PLANT SCIENCE TODAY
Vol 13(2): 1-16
https://doi.org/10.14719/pst.12927

eISSN 2348-1900

REVIEW ARTICLE

Ethnomedicinal plants of Assam, India: A review on bioactive metabolites, therapeutic potential and future perspectives

Satya Nath Doley[1*], Ruby Doley[2] & Manoj Barthakur[3]

[1]Department of Botany, Gauhati University, Guwahati 781 014, Assam, India
[2]Department of Botany, North Gauhati College, Guwahati 781 031, Assam, India
[3]Department of Botany, B. Borooah College (Autonomous), Guwahati 781 013, Assam, India

*Correspondence email - satyadoley369@gmail.com

Received: 26 November 2025; Accepted: 19 February 2026; Available online: Version 1.0: 20 April 2026; Version 2.0: 27 April 2026

Cite this article: Satya ND, Ruby D, Manoj B. Ethnomedicinal plants of Assam, India: A review on bioactive metabolites, therapeutic potential and future perspectives. Plant Science Today. 2026; 13(2): 1-16. https://doi.org/10.14719/pst.12927

Abstract

Ethnomedicinal plants are integral to the traditional healthcare systems of indigenous communities in Assam, India. Groups such as the Bodo, Mising, Dimasa, Karbi, Rabha and Deori have long utilized a diverse range of local flora to treat ailments ranging from infections and fevers to chronic inflammatory and metabolic disorders. This review synthesizes current knowledge on bioactive metabolites derived from ethnomedicinal plants of Assam and evaluates their therapeutic relevance and future research prospects. A systematic literature survey was conducted using major scientific databases including Scopus, Web of Science, PubMed and Google Scholar. A total of 139 studies were included in the final analysis, documenting 86 ethnomedicinal plant species belonging to 48 families, traditionally used to treat major ailment categories, with gastrointestinal disorders, dermatological conditions and inflammatory diseases being the most frequently reported. Phytochemical investigations revealed the presence of diverse classes of bioactive metabolites, including alkaloids, flavonoids, phenolics, terpenoids, glycosides and saponins. Several species demonstrated significant pharmacological activities such as antioxidant, antimicrobial, anti-inflammatory, antidiabetic and anticancer properties, corroborating traditional therapeutic claims. The review highlights critical research gaps, including limited metabolite profiling, lack of clinical validation and concerns regarding sustainable utilization. Future perspectives emphasize the need for integrative ethnobotanical-phytochemical approaches, advanced metabolomics and conservation-oriented strategies to harness Assam's ethnomedicinal wealth for drug discovery and sustainable healthcare development. Integrating traditional knowledge with modern scientific approaches can both preserve cultural heritage and contribute meaningfully to global drug discovery and sustainable healthcare solutions.

Keywords: Assam; bioactive compounds; ethnomedicinal plants; indigenous communities; phytochemistry; traditional medicine

Introduction

The North-Eastern region of India is a rich reservoir of ethnomedicinal flora. Owing to its distinctive climate, varied topography and rich ecological diversity, Assam stands as a key state in the region, supporting an extensive range of plant species used traditionally for healthcare by its indigenous populations. Approximately 15.64 % of Assam's 30.9 million residents belong to tribal communities that comprise the Bodo, Mising, Karbi, Dimasa, Garo, Hmar, Rabha and Deori (1). Within their culture, these communities have relied on locally available medicinal plants for treating a range of ailments, integrating them deeply into their cultural and spiritual traditions. This wealth of ethnobotanical knowledge also offers immense potential for applications in pharmaceuticals and nutraceuticals.

Assam possesses a remarkable diversity of medicinal and wild edible plants, many of which are commonly integrated into traditional diets and healing practices. Ethnobotanical surveys confirm that most traditional remedies are plant-based and are widely practiced among the state's ethnic communities (2). Despite regional differences in plant nomenclature and utilization, the exchange of ethnobotanical knowledge is widespread, particularly in multi-ethnic villages located adjacent to protected forest areas. Recent surveys across Assam's districts highlight the widespread and continued use of traditional medicine, underscoring the urgent need to preserve this valuable knowledge system.

Globally, the scientific pursuit of naturally sourced bioactive and therapeutic compounds, which hold immense potential for developing safer and more sustainable medicines has grown significantly in recent decades (3). This renewed interest has encouraged extensive research into plants, fungi and other natural materials as potential reservoirs of novel pharmacologically active molecules.

Ethnomedicinal studies serve as a cornerstone in this pursuit, providing crucial leads for identifying novel bioactive molecules (4). Increasing scientific evidence now validates the therapeutic effectiveness of numerous traditional plant-based remedies (5). Currently, about 25 % of pharmaceutical drugs are sourced from plants (6) and in many developing nations, nearly 70 % to 95 % of the population depends on medicinal plants for primary healthcare (7). Plants synthesize a wide range of secondary metabolites-including alkaloids, flavonoids, phenolics,

saponins and terpenoids which, though primarily involved in defense and adaptation, have demonstrated significant health-promoting properties in humans (8). Produced through specialized secondary biosynthetic pathways, these compounds function as ecological tools for protection, attraction and communication (9). Historically, plant-derived substances formed the basis of early medicinal practices and the emergence of modern pharmacology can be traced to their systematic isolation and characterization in the 19th century (10).

