

Medicinal Plants Diversity in Arunachal Pradesh: A review

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Abstract

Arunachal Pradesh, situated within the Eastern Himalayan biodiversity hotspot, is recognized as one of India's most significant reservoirs of medicinal plant diversity. The region contains over 500 documented medicinal plant species from more than 120 families, which are extensively used by indigenous tribal communities for primary healthcare. Traditional knowledge systems, which are transmitted orally across generations, are integral to the treatment of a wide range of ailments, including gastrointestinal disorders, respiratory diseases, skin infections, fever, and metabolic conditions. This paper review existing literature on the diversity, ethnomedicinal applications, and conservation status of medicinal plants in Arunachal Pradesh, drawing on data from major scientific databases including Scopus, Web of Science, PubMed, and Google Scholar. The analysis reveals that dominant plant families, including Asteraceae, Fabaceae, Zingiberaceae, and Lamiaceae, make substantial contributions to the region's medicinal flora. Various plant parts, such as leaves, roots, bark, and rhizomes, are used in formulations such as decoctions, infusions, and pastes. Despite their considerable therapeutic potential and cultural importance, many species face threats from overharvesting, habitat degradation, and climate change. The review underscores the urgent need for systematic documentation, the development of conservation strategies, and the implementation of sustainable utility practices. Integrating traditional knowledge with modern pharmacological research may further facilitate drug discovery and support biodiversity conservation.

Keywords: Medicinal Plants, Arunachal Pradesh, Ethnobotany, Review.

Introduction

Medicinal plants have been fundamental to human healthcare systems since ancient times and continue to play a vital role in both traditional and modern medicine. According to a 2019 global report by the World Health Organisation, traditional and complementary medicines are practiced in 179 countries, reflecting their widespread use in healthcare systems worldwide. The WHO's third global survey on TCIM found that 67% of respondents indicated that 40–99% of their populations use TCIM. These statistics demonstrate the widespread and variable use of TCIM worldwide, highlighting the need for clear definitions and consistent data collection to inform effective policy, regulation, and integration within health systems (4). Beyond their role in primary healthcare, medicinal plants have made significant contributions to modern pharmacology, with approximately 25% of currently used drugs derived from plant sources or their derivatives (5). This evidence underscores the importance of documenting and conserving plant diversity, particularly in regions with high biodiversity.

India is recognized as one of the world's twelve "Megabiodiversity" countries, containing an estimated 45,000 plant species, of which over 7,000 are reported to possess medicinal value (6). Northeast India is particularly notable for its unique geographic position at the intersection of the Indo-Malayan, Indo-Chinese, and Himalayan biogeographic zones, resulting in high species richness and endemism (7). Arunachal Pradesh, the largest state in Northeast India, is among the most floristically diverse regions, characterised, by broad altitudinal gradients from tropical lowlands to alpine ecosystems, diverse climatic conditions, and extensive forest cover (8). Arunachal Pradesh is home to more than 26 major tribes, including the Adi, Nyishi, Apatani, Monpa, and Mishmi communities, each of which possesses extensive ethnobotanical knowledge developed through centuries of interaction with the natural environment (9). These indigenous groups depend heavily on forest resources for primary healthcare and have established sophisticated traditional medicinal practices using locally available plant species.

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According to a review by Bushi and colleagues (10), the indigenous tribal communities of Arunachal Pradesh, India, still rely on plant-based ethnomedicine to treat a wide range of health conditions within their cultural and environmental contexts. Knowledge of these practices is typically passed down orally from one generation to the next, making it vulnerable to being lost, especially as socio-economic changes and continued modernisation.

In recent decades, extensive ethnobotanical research in Arunachal Pradesh has documented the region's medicinal plant diversity and traditional knowledge. Early comprehensive studies by Namsa and colleagues (1) identified more than 50 plant species from 29 families used to treat 22 human and 4 veterinary ailments. 358 medicinal plants were reviewed for the ethnobotanical knowledges used in Arunachal Pradesh and reported to belong from 100 families and used in 10 major health problems (11). Kala (12) reported that the Apatani tribe used 158 medicinal plant species, distributed across 73 families and 124 genera. Asteraceae was the most dominant family (19 species, 11 genera), followed by Zingiberaceae, Solanaceae, Lamiaceae, and Araceae. The use of aboveground plant parts was higher (80%) than that of belowground parts among the Apatani, with leaves being the most commonly used (56 species), followed by fruits. According to a study by Nima and colleagues (13), 34 identified ethnobotanical species in Arunachal Pradesh were used as herbal medicines to treat anti-inflammatory in the Lohit District of Arunachal Pradesh. The referred workers have established Arunachal Pradesh as a major repository of medicinal plant diversity, underscoring the ecological and economic significance of these resources and highlighting threats from overexploitation and habitat degradation (1-3, 8-13).

