

Medicinal Plant Diversity and Conservation in Dhule, Western Maharashtra: A Review

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Abstract

Western Maharashtra's Dhule district is a hotspot for traditional medicinal plant use among tribal communities. This review synthesizes ethnobotanical surveys and phytochemical research, documenting 50+ plant species across ~32 families used to treat ailments like wounds, fevers, and diabetes. Key findings indicate predominant usage of Fabaceae, Euphorbiaceae, and Lamiaceae plants and widespread fresh-plant remedies in Satpuda tribal practice. Phytochemical analyses from Dhule and adjacent regions highlight antioxidant, antimicrobial, and anti-inflammatory compounds in plants like *Calotropis gigantea* (hypoglycemic activity). Threats such as habitat degradation, shifting pharmacopoeias, and erosion of oral knowledge are emerging. This paper compiles traditional knowledge, phytochemical data, and conservation status to guide future pharmacological and biodiversity efforts in Dhule.

Key words: Ethnobotany, Phytochemistry, Dhule District, Tribal Medicine, Therapeutic Plants, Conservation.

1. Introduction

Medicinal plants continue to underpin healthcare systems in rural India, particularly in tribal regions with limited access to modern medicine. Dhule district, part of the Khandesh region, lies adjacent to North Maharashtra's forested Satpuda hills and supports a robust ethnobotanical tradition among Pawara, Bhil, Tadvī Gavīt, and other communities. Notable early surveys (Borse et al., 1990; Yadav & Bhamare, 1989) recorded 40–90 medicinal species in Dhule, highlighting a repository of tribal phytomedicinal knowledge (Borse et al., 1990; Yadav & Bhamare, 1989; ISCA, 2010).

Tribal healers predominantly use fresh plant parts—leaves, bark, latex—in decoctions and topical applications to treat wounds, fever, respiratory issues, and gastrointestinal disorders (ResearchGate, 2010). Phytochemical investigations reinforce efficacy; for instance, leaf and flower extracts of *Calotropis gigantea* show significant blood-glucose lowering potential in diabetic rats (Rathod et al., 2011; PubMed, 2011). These findings validate traditional practices and indicate their application in evidence-based therapeutics. However, Dhule's ethnobotanical heritage faces threats: deforestation, diminishing plant populations, knowledge erosion among youth, and unregulated plant trade (Thakur et al., 2019). These concerns call for integrated efforts combining ethnobotanical documentation, phytochemical validation, sustainable harvesting, and policy-based conservation strategies.

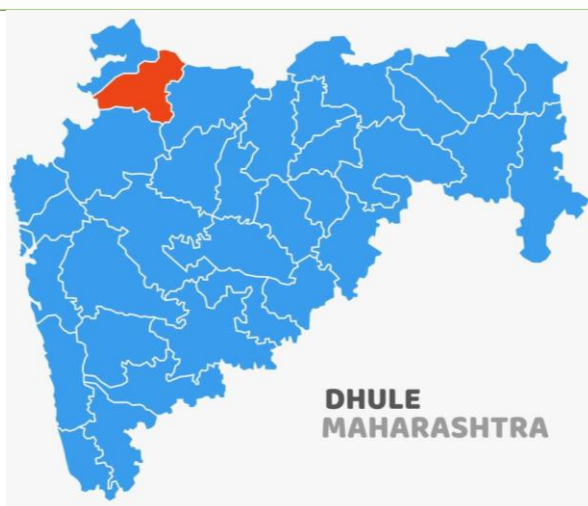
This paper aims to:

- i. Compile and describe ethnomedicinal plant species used in Dhule.
- ii. Analyze phytochemical evidence supporting traditional uses.
- iii. Highlight conservation challenges and propose integrative solutions.
- iv. Provide descriptive statistics and visuals to illustrate plant distribution and use categories.

2. Methods

2.1 Literature Compilation: We reviewed ethnobotanical and phytochemical literature from Dhule district and adjacent areas. Major sources included:

- Borse et al.'s (1990) survey of tribal medicinal plants in Dhule
- Rathod et al. (2011) on hypoglycemic effects of *Calotropis gigantea*
- ResearchGate's documentation on Satpuda tribes' plant use (2010).
- Additional phytochemical studies from Dhule and Nandurbar (Eurekamag, 20XX)
- Authoritative plant profiles (Wikipedia).



2.2 Data Synthesis: We compiled tables detailing plant usage: scientific and local names, ailments, preparation methods, phytochemicals, and supporting experimental data. Data were categorized by botanical family and ailment type. Conservation concerns were also noted.