Despite remarkable strides in synthesizing modern drugs, medicinal plants persist as key contributors of raw materials for the pharmaceutical industry (11). Growing clinical and pharmacological evidence has further heightened awareness of their therapeutic value, contributing to a global shift toward herbal medicines that are perceived as both effective and safer alternatives to many synthetic formulations (12). Yet, a substantial proportion of phytochemical constituents across diverse plant species remains uninvestigated (13). Existing research is often fragmented and disproportionately centered on a limited number of well-known species, leaving numerous potentially valuable plants insufficiently studied. This disparity underscores the need for comprehensive, systematic investigations.

Considering these issues, this review intends to bring together and critically examine available research on the ethnomedicinal flora of Assam and their associated bioactive metabolites. By identifying existing gaps in knowledge and highlighting understudied taxa, this review aims to guide and inform future research priorities in the domains of ethnobotany, phytochemistry and natural product drug discovery.

Methodology

A systematic literature search was conducted to collect information on bioactive metabolites from ethnomedicinal plants of Assam, India. The search was performed across multiple electronic databases, including PubMed, Scopus, Web of Science, Google Scholar, ScienceDirect, SpringerLink and relevant books, theses and conference proceedings. Peer-reviewed articles, theses and authoritative reports were screened using keywords related to ethnomedicinal plants of Assam, bioactive metabolites, phytochemistry and pharmacological activities. Scientific names of plants were validated using authoritative botanical databases such as: International Plant Names Index (IPNI) (https://www.ipni.org), POWO: Plants of the World Online (https://powo.science.kew.org), World Flora Online Plant List (https://wfoplantlist.org/). Synonyms were updated and standardized to ensure consistency.

Floristic and ethnomedicinal diversity

Assam harbors ~3000–3500 species of flowering plants, representing about 25 % of India's angiosperm diversity. Of these, 600–700 plant species are reported to have ethnomedicinal importance. The vegetation ranges from tropical wet evergreen and semi-evergreen forests to grasslands and riparian ecosystems, contributing to high plant diversity. Assam forms part of the Indo-Burma Biodiversity Hotspot, known for high endemism and species richness. The state's varied geoclimatic landscape, coupled with the coexistence of multiple native communities, has played major contribution to the development of a well-established tradition of ethnobotanical expertise and plant-based healing practices. The region's traditional therapeutic practices are deeply anchored in the indigenous wisdom of its culturally diverse ethnic groups. In Assam, ethnomedicinal wisdom is primarily preserved through oral transmission across successive generations. The perpetuation of this knowledge rests largely on village elders, herbalists and traditional healers collectively known as ojhas or bej (Fig. 1) who serve as its primary custodians. These practitioners primarily utilize native plant species that are widely available and readily accessible in their immediate environment.

A systematic ethnobotanical analysis reported 273 species of medicinal plants from 83 families utilized by different tribal groups in districts like Dima Hasao and Karbi Anglong, addressing 10 broad disease categories and 91 specific ailments, highlighting extensive plant use patterns (14). Traditional medicine has long been integral to community health and well-being in Assam. Although the therapeutic benefits and treatment methods associated with many plants are well recognized, the specific bioactive compounds responsible for these effects often remain unidentified. In recent years, several researchers have documented the ethnomedicinal practices prevalent in various parts of Assam. In Dibrugarh, the Bodo community uses 129 medicinal plant species across 18 ailment categories, presenting strong quantitative traditional use values like use value (UV), relative frequency of citation (RFC) and Informant Consensus (15). Across different ethnobotanical surveys in Assam, 50–181 ethnomedicinal plant species have been documented in single district studies (16,17). Most surveys report that leaves are the most frequently used plant part, followed by roots, stems and whole plants, indicating a common pattern of traditional remedy preparations (16). Many of these ethnomedicinal species belong to families known for rich phytochemistry (e.g., Fabaceae, Lamiaceae, Asteraceae), which often contain alkaloids, flavonoids, terpenoids and phenolics, aligning floristic diversity with potential bioactive metabolite sources (18). However, only a small fraction of the region's rich plant diversity has been scientifically evaluated for its phytochemical composition and antioxidant properties (19). This highlights the need for further systematic studies to validate traditional knowledge and identify new therapeutic agents.

Fig. 1. A tradition healer or bej preparing medicine for locally available plant resources.

Positioned in a globally recognized biodiversity hotspot, Assam has a long-standing tradition of utilizing a variety of plant species to cure or alleviate human illnesses. Phytochemicals, synthesized through secondary metabolism, are non-nutritive plant compounds recognized for their protective and health-promoting functions. These secondary metabolites, distributed across plant parts like leaves, roots and stems, play a vital role in shielding plants from pathogens and ecological stressors (20). Exploring these compounds deepens our understanding of their ecological roles and offers important insights into their potential for development of novel pharmaceutical agents.

Plant bioactive compounds

Naturally sourced bioactive phytochemicals significantly contribute to human health and help lower the vulnerability to a range of diseases. Bioactive compounds, commonly known as phytochemicals or secondary metabolites, possess a broad spectrum of structural and functional variations that underpin their biological activities (21). These compounds are widely present in plant-derived foods such as vegetables, fruits, grains, seeds and nuts serving as the plant's built-in defenses against environmental challenges, pathogenic organisms and herbivores.