Subsequent ethnobotanical surveys have concentrated on specific tribes and regions within Arunachal Pradesh, yielding more detailed insights into patterns of plant use. Namsa et al. (13) documented medicinal plants used by tribal communities in the Lohit district, identifying 34 species across 32 genera and 22 families, many of which have anti-inflammatory and therapeutic properties. The families Asteraceae, Euphorbiaceae, Zingiberaceae, and Lamiaceae were most frequently represented. Thirteen species, including *Bombax ceiba*, *Canarium strictum*, *Chloranthus erectus*, *Xanthium indicum*, *Lycopodium clavatum*, *Coleus blumei*, *Batrachospermum atrum*, *Chlorella vulgaris*, *Marchantia palmata*, *Marchantia polymorpha*, *Eria pannea*, *Sterculia villosa*, and *Alpinia galanga*, were reported for the first time as treatments for inflammation-related diseases. Similarly, studies on the Monpa tribe documented 50 plant species from 29 families used to treat 22 human and 4 veterinary ailments. Herbs were the most common growth form (40%), followed by shrubs, trees, and climbers; leaves were the most frequently used plant part (1). According to a comprehensive review in the *Ethnobotany Research & Applications* journal, informant consensus was highest for the use of medicinal plants to treat dermatological

conditions, with a notable factor of informant consensus, followed by gastrointestinal disorders. The review also highlights the significant plant diversity in Arunachal Pradesh, documenting over 358 medicinal plant species traditionally used by various tribal communities to address these health issues, as well as the widespread reliance on ethnomedicine (10). Additionally, disease-specific studies have identified plants used for managing diabetes, reflecting the expanding role of traditional medicine in addressing chronic diseases (14). In ethnobotanical documentation, several studies have explored the phytochemical and pharmacological properties of medicinal plants from Arunachal Pradesh. These plants are rich in bioactive compounds, including alkaloids, flavonoids, terpenoids, and phenolic compounds, which contribute to their therapeutic efficacy (5, 15). For example, species such as *Coptis teeta*, *Aconitum heterophyllum*, *Swertia chirayita*, and *Paris polyphylla* have been reported to possess significant pharmacological activities, including antimicrobial, anti-inflammatory, and antidiabetic effects (16, 17, 18, 19). These findings provide scientific validation for traditional uses and highlight the potential of these plants for drug discovery.

Despite the extensive ethnobotanical knowledge and growing scientific interest, the diversity of medicinal plants in Arunachal Pradesh faces considerable conservation challenges. According to a study by Tangiang and colleagues (11), 74 medicinal plant species are traditionally used in Arunachal Pradesh to treat various ailments, highlighting the significant biodiversity in the region's herbal markets. According to a report from *Frontiers in Forests and Global Change*, the Himalayan region hosts a diverse range of wild medicinal plants crucial to local livelihoods and health, but growing market demand has led to excessive exploitation and rapid declines in several species, threatening the preservation of ethnomedicinal heritage. In situ conservation of natural habitats, ex situ cultivation in botanical gardens, and community-based resource management has been proposed as effective strategies for the sustainable utilization of resources (20). Advances in biotechnology, such as tissue culture and micropropagation, also offer promising tools for the conservation and large-scale propagation of endangered medicinal plant species (21).

Given the ecological, cultural, and pharmacological significance of medicinal plants in Arunachal Pradesh, a comprehensive review of published works is necessary. Although numerous studies have documented plant diversity and traditional uses, there is a need to integrate these findings into a cohesive framework that addresses conservation challenges and outlines future research directions. This review seeks to provide an up-to-date, comprehensive account of medicinal plant diversity in Arunachal Pradesh, emphasizing ethnobotanical significance, therapeutic applications, and conservation perspectives.

Such an approach is essential for promoting sustainable use, preserving indigenous knowledge systems, and supporting the development of plant-based therapeutics to meet future healthcare needs.

Methods:

The present study is based on an extensive review of recent past existing literature on the diversity and ethnomedicinal uses of plants in Arunachal Pradesh, India. A systematic and multi-step approach was adopted to ensure the collection of reliable, relevant, and up-to-date information.

2.1 Literature Survey and Data Sources

An extensive literature search was conducted using major scientific databases, including Scopus, Web of Science, PubMed, Google Scholar, and Elsevier ScienceDirect. Additional sources, including institutional repositories, government reports, ethnobotanical monographs, and dissertations, were also consulted to capture region-specific data. Medicinal plants Arunachal Pradesh, "Ethnobotany Northeast India," "traditional medicine tribal communities," "Phytodiversity Arunachal Pradesh," and "ethnomedicinal uses Himalayan plants were searched in published data.