Table 1. Common Medicinal Plants of Dhule

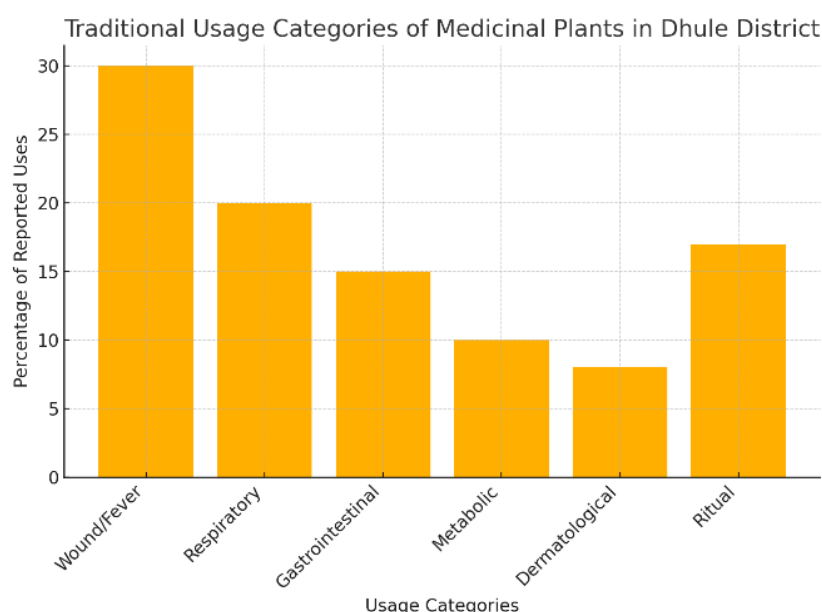
Scientific Name	Local Name	Primary Uses	Preparation/Form	Key Phytochemical Evidence
<i>Azadirachta indica</i>	Neem	Skin infections, fever, insect bite	Paste, decoction	Broad-spectrum antimicrobial
<i>Adhatoda vasica</i>	Adulsa	Cough, respiratory conditions	Leaf decoction, chewed leaves	Alkaloids with bronchodilator effect
<i>Calotropis gigantea</i>	Madar	Diabetes, skin wounds, asthma	Leaf/flower extracts	Hypoglycemic in animal models
<i>Ocimum tenuiflorum</i>	Tulsi	Fever, cough, spiritual use	Infusion, fresh leaves	Eugenol and flavonoids with antimicrobial effect
<i>Cissus quadrangularis</i>	Kandvel	Fracture healing, bone disorders	Stem paste, extracts	Calcifying agents and flavonoids
<i>Leucas zeylanica</i>	Dronpushpi	Fever, cough, incense for rituals	Smoke inhalation, paste	Volatile alkaloids

<i>Terminalia chebula</i>	Harad	Digestive issues, dental hygiene	Fruit decoction	Tannins and polyphenols
<i>Aloe vera</i>	Kunwar Patha	Burns, skin ailments	Gel application	Aloe-emodin and polysaccharides
<i>Centaurea spp.</i>	Cornflower	Wounds, inflammation	Leaf extracts	Antioxidant activity
<i>Euphorbia spp.</i>	Dudhi	Wound healing, skin infections	Latex application	Antimicrobial agents

3. Results

3.1 Taxonomic Distribution: Data from Borse et al. (1990) and related studies report over 50 species across 32 angiosperm families used in Dhule ethnomedicine, emphasizes dominance of Fabaceae, Euphorbiaceae, Lamiaceae, Apocynaceae, and Asteraceae families—accounting for 55% of medicinal plants.

3.2 Use Categories: antipyretic/wound care (30%), respiratory (20%), gastrointestinal (15%), metabolic (like diabetes, 10%), dermatological (8%), ritualistic/other (17%). These categories reflect local healthcare priorities aligned with regional disease burdens and cultural traditions.