While traditional phytochemistry outlines broad classes such as alkaloids, flavonoids and terpenoids, evidence from Assam's medicinal flora identifies specific bioactive constituents linked to documented ethnomedicinal uses. *Acorus calamus* L. rhizomes collected from Lower Assam contain high concentrations of α- and β-asarone, compounds reported to exhibit antimicrobial and gastroprotective activities (22). *Curcuma caesia* Roxb. rhizomes from Assam showed the presence of flavonoids, phenolics, alkaloids and other phytoconstituents validating traditional uses (23). Essential oil composition of *C. caesia* revealed several biologically active compounds with potential anticancer actions (24). Similarly, Curcuma species used in Upper Assam have been shown by HPLC and GC-MS studies to be rich in curcuminoids and ar-turmerone, which correlate with strong antioxidant and anticancer effects (25). Locally studied *Zingiber officinale* Roscoe cultivars demonstrate elevated gingerol content, aligning with demonstrated anti-inflammatory effects (26). Tinosporaside has been characterised from Assam specimens of *Tinospora cordifolia* (Wild) Hook. f & Thomson, demonstrating immunomodulatory effects that support traditional therapeutic applications (27). Despite these insights, many Assam plants such as *Phlogacanthus thyrsiformis* (Roxb. ex Hardw.) Mabb. and *Clerodendrum serratum* (L.) Moon requires more detailed compound isolation and pharmacological validation using modern analytical platforms (28).

When categorized by their biosynthetic origin, secondary metabolites fall into 6 major groups: phenolics, terpenes, alkaloids, saponins, glycosides and polysaccharides. Each group contains a wide variety of compounds with distinct therapeutic properties, such as antioxidant, anti-inflammatory, antimicrobial and anticancer activities. Assam, recognized for its rich ethnomedicinal traditions, hosts a wide range of indigenous plant species that contain noteworthy bioactive molecules, enhancing their medicinal significance. The list of these plants along with their key bioactive components is shown in Table 1.

Polyphenols

Polyphenols are part of the diverse array of plant-derived secondary metabolites synthesized by plants that, although not essential as nutrients, play highly significant biological roles. They are abundantly present in a wide range of fruits, vegetables, seeds and other plant-derived foods, representing one of the most extensive groups of active secondary metabolites. These molecules are primarily formed through the phenylpropanoid pathway, originating from the amino acid L-phenylalanine.

Defined by the presence of one or more phenolic rings, polyphenols display remarkable structural variability, which contributes to their diverse functional attributes. These compounds fall into multiple major subclasses, including flavonoids, phenolic acids, lignans, stilbenes, tannins and coumarins. Beyond their biochemical significance, polyphenols also influence key sensory qualities of plant foods, such as colour, flavour and aroma.

Their strong antioxidant potential enables polyphenols to neutralize reactive oxygen species, thereby alleviating oxidative stress within biological systems. This protective mechanism has been linked to a lower incidence of multiple chronic health conditions, including cancer, cardiovascular diseases, inflammatory disorders, neurodegenerative diseases and age-associated ailments (29).

Phenolic acids

Phenolic acids are a group of phytochemicals characterised by the presence of one or more hydroxyl (–OH) groups attached to an aromatic ring. These compounds play essential roles in plants, contributing to pigmentation, facilitating pollination and providing protection against pathogenic microorganisms. They occur widely in plant-derived foods, with notable dietary sources including fruits, vegetables, coffee, tea and wine; however, their concentration and distribution vary across different plant tissues.

In addition to their ecological importance, phenolic acids are involved in numerous physiological processes within plants, such as reproductive development, cell growth and responses to environmental stress (30). From a biological and medicinal perspective, phenolic acids display significant antimicrobial properties, help stabilize ascorbic acid and inhibit lipid peroxidation, thereby reducing the initiation and progression of carcinogenic processes (31). Their multifunctional roles make them important contributors to both plant health and human nutrition.

Flavonoids

Flavonoids constitute one of the most prominent subclasses of polyphenols and are abundantly found in a wide variety of plant-derived foods and beverages. They occur particularly in richly pigmented fruits such as grapes, cherries, berries, plums and cranberries. Broadly, flavonoids are categorized into 2 primary groups: anthocyanins and anthoxanthins. Anthocyanins impart the bright red, blue and purple pigmentation observed in numerous fruits and flowers, while anthoxanthins, generally colorless, comprise key subclasses such as flavones, isoflavones, flavanols and flavanones. Several well-studied flavonoids, including anthocyanins, kaempferol, hesperidin, naringenin, myricetin and quercetin, demonstrate a wide spectrum of biological activities. These compounds exhibit antioxidant, anticancer, anti-inflammatory and immunomodulatory activities,

Table 1. List of ethnomedicinal plants of Assam and their reported bioactive compounds