2.2 Inclusion and Exclusion Criteria

To ensure data quality and relevance, the following inclusion criteria were applied:

- Peer-reviewed research articles, review papers, and ethnobotanical surveys
- Studies specifically focused on Arunachal Pradesh or the Eastern Himalayan region.
- Articles reporting medicinal plant species, traditional uses, or pharmacological relevance
- Publications available in English
- Exclusion criteria included:
- Studies lacking clear methodological details
- Reports without taxonomic validation of plant species
- Duplicated datasets across multiple publications
- Non-scientific or anecdotal sources without verifiable data

2.3 Data Extraction and Compilation

Relevant information was systematically extracted from selected publications, including:

- Botanical name (scientific nomenclature verified using standard floras)
- Family and life form (herb, shrub, tree, climber)

- Plant parts used (leaves, roots, bark, rhizomes, fruits, seeds)
- Ethnomedicinal uses (disease categories and therapeutic applications)
- Preparation methods (decoction, infusion, paste, powder, etc.)
- Distribution and habitat information
- Conservation status, where available

Data were compiled into structured datasets and categorized based on plant families, disease categories, and usage patterns. Cross-verification of species names was performed using taxonomic databases, including The Plant List and World Flora Online, to ensure nomenclatural accuracy.

2.4 Data Analysis and Classification

Descriptive and comparative approaches were used to analyse the collected data. Medicinal plant diversity was assessed based on:

- Species richness (total number of species reported)
- Family-wise distribution
- Growth form distribution (herbs, shrubs, trees, climbers)
- Frequency of plant parts used

Ethnomedicinal uses were grouped into major disease categories, such as:

- Gastrointestinal disorders
- Respiratory diseases
- Dermatological conditions
- Fever and infectious diseases
- Metabolic disorders (e.g., diabetes, hypertension)

2.5 Validation of Ethnomedicinal Information

To enhance the reliability of traditional knowledge data, ethnomedicinal uses were cross-checked across multiple independent studies. Only those uses reported in at least two credible sources were considered for analysis. Where available, pharmacological studies supporting traditional claims were also incorporated to strengthen scientific validation.

2.6 Ethical Considerations

The study is based entirely on published works. However, due acknowledgment is given to indigenous communities whose traditional knowledge underpins ethnobotanical research. Ethical guidelines related to the use of traditional knowledge and biodiversity conservation were considered.

| S.No | Plant Name | Family | Part(s) Used | Habit | Key Use(s) |
|------|-------------------------------|---------------|-------------------|-------|---------------------------------|
| 1 | <i>Abroma augusta</i> | Malvaceae | Root, Bark | Shrub | Menstrual disorders, diabetes |
| 2 | <i>Aconitum heterophyllum</i> | Ranunculaceae | Root | Herb | Fever, stomach disorders |
| 3 | <i>Acorus calamus</i> | Acoraceae | Rhizome | Herb | Digestive issues, asthma |
| 4 | <i>Adhatoda vasica</i> | Acanthaceae | Leaf | Shrub | Cough, bronchitis |
| 5 | <i>Aegle marmelos</i> | Rutaceae | Fruit, Leaf | Tree | Diarrhea, dysentery |
| 6 | <i>Ageratum conyzoides</i> | Asteraceae | Leaf, Whole plant | Herb | Wound healing, skin infections |
| 7 | <i>Aloe vera</i> | Asphodelaceae | Leaf gel | Herb | Burns, skin problems |
| 8 | <i>Alstonia scholaris</i> | Apocynaceae | Bark | Tree | Respiratory disorders, malaria |
| 9 | <i>Amaranthus spinosus</i> | Amaranthaceae | Leaf, Whole plant | Herb | Urinary problems, skin diseases |