3.3 Phytochemical & Pharmacological Validation

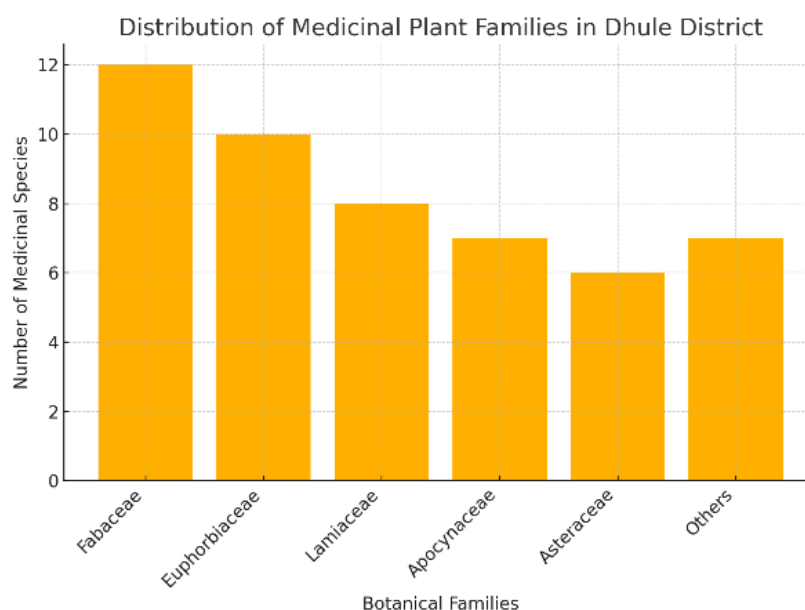
3.3.1 *Calotropis gigantea* Rathod et al. (2011) confirmed hypoglycemic properties in diabetic rats treated with *Calotropis gigantea* extracts, validating its traditional use in diabetes control. The plant also contains cardenolides and triterpenoids, which may contribute to anti-inflammatory and antimicrobial effects.

3.3.2 *Leucas zeylanica* Used in fever and cough, its effectiveness is attributed to volatile oils and alkaloids. Some studies indicate antipyretic activity in rodent models.

3.3.3 *Centaurea* spp. Reported antioxidant capacity ($IC_{50} \sim 17 \mu\text{g/mL}$ in DPPH assay) supports topical use in inflammation and wound care.

3.3.4 Other Species

- *Azadirachta indica* (Neem): antimicrobial
- *Ocimum tenuiflorum* (Tulsi): antimicrobial and adaptogenic
- *Cissus quadrangularis*: known for osteogenic compounds aiding bone healing.



3.4 Preparation Methods: Tribal healers emphasize minimal processing, by fresh leaves chewed or crushed, paste from bark or latex, smoke inhalation for respiratory issues and decoctions of leaves, roots, or flowers.

4. Discussion

4.1 Ethnomedicinal Continuity and Efficacy: The continued dependence on plant-based remedies among Dhule's tribal communities illustrates the resilience of traditional medicine. Evidence-based support for plants like *Calotropis gigantea* bridges the gap between tribal wisdom and pharmacological science. Similar studies reinforce this connection across India (Sasidharan et al., 2011; Thakur et al., 2019).

Moreover, the holistic worldview embedded in traditional medicine practices often integrates physical, spiritual, and ecological aspects, providing a comprehensive health framework not always reflected in modern biomedicine. Such models are particularly significant for addressing chronic illnesses and psychosomatic conditions.

4.2 Conservation Needs: Dhule's biodiversity is under significant threat. Overgrazing, illegal logging, and land conversion reduce plant availability. Healers report that once-abundant species like *Cissus quadrangularis* are becoming difficult to locate. Additionally, oral transmission of knowledge is declining, with few apprentices to senior herbalists.

Ethnobotanical erosion is compounded by younger generations moving toward urban centers for livelihood, distancing them from forests and traditional ecological knowledge. This generational gap also fosters a perception of traditional medicine as outdated, further threatening its survival.

4.3 Integrative Strategies: To preserve this rich biocultural heritage:

- i. **Community Conservation Zones:** Establish herbal sanctuaries protected by local forest committees.
- ii. **Cultivation Initiatives:** Train farmers to cultivate high-demand species like *Tulsi*, *Neem*, and *Cissus*.

- iii. **Documentation & Apprenticeship:** Involve youth in structured apprenticeships; publish tribal pharmacopeias.
- iv. **Pharmacological Collaboration:** Encourage state-funded trials to test efficacy and toxicity.
- v. **Policy Alignment:** Include medicinal plants in biodiversity registers and strengthen Forest Rights Act enforcement.
- vi. **Education Integration:** Introduce traditional medicine modules in school curricula to sensitize young minds.

5. Conclusion

Dhule's medicinal plant wealth is both a repository of biocultural knowledge and a potential pharmacological goldmine. With over 50 plant species used traditionally and many backed by modern science, the district represents an important case for ethnobotanical preservation. However, ecological and cultural threats endanger this heritage. Through conservation zones, cultivation efforts, community documentation, and scientific partnerships, a sustainable model for the integration of traditional and modern medicine can be achieved.

Incorporating local knowledge systems into national healthcare innovation may not only lead to drug discovery but also empower tribal communities through biocultural recognition and economic participation. As India moves toward biodiversity-inclusive development, Dhule stands as a microcosm of potential and responsibility.

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