Sl. No.	Botanical name	Family	Local name	Plant parts used	Method of preparation	Mode of administration	Medicinal use	Bioactive compounds	Reference
1.	*Acmella paniculata* (Wall. ex DC.) R.K.Jansen	Asteraceae	Bon narji	Flowers, leaves	Decoction	Oral	Toothaches, sore throat, stimulant	phenolics, flavonoids, antioxidants	57
2.	*Aegle marmelos var. mahurensis* Zate	Rutaceae	Bel	Flowers, leaves	1. Paste of leaves 2. Juice of leaves	Topical	1. Small pox 2. Menstrual problem, digestive aid	skimmianine, aegelin, lupeol, cineol, citral, marmin, tannin	58
3.	*Ageratum conyzoides* L.	Asteraceae	Gundhua bon	Leaf	Paste	Topical	Cuts and wounds	stigmasterol, β□sitosterol	59
4.	*Alpinia nigra* (Gaertn.) B.L.Burtt	Zingeberaceae	Tora	Tuber	Juice	Oral	Digestive disorders, Nail infection	alkaloids, carbohydrate, flavonoids, glycosides, phenols and saponins	60
5.	*Amaranthus spinosus* L.	Amaranthaceae	Khutura	Root, Leaf	cooked	Oral	Pitted keratolysis, septic, asthma, diuretic	amaranthine, isoamaranthine, hydroxy-cinnamates, quercetin, kaempferol glycosides	61
6.	*Andrographis paniculata* (Burm.f.) Wall. ex Nees,	Acanthaceae	Sirata	Leaf	extract	Oral	Diabetes, worm infection, liver problem, malaria	andrographolide, flavones, lactones	62
7.	*Asparagus racemosus* Willd.	Asparagaceae	Satmul	Root	Extract	Oral	Nerve problem, Diabetes, kidney stone, constipation	phenols (flavonoids and hydroxycinnamic acids), saponins	63
8.	Averrhoa carambola L.	Oxalidaceae	Kordoi	Fruit	Juice	Oral	Cough	ascorbic acid, β-carotene, flavonoids, γ- and δ-tocopherol	64
9.	*Azadirachta indica* A.Juss.	Meliaceae	Neem	Leaves	Decoction, paste	Topical, Oral	Skin infection, intestinal worm	isoprenoids, gedunin, vilasinin and csecomeliacins such as nimbin, salanin, azadirachtin	65
10.	*Bacopa monnieri* (L.) Wettst.	Plantaginaceae	Brahmi	Whole plant	Juice	Oral	Memory booster	bacoside□a, triterpenoid, saponin, glycosides	66
11.	Bambusa balcooa Roxb.	Poaceae	Bholuka banh	Immature culms	extract	Topical	insect bites	flavanoids, saponins, phytosterols	67
12.	*Cannabis sativa* L.	Cannabinaceae	Bhang	Leaf	Steam of the boiled dried leves is inhaled	Nasal	Sinusitis	alkaloids, cardiac glycosides, flavonoids, resins, steroids, terpins	68
13.	*Centella asiatica* (L.) Urb.	Apiaceae	Bormanimuni	Leaf	extract	Oral	Stomach ulcers, memory booster, asthma, gastritis	asiatic acid, asiaticoside, madecassic acid, madecassoside	69
14.	Cinnamomum verum J. Presl	Lauraceae	Dalchini	Bark	extract	Oral	Digestive aid, anti-inflammatory, anti-diabetic	hydroquinone, 1,4-cyclohexanedione, cinnamaldehyde	70
15.	*Citrus aurantiifolia* (Christm.) Swingle	Rutaceae	Golnemu	Fruit	juice	Oral	Dysentery, stomachache	flavonoids, limonin,trans-bergamotene, limonexic acid, isolimonexic	71
16.	*Citrus limon* (L.) Osbeck	Rutaceae	Nemu	Root fruit	extract	Oral	Menstruation pain, Stomachache, Dysentery, scurvy	phenolic compounds as well as vitamins, minerals, dietary fiber, essential oils, carotenoids	72
17.	*Citrus maxima* (Burm.) Merr.	Rutaceae	Singkin	Fruit	Directly consumed	Oral	Indigestion	naringin, phenols, carotenoids	73
18.	*Clerodendrum infortunatum* Dennst.	Lamiaceae	Bhatai tita	Leaves, roots	1. Boiled 2. Paste	1.Oral 2.Topical	Anti-inflammatory, Skin infection	limonene, phytol, catechol, hexadecenoic acid, squalene, dodecanoic acid, vitamin E, hydroxymethylfurfural, stigmasterol	74
19.	*Clerodendrum chinense* (Osbeck) Mabb.	Lamiaceae	Dapai tita	Leaves	1. Paste 2.decoction	1. Topical 2. Oral	Malaria, Leech bite	iridoid glucosides, cyclohexylethanoids	75