| | | | | | |
|----|-----------------------------------|------------------|------------------------|-----------|------------------------------------|
| 10 | <i>Andrographis paniculata</i> | Acanthaceae | Leaf, Whole plant | Herb | Fever, liver disorders |
| 11 | <i>Anisomeles indica</i> | Lamiaceae | Leaf, Whole plant | Herb | Fever, digestive disorders |
| 12 | <i>Ardisia crenata</i> | Primulaceae | Root, Leaf | Shrub | Rheumatism, wound healing |
| 13 | <i>Aristolochia indica</i> | Aristolochiaceae | Root | Climber | Snake bites, skin diseases |
| 14 | <i>Artemisia vulgaris</i> | Asteraceae | Leaf, Whole plant | Herb | Digestive, menstrual problems |
| 15 | <i>Asparagus racemosus</i> | Asparagaceae | Root | Climber | Reproductive health, lactation |
| 16 | <i>Azadirachta indica</i> | Meliaceae | Leaf, Bark | Tree | Skin diseases, malaria |
| 17 | <i>Bambusa arundinacea</i> | Poaceae | Young shoot, Leaf | Tree-like | Joint pain, wounds |
| 18 | <i>Barleria cristata</i> | Acanthaceae | Leaf | Shrub | Toothache, cough |
| 19 | <i>Bauhinia purpurea</i> | Fabaceae | Bark, Flower | Tree | Diarrhea, ulcers |
| 20 | <i>Berberis aristata</i> | Berberidaceae | Root, Bark | Shrub | Eye diseases, jaundice |
| 21 | <i>Boerhavia diffusa</i> | Nyctaginaceae | Root, Whole plant | Herb | Kidney disorders, edema |
| 22 | <i>Bombax ceiba</i> | Malvaceae | Bark, Flower | Tree | Diarrhea, skin diseases |
| 23 | <i>Brassica juncea</i> | Brassicaceae | Seed, Leaf | Herb | Muscle pain, skin infections |
| 24 | <i>Butea monosperma</i> | Fabaceae | Flower, Seed, Bark | Tree | Diarrhea, skin diseases |
| 25 | <i>Callicarpa macrophylla</i> | Lamiaceae | Leaf | Shrub | Bleeding, wounds |
| 26 | <i>Calotropis gigantea</i> | Apocynaceae | Leaf, Latex | Shrub | Skin diseases, digestive disorders |
| 27 | <i>Cannabis sativa</i> | Cannabaceae | Leaf, Flower, Seed | Herb | Pain relief, digestive issues |
| 28 | <i>Capparis zeylanica</i> | Capparaceae | Leaf, Bark | Shrub | Rheumatism, ulcers |
| 29 | <i>Cardiospermum halicacabum</i> | Sapindaceae | Leaf, Whole plant | Climber | Joint pain, skin diseases |
| 30 | <i>Careya arborea</i> | Lecythidaceae | Bark, Leaf | Tree | Diarrhea, wounds |
| 31 | <i>Cassia alata</i> | Fabaceae | Leaf | Shrub | Skin diseases, constipation |
| 32 | <i>Cassia fistula</i> | Fabaceae | Fruit pulp, Seed, Leaf | Tree | Constipation, skin diseases |
| 33 | <i>Catharanthus roseus</i> | Apocynaceae | Leaf, Root | Herb | Diabetes, cancer |
| 34 | <i>Centella asiatica</i> | Apiaceae | Whole plant | Herb | Memory enhancement, wound healing |
| 35 | <i>Cissampelos pareira</i> | Menispermaceae | Root, Leaf | Climber | Fever, urinary disorders |
| 36 | <i>Clerodendrum indicum</i> | Lamiaceae | Root, Leaf | Shrub | Cough, fever |
| 37 | <i>Clerodendrum serratum</i> | Lamiaceae | Root, Leaf | Shrub | Asthma, cough |
| 38 | <i>Cocculus hirsutus</i> | Menispermaceae | Leaf, Whole plant | Climber | Fever, skin diseases |
| 39 | <i>Coffea arabica</i> | Rubiaceae | Seed | Shrub | Stimulant, fatigue |
| 40 | <i>Colocasia esculenta</i> | Araceae | Tuber, Leaf | Herb | Digestive disorders, wounds |
| 41 | <i>Combretum indicum</i> | Combretaceae | Fruit, Seed | Climber | Fever, digestive issues |
