight). Carbohydrates range between 2.0–9.94 g/100 g in young shoots. Minerals are abundant, including potassium, phosphorus, sodium, calcium, magnesium, iron, manganese, cobalt, selenium, copper, and zinc. Vitamins C and E are present in significant amounts, supporting antioxidant defense and immune function. Bamboo shoots are rich in phenolic compounds such as catechin, caffeic acid, gallic acid, and flavonoids like orientin, vitexin, and tricic (Jeba Akhtar, Lima Patowary, 2022)

2. Fig (*Ficus drupacea* Thunb.)

Ficus drupacea fruits have high moisture content (87.99%) and moderate levels of protein (3.25%), carbohydrates (3.21%), fiber (2.20%), and ash (1.47%), with low fat (0.92%) and an energy value of 30.18 kcal/100 g. Mineral content includes potassium (21.03 mg/g DW), magnesium (13.24 mg/g), calcium (11.07 mg/g), iron (686.67 µg/g DW), zinc (124.33 µg/g), manganese (114.40 µg/g), boron (35.78 µg/g), and copper (13.93 µg/g). Antioxidant activities measured by DPPH, TAA, and FRAP assays revealed strong radical-scavenging abilities, particularly linked to its rich phenolic content.

The fruit contains essential fatty acids like α -linolenic, oleic, and linoleic acids. (Hosakatte Niranjana Murthy et al., 2024)

3. Sword Bean (*Canavalia gladiata* Jacq.)

Sword bean seeds, when processed by autoclaving, show improved protein utilization and reduced antinutritional factors. The seeds exhibit protein content of around 23–26%, carbohydrates around 60%, and fiber 7–9%. Fat content is generally low (2–3%). Autoclaving reduces trypsin inhibitors and tannins significantly, increasing digestibility (73.35%) and biological value (70.51%). Sword beans are also rich in iron, phosphorus, and potassium, making them a valuable source of plant-based protein and minerals for human consumption. (Vadivel V et al., 2010)

4. Ber (*Ziziphus mauritiana* Lam.)

The leaves and fruits of *Ziziphus mauritiana* are nutrient-dense. Fruit composition includes high protein (27.18%), lipids (6.65%), carbohydrates (~50%), and fiber (~10%). Mineral analysis reveals high potassium, sodium, magnesium, and iron in leaves, while fruits contain significant levels of phosphorus and zinc. Flavonoid (25.80 mg/100 g) and saponin contents are particularly high. (Anka et al., 2019)

5. American Mint (*Hyptis suaveolens* L.)

The proximate composition of *Hyptis suaveolens* varies across regions. Indian samples contain 11–12% protein, 3–4% lipids, 70–75% carbohydrates, 7–10% fiber, 11–18% ash, and moisture around 80–83%. Nigerian samples report 14.22% protein, 4.46% lipids, 66.61% carbohydrates, and 9.04% fiber. Rich in flavonoids, saponins, and tannins, *Hyptis suaveolens* demonstrates potent antifungal, antibacterial, and antidiabetic activities. It is traditionally used for gastrointestinal, respiratory, and inflammatory disorders. (L. Umedun Ngozi et al., 2014)

6. Sponge Gourd (*Luffa cylindrica* L.)

The sponge gourd is a popular culinary vegetable, known for its high moisture content (72.29%), making it excellent for hydration. It contains carbohydrates (10.89%), proteins (8.75%), crude fiber (4.91%), lipids (1.70%), and ash (1.46%). Rich in minerals such as calcium, potassium, phosphorus, and magnesium, it also provides vitamins like vitamin A, vitamin C, and folate. (P. N. Sonavane et al., 2021)

7. Ramphal (*Annona reticulata* L.)

Annona reticulata (Ramphal) fruits provide a well-rounded nutritional profile, containing moisture (76.8%), carbohydrates (15.8 g/100 g), proteins (1.5 g/100 g), fats (0.2 g/100 g), fiber (2.1 g/100 g), and energy (71 kcal/100 g). They are rich in minerals such as calcium (40 mg/100 g), phosphorus (30 mg/100 g), and iron (0.5 mg/100 g). The fruit also contains vitamin C (5 mg/100 g), riboflavin, niacin, and carotenoids (67 µg/100 g). (M. Prathapa Reddy et al., 2015)

8. Guava (*Psidium guajava* L.)

Guava is renowned for its exceptional vitamin C content (228.3 mg/100 g), significantly contributing to immune support. It contains water (80%), carbohydrates (14.32%), proteins (2.55%), fats (0.95%), fiber (5.4%), and energy (68 kcal/100 g). Minerals include potassium (417 mg/100 g), calcium (18 mg/100 g), iron (0.26 mg/100 g), and zinc (0.23 mg/100 g). (Faryal Asif et al., 2022)