20.	*Clerodendrum colebrookeanum* Walp.	Lamiaceae	Nefafu	Leaves	Cooked	Oral	Hypertension, anti-inflammatory	tannic acid, quercetin, catechin, reserpine, ascorbic acid, gallic acid	76
21.	*Colocasia antiquorum var. esculenta* (L.) Schott	Araceae	Kosu	Sap, Leaves	Directly used	Topical	Cuts and wounds	carbohydrates, protein, thiamine, riboflavin, niacin, oxalic acid, calcium oxalate, minerals, lipids, unsaturated fatty acids, anthocyanins	77
22.	*Commelina benghalensis* Wall.	Commelinaceae	Kona ximolu	Leaf, stem	Extract	Oral, Topical	Infertility, boil, eye infection	nonanoic acid, oxiraneethanol, propanoic acid, phytol, heptasiloxane	78
23.	*Corchorus capsularis* L.	Malvaceae	Mora	Leaf	Dried leaves boiled	Oral	Allergy, Fever	fatty acids, tocopherols, phenols,	79
24.	*Cryptolepis sinensis* Merr.	Apocynaceae	Harjora	Stem	Paste	Topical	Bone fracture	alkaloids, saponins, cardiac glycosides, phenols, tannins, flavonoids, anthocyanins, phlobatannins, lignin,steroids	80
25.	*Curcuma caesia* Roxb.	Zingiberaceae	Kola haldi	Rhizome	Juice	Oral	Blood purifier, tonsil, menstruation pain, eye infection	Curzerenone, Eucalyptol, Flavonoids, Phenolics, Alkaloids, Terpenoids, saponins	23
26.	*Curcuma longa* L.	Zingiberaceae	Haladhi	Rhizome	1.Paste 2. Juice	1. Topical 2. Oral	Cuts and wounds, skin infection, body ache	alkaloids, glycosides, steroids, flavonoids,saponins, phenol, resins	81
27.	*Cynadon dactylon* (L.) Pers.	Poaceae	Dubori	Whole plant	Extract, juice	Oral	Digestive disorder, antiseptic, stop epistaxis	cyanidin, luteolin, apigenin, β-sitosterol.	82
28.	*Dillenia indica* Blanco.	Dtilleniaceae	Ou tenga	Fruit	Cooked or eaten raw	Oral	Diabetes, urethritis	tannin, dillenetin, betulinic acid, rhamnetin, dihydro-isorhamnetin, lupeol, myricetin, naringenin, quercetin derivatives, kaempferol glucoside	83
29.	*Dioscorea alata* L.	Dioscoraceae	Kath alu	Tuber	juice	Oral	contraceptive	phenols, flavonoids	84
30.	*Drymaria cordata (L.) Roem. & Schult.*	Caryophyllaceae	Laijabori	Tender shoot	1. Juice 2. Boiled and steam is inhaled	1. Oral 2. Nasal	Allergy, headache, sinusitis	glycolipid	85
31.	*Eclipta alba var. prostrata (L.) Miq.*	Asteraceae	Keyaras	Whole plant	extract	Oral	Septic, diarrhoea, jaundice	triterpenoids, 3-acetylaleuritolic acid, stigmasterol, fatty esters, aromatic components	86
32.	*Euphorbia hirta* L.	Euphorbiaceae	Gakhirioti	Leaves	cooked	Oral	Lactation	steroids, terpenoids, saponnins, tannins,quinone	87
33.	*Ficus racemosa* Willd.	Moraceae	Dimoru	Latex, Leaf	Juice and latex is directly consumed	Oral	Haemorrhoids, Diabetes, Dysentery	tannin, wax, saponin gluanol acetate, β sitosterol, lupeol, ceryl behenate, lupeol acetate,α-amyrin acetate,leuoanthocyanidin and leucoanthocyanin from trunk bark, lupeol, β- sitosterol, stigmasterol	88
34.	*Garcinia pedunculata* Roxb.	Clusiaceae	Thekera	Fruit	Juice	Oral	Menstruation pain, Dysentery	alkaloids, carbohydrates, saponin, phenolic compounds, proteins along with fixed oils and fats, glycosides, amino acid	89
35.	*Garcinia xanthochymus* Hook.f.	Clusiaceae	Tepor tenga	Fruit, Leaves	Juice	Oral	Piles, abdominal disorder, vomiting, anaemia, urine problem	xanthones, benzophenones, flavonoids, isocoumarin	90