| 42 | <i>Costus speciosus</i> | Costaceae | Rhizome | Herb | Diabetes, skin diseases |
| 43 | <i>Crinum asiaticum</i> | Amaryllidaceae | Bulb, Leaf | Herb | Rheumatism, wounds |
| 44 | <i>Crotalaria juncea</i> | Fabaceae | Leaf, Stem | Herb | Skin diseases, wounds |
| 45 | <i>Curcuma longa</i> | Zingiberaceae | Rhizome | Herb | Anti-inflammatory, wounds |
| 46 | <i>Cuscuta reflexa</i> | Convolvulaceae | Whole plant | Climber | Liver disorders, skin diseases |
| 47 | <i>Cymbopogon citratus</i> | Poaceae | Leaf | Herb | Fever, digestive issues |
| 48 | <i>Cyperus rotundus</i> | Cyperaceae | Tuber | Herb | Diarrhea, fever |
| 49 | <i>Datura metel</i> | Solanaceae | Leaf, Seed | Shrub | Asthma, pain relief |
| 50 | <i>Dioscorea bulbifera</i> | Dioscoreaceae | Tuber | Climber | Rheumatism, stomach disorders |
| 51 | <i>Dioscorea glabra</i> | Dioscoreaceae | Tuber | Climber | Rheumatism, digestive disorders |
| 52 | <i>Dioscorea oppositifolia</i> | Dioscoreaceae | Tuber | Climber | Rheumatism, digestive disorders |
| 53 | <i>Diospyros melanoxylon</i> | Ebenaceae | Leaf, Bark | Tree | Diarrhea, wounds |
| 54 | <i>Drymaria cordata</i> | Caryophyllaceae | Whole plant | Herb | Cough, fever |
| 55 | <i>Eclipta prostrata</i> | Asteraceae | Whole plant | Herb | Liver disorders, hair growth |
| 56 | <i>Elaeocarpus ganitrus</i> | Elaeocarpaceae | Seed (bead) | Tree | Epilepsy, mental disorders |
| 57 | <i>Elephantopus scaber</i> | Asteraceae | Whole plant | Herb | Fever, wounds |
| 58 | <i>Emblcia officinalis</i> | Phyllanthaceae | Fruit | Tree | Immunity, digestive aid |
| 59 | <i>Eryngium foetidum</i> | Apiaceae | Leaf | Herb | Digestive problems, fever |
| 60 | <i>Eupatorium odoratum</i> | Asteraceae | Leaf, Whole plant | Shrub | Wound healing, fever |
| 61 | <i>Euphorbia hirta</i> | Euphorbiaceae | Whole plant | Herb | Asthma, cough |
| 62 | <i>Ficus hispida</i> | Moraceae | Fruit, Leaf | Tree | Diarrhea, wounds |
| 63 | <i>Ficus religiosa</i> | Moraceae | Bark, Leaf | Tree | Diabetes, wounds |
| 64 | <i>Flemingia strobilifera</i> | Fabaceae | Root, Leaf | Shrub | Rheumatism, wounds |
| 65 | <i>Garcinia pedunculata</i> | Clusiaceae | Fruit | Tree | Digestive disorders, obesity |
| 66 | <i>Garcinia lancifolia</i> | Clusiaceae | Fruit | Tree | Digestive disorders, wounds |
| 67 | <i>Glycosmia pentaphylla</i> | Rutaceae | Leaf, Root | Shrub | Cough, fever |
| 68 | <i>Gynura nepalensis</i> | Asteraceae | Leaf, Whole plant | Herb | Wound healing, fever |
| 69 | <i>Hedychium coronarium</i> | Zingiberaceae | Rhizome | Herb | Respiratory disorders, wounds |
| 70 | <i>Helicteres isora</i> | Malvaceae | Root, Fruit | Shrub | Diarrhea, cough |
| 71 | <i>Hibiscus rosa-sinensis</i> | Malvaceae | Flower, Leaf | Shrub | Menstrual disorders, hair growth |
| 72 | <i>Holarrhena antidysenterica</i> | Apocynaceae | Bark, Seed | Tree | Diarrhea, dysentery |
| 73 | <i>Hypoestes phyllostachya</i> | Acanthaceae | Leaf | Herb | Wounds, skin diseases |
| 74 | <i>Imperata cylindrica</i> | Poaceae | Root, Rhizome | Herb | Bleeding, wounds |
| 75 | <i>Ipomoea aquatica</i> | Convolvulaceae | Leaf, Stem | Herb | Constipation, skin diseases |