9. Indian Almond (*Terminalia catappa* L.)

The kernels of *Terminalia catappa* provide high fat (54.47% in Kota Kinabalu samples), moderate protein (22.44%), fiber (5.13%), and carbohydrates (6.88%). Moisture content averages around 6.87%, and ash content is 4.77%. Regional variations affect oil properties: high iodine value (135) in Nigerian samples and peroxide value (7.33 mEq/g) in Keningau samples. (M.H.A. Jahurul et al., 2022)

10. Sickle Senna (*Cassia tora* L.)

Cassia tora seeds show remarkable nutritional richness, with 23.44% protein, 28.13% fiber, 25.68% carbohydrates, 9.25% fats, and 4.44% ash. Mineral content is significant, including calcium (630 mg/100 g), iron (37.1 mg/100 g), and phosphorus (240 mg/100 g). (Pooja Sahu et al., 2023)

11. Leaf Mustard (*Brassica juncea* L.)

Leaf mustard (*Brassica juncea* var. *rugosa*) is highly nutritious, especially genotype PLM-16, which recorded the highest protein (33.38%), nitrogen (5.55%), phosphorus (1400 mg/100 g), potassium (2770 mg/100 g), iron (30.56 mg/100 g), zinc (5.73 mg/100 g), and manganese (4.94 mg/100 g). Leafy mustard is rich in vitamins A, C, K, and B-complex, offering antioxidant benefits, aiding in anemia prevention, and protecting cardiovascular health. (Priyanka et al., 2021)

12. Amaranth (*Amaranthus deflexus* L.)

Amaranth species possess a highly balanced nutritional profile: 68.1% carbohydrates, 14.6% protein, 6.04% fats, and 2.40% ash, with significant dietary fiber (6.7 mg/100 g), vitamin C (4.2 mg/100 g), and iron (7.61 mg/100 g). (Moazma Sattar et al., 2024)

13. Drumstick (*Moringa oleifera* Lam.)

Moringa is one of the most nutrient-rich plants, offering 27.1–29.4% protein, high calcium (2185 mg/100 g dry leaves), potassium (1324 mg/100 g), iron (25.6–28.2 mg/100 g), and vitamin C (up to 220 mg/100 g fresh leaves). (Lakshmipriya Gopalakrishnan et al., 2016)

14. Spider Plant (*Cleome gynandra* L.)

Spider plant (*Cleome gynandra*) offers high protein (7.33%), fiber (7.58%), carbohydrates (37.06%), and essential amino acids like valine, lysine, leucine, and tryptophan. It is rich in calcium, magnesium, potassium, phosphorus, and vitamins A, C, and E. Phytochemicals such as flavonoids, alkaloids, saponins, and tannins contribute to its antioxidant, anti-inflammatory, and hepatoprotective properties. (Eugénie Kayitesi et al., 2022)

15. Great Mullein (*Verbascum thapsus L.*)

Verbascum thapsus (Common Mullein) is rich in phenolic compounds, saponins, flavonoids, vitamin C, and iridoid glycosides. It shows strong anti-inflammatory, antioxidant, anticancer, and antimicrobial properties. (Muhammad Riaz et al., 2013)

4. Discussion

The results of the present study are consistent with earlier findings that highlight the importance of wild edible plants in ensuring nutritional security and supporting traditional healthcare systems (Bharucha & Pretty, 2010). These plants serve as important sources of micronutrients and help diversify diets.

The ethnomedicinal uses documented in this study align with observations reported by Maikhuri et al. (2004), who emphasized the reliance of rural communities on plant-based remedies. The integration of food and medicinal uses reflects the holistic approach of traditional knowledge systems.

Despite their importance, wild edible plants remain underutilized and undervalued. Factors such as habitat loss, urbanization, and changing lifestyles are contributing to the decline of traditional knowledge associated with these plants. Therefore, there is a need for scientific validation, conservation efforts, and awareness programs to promote their sustainable use.

The documentation of such plant species contributes significantly to the preservation of indigenous knowledge systems, which are often transmitted orally across generations. The gradual erosion of this knowledge due to modernization poses a serious concern for future sustainability. Promoting community participation in conservation practices can help in safeguarding both biodiversity and traditional wisdom.

5. Conclusion

The study highlights the significant nutritional and ethnomedicinal value of wild edible plants found along the Akot–Wadner Gangai roadside ecosystem. These plants contribute to dietary diversity, food security, and traditional healthcare practices in rural communities. The dual role of these species underscores their importance as valuable biological resources.

However, increasing environmental pressures and loss of traditional knowledge threaten their sustainability. Therefore, systematic documentation, conservation strategies, and promotion of their utilization are essential to preserve this valuable heritage for future generations.

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