36.	*Gloriosa superba* L.	Colchicaceae	Agnilata	Tendril	Juice	Oral	Intestine worm	alkaloid, flavonoids, glycosides, phenols, saponins, steroids, tannin, terpenoids	91
37.	*Hellenia speciosa* (J.Koenig) S.R.Dutta	Costaceae	Jom lakhuti	Rhizome, tender leaves	extract	Oral	Anti-inflammatoru, diuretic	Alkaloids, flavonoids, phenols, sterol, quinines	92
38.	*Houttuynia cordata* Thunb.	Saururaceae	Mosundori	Leaf, tender stem, roots	paste	Oral	Dysentery, gastritis	chlorogenic acid, rutin, hyperin, quercitrin, piperolactam, aristolactam B, cepharadione B	93
39.	*Hydrocotyle rotundifolia* Roxb.	Araliaceae	xorumanimuni	Whole plant	extract	Oral	Diarrhoea, Allergy, asthma	phenolics, flavonoids and tannins	94
40.	*Ipomoea aquatica* Forssk.	Convolvulaceae	Kolmou	Tender shoot and leaves	extract	Oral	digestive disorders, general weakness, liver complaints and other health ailments	ellagic acid, quercetin glycosides, phenolic acids, flavonoids, alkaloids	95
41.	*Justicia adhatoda* L.	Acanthaceae	Bahaka	Leaves, stem	extract	Oral	Anti-inflammatory, analgesic	carbohydrate, protein, total phenolics, flavonoids, alkaloid.	96
42.	*Kalanchoe pinnata* (Lam.) Pers.	Crassulaceae	Dupor tenga	Leaf, young shoots	extract	Oral	Urinary problem, Kidney stone, Nail and foot infection	alkaloids, flavoniods, saponins, tannins	97
43.	*Lasia spinosa* (L.) Thwaites	Araceae	Sengmora	Bulb	cooked	Oral	Piles, wounds, menstrual problem	alkaloids, carbohydrates, proteins, flavonoids, terpenoids, phenolic compounds, steroids, saponins, glycosides, ascorbic acid, tannins	98
44.	*Leucas plukenetii* (Roth) Spreng.	Lamiaceae	Duron bon	Leaf, shoot tip	extract	Oral	Memory booster, pneumonia, gastritis, tonsil	long chain aliphatic compound, triterpenes, sterols, novel phenolic compounds	99
45.	*Manihot esculenta* Crantz.	Euphobiaceae	Ximolu	Roots, Leaves	Boiled	Oral	Digestive aid	flavonoids, anthocyanins, phenolic compounds.	100
46.	*Mentha arvensis* L.	Lamiaceae	Pudina	Leaves	1. Juice 2. Paste	1. Oral 2. Topical	1. Diarrhoea 2. Skin infection	menthol, isomenthone, menthone, cineole, flavonoids, alkaloids	101
47.	*Mikania micrantha* Kunth.	Asteraceae	Prem-Lota	Leaf	extract	Oral	Dysentery	phenolic compounds, flavonoids, antioxidants, hydrocarbon compounds, sesquiterpenes	102
48.	*Moringa oleifera* Lam.	Moringaceae	Sojina	Fruit, Leaves	Cooked	Oral	Dysentery, Hypertension	tocopherols (γ and α), phenolic compounds, β-carotene, vitamin C, phytates,tannins, quercetin-3-*O*-glucoside, kaempferol-3-O-glucoside, vicenin-2	103
49.	*Murraya koenigii* (L.) Spreng.	Rutaceae	Norohinga	Leaf	cooked	Oral	Diarrhoea, dysentery, diabetes, improve digestion	lutein, tocopheral, carotene, koenimbine, isomahanimbine.	104
50.	*Musa balbisiana* Colla.	Musaceae	Athia kol	Fruit, Rhizome	1. Fruit Cooked 2. Rhizome Juice	Oral	Dysentery, Diabetes, intestinal worm	Flavonoids, polyphenols, crude fibres.	105
51.	*Musa paradasica* L.	Musaceae	Bhim kol	Fruit, tuber	Raw, cooked	Oral	Pneumonia, toothache, chronic dysentery, menstruation problem	flavonoids, alkaloids, phenolics, tannins, ascorbic acid, saponins, β-carotene, lycopene	106
52.	*Nyctanthes arbor-tristis* L.	Oleaceae	Sewali	Leaf, flower	cooked	Oral	Piles, hypertension	carbohydrates, tanins, alkaloids, triterpenoids, saponins,flavonods	107

53.	*Ocimum basilicum* L.	Lamiaceae	Tulokhi	Leaf, seeds	extract	Oral	Anti-microbial, anti-inflammatory, Cough	phenols, flavonoids, terpenes	108
54.	*Ocimum tenuiflorum* L.	Lamiaceae	Tulokhi	Leaf	extract	Oral	Cough, malaria	eugenol, methyl cinnamate, camphor, thymol	109
55.	*Oldenlandia corymbose* L.	Rubiaceae	Bonjaluk	Whole plant, root	extract	Oral	Jauntice, bone fracture	flavonoids, tannins, saponins, phenolics, alkaloids, terpenoids.	17
56.	*Oroxylum indicum* (L.) Benth. ex Kurz.	Bignoniaceae	Bhat gila	Seed	extract	Oral	Vomiting, weakness	flavonoids, alkaloids,tannins, sterols, saponins, glycosides, phenols and quinones	110
57.	*Oxalis corniculata* L.	Oxalidaceae	Tengesi tenga	Whole plant	extract	Oral	Dysentery	flavonoids, alkaloids, tannins, phenols	111
58.	*Paederia foetida* L.	Rubiaceae	Bhedailota	Leaf	extract	Oral	Stomach ailments, gastric problems	saponin, tannin, phenol, flavonoid,terpenoid, cardiac glycoside, alkaloid	112
59.	*Perilla frutescens* (L.) Britton.	Polygonaceae	Hugloti	Leaf	Boiled	Oral	Cough	β-tocopherol, γ-tocopherol, β-sitosterol, and stigmasterol, triterpene acids	113
60.	*Persicaria hydropiper* (L.) H.Gross.	Polygonaceae	Bihlongoni	Shoot tip	extract	Oral	Septic	flavonoids, phenylpropanoid derivatives, sesquiterpenoids	114
61.	*Phlogacanthus thyrsiformis* (Roxb. ex Hardw.) Mabb.	Acanthaceae	Titaphul	Flower, Leaf	extract	Oral	Blood purifier, pneumonia, asthma	tannins, phenolic compounds, flavonoids,coumarins,saponins, fixed oils and fats	115
62.	*Phyla nodiflora* (L.) Greene.	Verbenaceae	Kurkuri bon	Leaves, flowers	Dried and powder	Topical	Skin infection	sugar, triterpenoids, flavonoids, phenol, steroids, essential oils, resins, tannins	116
63.	*Phyllanthus acidus* (L.) Skeels.	Phyllanthaceae	Pora amlokhi	Leaves	Juice	Oral	Cough	alkaloids, tannins, flavonoids, lignans, phenolics, terpenes	117
64.	*Phyllanthus emblica* L.	Phyllanthaceae	Amlakhi	fruit	Eaten raw	Oral	Diabetes, anaemia, vomiting, piles	alkaloids, caridac glycosides, saponins	118
65.	*Phrynium pubinerve* Blume	Marantaceae	Koupat	Leaves	Slightly warmed	Topical	Eye injury	antioxidants, aliphatic alcohols, aromatics, oxygenated monoterpenes, diterpenes	119
66.	*Piper betle* L.	Piperaceae	Paan	Leaf, petiole, mature shoot tip	extract	External, Oral	Dog bite, nail infection, bleeding from nose, asthma	hydroxychavicol, eugenol, tannins, saponins, alkaloids, flavonoids, steroids, terpenoids, phenolic compounds	120
67.	*Piper betleoides* C.DC.	Piperaceae	Jangi jaluk	Root	Juice	Oral	Jaundice	pedicellamide	121
68.	*Piper longum* Blume.	Piperaceae	Pipoli	Leaf, stem, fruit	extract	Oral	Pneumonia, asthma	piperine, pellitorine, guineensine,pipnoohine, trichostachine, piperonal	122
69.	*Ricinus communis*	Euphorbiaceae	Era gos	Leaf	extract	External, Oral	Pain, piles, cancer		
70.	*Scoparia dulcis* L.	Plantaginaceae	Jalukbon	Whole plant	extract	Oral	Malaria	terpenes, alkaloids, Scoparic acid A, scoparic acid D, scutellarein, apigenin, luteolin, coixol, glutinol	123
71.	*Sesamum indicum* L.	Pedaliaceae	Til	Seed	cooked	Oral	Stomachache, constipation	Flavanoids, flavanols, Lignans, phenolic compounds	124
72.	*Solanum anguivi* Herb.Lamb. ex Dunal,	Solanaceae	Banko	Leaf	juice	Oral	Diarrhoea	gallic acid, caffeic acid, chlorogenic acid, quercetin	125
73.	*Solanum nigrum* L.	Solanaceae	Xoru pokmou	Tender shoots	cooked	Oral	Jaundice	alkaloids, carbohydrates, flavonoids, glycosides, phenolic compounds, phytosterols, proteins, saponins, tannis	126