| | | | | | |
|-----|-----------------------------------|-----------------|---------------------|------------|------------------------------------|
| 76 | <i>Jatropha curcas</i> | Euphorbiaceae | Seed, Leaf | Shrub | Skin diseases, wounds |
| 77 | <i>Justicia adhatoda</i> | Acanthaceae | Leaf | Shrub | Cough, bronchitis |
| 78 | <i>Kaempferia galanga</i> | Zingiberaceae | Rhizome | Herb | Digestive disorders, pain relief |
| 79 | <i>Leea indica</i> | Vitaceae | Leaf, Root | Shrub | Wound healing, fever |
| 80 | <i>Leucas aspera</i> | Lamiaceae | Leaf, Flower | Herb | Cough, fever |
| 81 | <i>Litsea glutinosa</i> | Lauraceae | Bark, Leaf | Tree | Rheumatism, wounds |
| 82 | <i>Lygodium flexuosum</i> | Lygodiaceae | Whole plant | Climber | Skin diseases, wounds |
| 83 | <i>Mallotus philippensis</i> | Euphorbiaceae | Fruit, Leaf | Tree | Skin diseases, wounds |
| 84 | <i>Melastoma malabathricum</i> | Melastomataceae | Leaf, Bark | Shrub | Bleeding, wounds |
| 85 | <i>Melia azedarach</i> | Meliaceae | Leaf, Bark, Fruit | Tree | Skin diseases, digestive disorders |
| 86 | <i>Mentha arvensis</i> | Lamiaceae | Leaf | Herb | Digestive disorders, cough |
| 87 | <i>Mimosa pudica</i> | Fabaceae | Root, Leaf | Herb | Wound healing, diarrhea |
| 88 | <i>Moringa oleifera</i> | Moringaceae | Leaf, Seed, Pod | Tree | Immunity, skin diseases |
| 89 | <i>Morus alba</i> | Moraceae | Leaf, Fruit | Tree | Diabetes, cough |
| 90 | <i>Murraya koenigii</i> | Rutaceae | Leaf | Shrub/Tree | Digestive disorders, diabetes |
| 91 | <i>Musa balbisiana</i> | Musaceae | Fruit, Leaf | Herb | Diarrhea, wounds |
| 92 | <i>Nyctanthes arbor-tristis</i> | Oleaceae | Flower, Leaf, Bark | Shrub/Tree | Fever, skin diseases |
| 93 | <i>Ocimum sanctum</i> | Lamiaceae | Leaf | Herb | Respiratory disorders, immunity |
| 94 | <i>Oroxylum indicum</i> | Bignoniaceae | Root, Bark | Tree | Cough, fever |
| 95 | <i>Oxalis corniculata</i> | Oxalidaceae | Whole plant | Herb | Diarrhea, wounds |
| 96 | <i>Paris polyphylla</i> | Melanthiaceae | Rhizome | Herb | Anti-inflammatory, wound healing |
| 97 | <i>Passiflora foetida</i> | Passifloraceae | Leaf, Whole plant | Climber | Anxiety, insomnia |
| 98 | <i>Phlogacanthus thyrsoformis</i> | Acanthaceae | Leaf | Shrub | Cough, wounds |
| 99 | <i>Phyllanthus amarus</i> | Phyllanthaceae | Whole plant | Herb | Liver disorders, jaundice |
| 100 | <i>Piper longum</i> | Piperaceae | Fruit | Climber | Cough, digestive disorders |
| 101 | <i>Piper nigrum</i> | Piperaceae | Fruit | Climber | Cough, digestive disorders |
| 102 | <i>Plantago major</i> | Plantaginaceae | Leaf, Whole plant | Herb | Wound healing, cough |
| 103 | <i>Plumbago zeylanica</i> | Plumbaginaceae | Root | Shrub | Skin diseases, digestive disorders |
| 104 | <i>Polygonum chinense</i> | Polygonaceae | Whole plant | Herb | Wound healing, digestive disorders |
| 105 | <i>Polygonum hydropiper</i> | Polygonaceae | Whole plant | Herb | Bleeding, wounds |
| 106 | <i>Premna herbacea</i> | Lamiaceae | Leaf, Root | Herb/Shrub | Wound healing, fever |
| 107 | <i>Psidium guajava</i> | Myrtaceae | Leaf, Bark | Tree | Diarrhea, wounds |
| 108 | <i>Rauvolfia serpentina</i> | Apocynaceae | Root | Shrub | Hypertension, insomnia |
| 109 | <i>Rhododendron arboreum</i> | Ericaceae | Flower, Bark | Shrub/Tree | Diarrhea, wounds |
| 110 | <i>Ricinus communis</i> | Euphorbiaceae | Seed, Leaf | Shrub | Constipation, skin diseases |
| 111 | <i>Rubia cordifolia</i> | Rubiaceae | Root | Climber | Blood purifier, skin diseases |
| 112 | <i>Saussurea costus</i> | Asteraceae | Root | Herb | Asthma, cough |
| 113 | <i>Scoparia dulcis</i> | Plantaginaceae | Whole plant | Herb | Diabetes, wounds |
| 114 | <i>Senna tora</i> | Fabaceae | Leaf, Seed | Herb/Shrub | Skin diseases, constipation |
| 115 | <i>Solanum nigrum</i> | Solanaceae | Leaf, Fruit | Herb | Liver disorders, ulcers |
| 116 | <i>Solanum torvum</i> | Solanaceae | Fruit, Leaf | Shrub | Cough, wounds |
| 117 | <i>Spilanthes paniculata</i> | Asteraceae | Flower, Whole plant | Herb | Toothache, fever |
| 118 | <i>Stephania japonica</i> | Menispermaceae | Root, Whole plant | Climber | Fever, wounds |
| 119 | <i>Swertia chirata</i> | Gentianaceae | Whole plant | Herb | Fever, malaria |
| 120 | <i>Syzygium cumini</i> | Myrtaceae | Fruit, Seed, Bark | Tree | Diabetes, digestive disorders |
| 121 | <i>Taxus baccata</i> | Taxaceae | Leaf, Bark | Tree | Cancer, respiratory ailments |
| 122 | <i>Terminalia bellirica</i> | Combretaceae | Fruit | Tree | Digestive disorders, cough |
| 123 | <i>Terminalia chebula</i> | Combretaceae | Fruit | Tree | Digestive disorders, wounds |
| 124 | <i>Tinospora cordifolia</i> | Menispermaceae | Stem | Climber | Immunity, fever |
| 125 | <i>Tragia involucrata</i> | Euphorbiaceae | Leaf, Root | Climber | Skin diseases, wounds |
| 126 | <i>Triumfetta rhomboidea</i> | Malvaceae | Root, Leaf | Shrub | Wounds, skin diseases |
| 127 | <i>Valeriana jatamansi</i> | Caprifoliaceae | Root, Rhizome | Herb | Insomnia, anxiety |
| 128 | <i>Verbena officinalis</i> | Verbenaceae | Whole plant | Herb | Fever, wounds |
| 129 | <i>Vitex negundo</i> | Lamiaceae | Leaf | Shrub | Joint pain, cough |
| 130 | <i>Wedelia chinensis</i> | Asteraceae | Whole plant | Herb | Fever, wounds |
| 131 | <i>Withania somnifera</i> | Solanaceae | Root | Shrub | Stress relief, strength |
| 132 | <i>Zingiber officinale</i> | Zingiberaceae | Rhizome | Herb | Digestive problems, cough |