74.	*Solanum torvum* Schltdl.	Solanaceae	Tita bangko	Fruit, Leaves	Eaten raw, cooked	Oral	Anti-oxidant, anti microbial	alkaloid, flavonoid, phenol, tannins, saponins, phytosterol, glycosides	127
75.	*Tamarindus indica* L.	Fabaceae	Teteli	Fruit	Infusion	Oral	Hypertension	phenolics, flavonoids, antioxidants, organic acids, sugar	128
76.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	Arjun	Bark	extract	Oral	Diabetes, Heart disease	tannins, triterpenoid saponins (arjunic acid, arjunolic acid, arjungenin, and arjunglycosides), flavonoids (arjunone, arjunolone, luteolin), gallic acid, ellagic acid, Oligomeric Proantho cyanidines, phytosterols	129
77.	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	Bhomora	Fruit	Eaten raw	Oral	Stomach disorder	flavonoids, tannins, phlobotanins, saponins,steroids, cardiac glycosides	130
78.	*Terminalia chebula* Retz.	Combretaceae	Xilikha	Fruit	Eaten raw, dried	Oral	Dysentery, pneumonia, gastritis	flavonoids, tannins, phlobotanins, saponins, steroids, cardiac glycosides	130
79.	*Thunbergia grandiflora* Roxb.	Acanthaceae	Khakaloti	Roots	Juice	Topical	Ear infection	isounedoside, grandifloric acid	131
80.	*Tinospora cordifolia* (Willd.) Miers ex Hook.f. & Thomson.	Menispermaceae	Shaguni lota	Stem	extract	Oral	Back pain	alkaloids, glycosides, steroids, aliphatic compounds, essential oils, mixture of fatty acid, calcium, phosphorous, polysaccharides	132
81.	*Vigna mungo* (L.) Hepper.	Fabaceae	Matimah	Seed	Paste with mustard oil	Topical	Body ache	ferulic acid, protocatechuic acid, ferulic acid, gentisic acid and gallic acid	133
82.	*Viola pilosa* Blume.	Violaceae	Banafsha	Whole plant	Juice	Oral	Haemorrhoids	alkaloids, proteins, tannins, carbohydrates, sterols, flavonoids, saponins, fats and oils	134
83.	*Vitex negundo* L.	Lamiaceae	Posotia	Tender shoots and leaves	Boiled extract	Oral	Cough, pain, fever, allergy	protocatechuic acid; oleanolic acid; flavonoids, β sitosterol, β-selinene; α- cedrene; germacrene D; hexadecanoic acid; p-cymene and valencene	135
84.	*Xanthium strumarium* L.	Asteraceae	Agora	Root	extract	Oral	Colic	xanthanolides (xanthatin, xanthinosin), phenolic acids, flavonoids, saponins.	136
85.	*Zanthoxylum nitidum* (Roxb.) DC.	Rutaceae	Tezmoi	Root	extract	Oral	Pneumonia	rhoifoline A, alkaloids	137
86.	*Zingiber officinale* Roscoe.	Zingiberaceae	Ada	Rhizome	Raw	Oral	Vomiting, cough, asthma	alkaloids, ascorbic acid, beta-carotene, polyphenols (flavonoids, flavones glycosides, rutin, etc.), terpenoids	138

which collectively enhance their protective influence on human health (9). By neutralizing free radicals, flavonoids help prevent oxidative damage to cellular components and by influencing various signalling pathways, they play a vital role in regulating immune function and reducing the risk of chronic diseases.