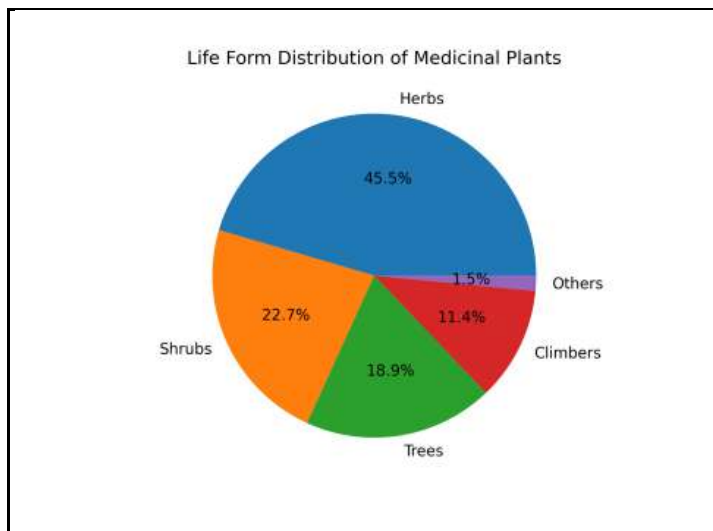


Figure 1: Distribution of medicinal plants by life form in Arunachal Pradesh: herbaceous species are dominant, followed by shrubs, trees, and climbers

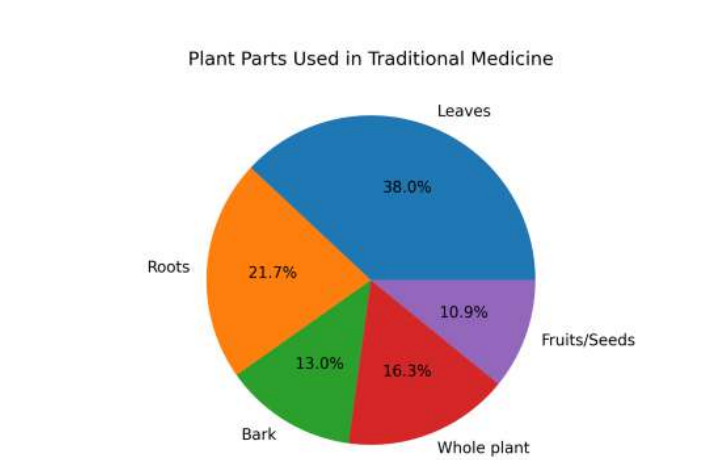


Figure 2: A pie diagram of plant parts used in traditional medicine, with leaves being the most frequently used component

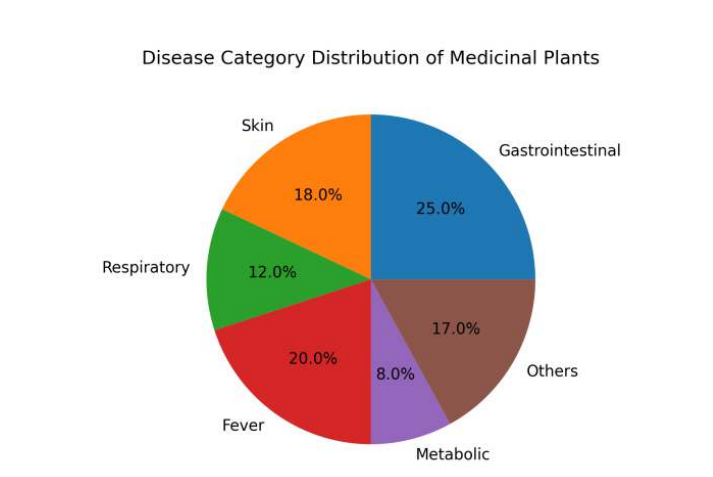


Figure 3: Bar diagram illustrating major disease categories treated using medicinal plants, highlighting gastrointestinal and fever-related ailments as predominant

Diversity of Medicinal Plants Analysis

The list encompasses 132 species across more than 40 botanical families, demonstrating the rich biodiversity of Arunachal Pradesh and its ethnomedicinal heritage; Fabaceae and Asteraceae are the most dominant families, each with 9 species.

This reflects their global prominence in medicinal plant use and their abundance in the region's flora; Other families with significant representation include Lamiaceae, Euphorbiaceae, Apocynaceae, Malvaceae, Zingiberaceae, Menispermaceae, and Solanaceae.

Growth Habit Analysis

Herbs are the most common growth form, accounting for approximately 55% (73 species) of the total. Herbs are often preferred in traditional medicine due to their accessibility and ease of processing; Shrubs represent about 21% (28 species), often used for their leaves, roots, or bark; Trees comprise 18% (24 species), valued for their bark, leaves, fruits, and sometimes seeds. Many are large forest trees, indicating the importance of forest ecosystems for medicinal resources; Climbers (including vines and twiners) account for 5% (7 species), and are often used for their roots, stems, or leaves; Some plants can fit into more than one habit, e.g., shrubs/trees or herbaceous climbers.

Parts Used in Traditional Medicine

The leaf is the most frequently used part, cited in over 50 species. Leaves are easy to harvest, regenerate quickly, and are commonly used in decoctions, poultices, and extracts; Roots/rhizomes/tubers are used in over 35 species, often for their potent bioactive compounds. Roots are often harvested for medicinal use, which can threaten plant populations, while smaller herbs and annuals are typically used whole, consistent with holistic traditional practices. According to a report on plant use in Arunachal Pradesh, fruits are a major component of traditional medicine, particularly from tree species, and bark is also commonly used, notably from *Alstonia scholaris*. Other plant parts employed by local tribes include flowers, seeds, stems, and, as frequently, latex, sap, pods, bulbs, tubers, and beads. The wide range of parts used shows a strong foundation of traditional knowledge among Arunachal's indigenous communities regarding plant-based therapies. Frequent use of leaves and fruits is more ecologically sustainable than using roots and bark, as it allows plants to regenerate. The high proportion of herbs indicates that ethnomedicine in Arunachal Pradesh relies heavily on readily accessible, rapidly growing plants, as well as on forest trees and climbers, reflecting the region's ecological richness.

Conservation Considerations

Species whose roots, rhizomes, or bark are used (e.g., *Aconitum heterophyllum*, *Rauvolfia serpentina*, *Berberis aristata*, *Coptis teeta*) may be at risk from overharvesting. Sustainable harvesting and cultivation are essential. Many tree and shrub species provide medicinal products without destruction, but their conservation depends on forest health. Climbers and herbaceous species are often underappreciated as medicinal resources outside traditional contexts.

Research Gaps

Increasing scientific validation is evident for many listed plants (e.g., *Curcuma longa*, *Tinospora cordifolia*, *Withania somnifera*), but many local species remain under-researched, such as *Zingiberianensis* and *Coptisteeta*. The list highlights several endemic and regionally important species that could be prioritized for pharmacological studies, conservation, and sustainable use. Continued ethnobotanical fieldwork is needed to document preparation methods, dosages, and tribal-specific uses. (1)

Conclusion

The medicinal flora of Arunachal Pradesh is exceptionally rich and diverse, with a strong representation of herbs and significant contributions from shrubs, trees, and climbers. The utilisation of various plant parts, especially leaves and roots, reflects deep ecological knowledge and adaptation to local environments. Safeguarding this resource requires an integrated approach that combines scientific research, traditional knowledge, conservation, and sustainable use strategies. The provided table serves as a valuable reference for future ethnobotanical, pharmacological, and conservation work in the region.

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