Lignans

Lignans are identified as phenolic bioactive molecules produced by plants characterised by a dibenzylbutane structural framework and are commonly recognized as natural phytoestrogens due to their ability to modulate estrogenic activity in humans and animals. They occur broadly throughout the plant kingdom and are especially abundant in legumes, cereals, vegetables and fruits, where they are typically present as glycosides or as bio-oligomeric aglycones. Among dietary sources, flaxseed, linseed and sesame seeds are considered the richest reservoirs of lignans.

A variety of key lignans have been identified, including syringaresinol, pinoresinol, sesamolin, sesamol, sesamin, matairesinol, secoisolariciresinol, 7-hydroxymatairesinol and lariciresinol. These compounds demonstrate an impressive range of biological functions, exhibiting antiviral, antioxidant, insecticidal and antifeedant activities (32). Beyond these biological activities, lignans are associated with multiple beneficial impacts on health, including supporting hormonal balance, mitigating oxidative damage and offering protection against various long-term ailments such as cardiovascular conditions and cancers influenced by hormonal pathways.

Alkaloids

Alkaloids represent one of the most structurally and functionally diverse groups of naturally occurring compounds. These nitrogen-containing organic bases are neither nucleosidic nor peptidic and typically possess heterocyclic nitrogen rings. Approximately 5500 alkaloids have been identified to date, making them the largest class of phytobioactive molecules (33). Many alkaloids exhibit potent biological activities and are utilized in both traditional and contemporary medicine, particularly for their analgesic, antimicrobial and neuroactive effects (34). Plants containing berberine-type alkaloids have long been used in traditional Chinese, Indian and Islamic medicine as antiseptics, sedatives and anti-inflammatory agents. Berberine, an isoquinoline alkaloid, also exhibits neuroprotective effects and antiviral activity against coronaviruses (35).

Terpenes

Terpenes, often referred to as terpenoids or isoprenoids constitute the most extensive class of natural products, with more than 55000 compounds documented to date. These structurally diverse molecules are integral to a wide range of industries, including food, cosmetics and pharmaceuticals, where they serve as flavor enhancers, aromatic components and biologically active agents. Well-known therapeutic terpenes include artemisinin, valued for its potent antimalarial activity and paclitaxel, a frontline chemotherapeutic drug (36). Beyond their industrial and medicinal relevance, terpenes display strong anti-inflammatory potential by regulating key molecular pathways associated with inflammation, thus contributing to the management of several chronic disorders (8).

Saponins

Saponins are plant-origin amphiphilic glycosides that occur widely in nature and are typically classified into 2 major groups: triterpenoid saponins, which contain a five-ring backbone and steroidal saponins, which possess a characteristic four-ring nucleus. These bioactive compounds are known for their notable cardioprotective properties, attributed to their ability to regulate calcium balance, enhance cellular energy pathways and modulate inflammatory processes (37). Their characteristic tendency to produce long-lasting foams in liquid solutions serves as the foundation for their broad utilization across food, cosmetic and pharmaceutical applications. Beyond their physicochemical attributes, saponins demonstrate an extensive range of biological functions, encompassing antimicrobial, immunomodulatory, antioxidant and lipid-lowering activities, making them valuable contributors to both traditional remedies and contemporary therapeutic formulations.

Polysaccharides

Polysaccharides are intricate carbohydrate molecules commonly found in fruits, vegetables and various plant-derived sources. These macromolecular compounds provide multiple health advantages, particularly cardiovascular protection, which is mediated by their antioxidant, anticancer, anti-inflammatory and immunoregulatory properties (38). Among the most studied bioactive polysaccharides are plant-derived gums and marine-sourced fucoidans, both recognized for their potent antioxidant capacity and low toxicity (39). Beyond cardiovascular support, polysaccharides contribute to gut health by promoting beneficial microbiota, modulating metabolic processes and enhancing immune function. Owing to their multifunctional properties, biocompatibility and safety, polysaccharides are increasingly incorporated into nutraceutical, functional food and pharmaceutical formulations, highlighting their growing significance in health promotion and disease prevention.

Scientific investigation on medicinal plants bioactive compounds

A thorough review of available literature was performed to identify the active phytochemical components occurring in the medicinal plants referenced in this study. These compounds exhibit diverse therapeutic effects, with their efficacy varying according to plant species, plant part and dosage. Comparing existing phytochemical data with ethnobotanical surveys of medicinal flora offers valuable insights into the distribution of bioactive compounds without the need for exhaustive experimental analyses of every species. Qualitative and quantitative phytochemical evaluations of 7 medicinal plants *Bryophyllum pinnatum* (Lam.) Oken, *Ipomoea aquatica* Forssk., *Oldenlandia corymbosa* L., *Ricinus communis* L., *Terminalia bellirica* (Gaertn.) Roxb., *T. cordifolia* and *Xanthium strumarium* L. carried out using different extraction solvents and plant parts, revealed the presence of major medicinally important constituents in both aqueous and organic extracts, thereby supporting their traditional therapeutic applications *(40)*. Phytochemical screening of *B. pinnatum* revealed alkaloids, polyphenols, flavonoids, terpenoids, carbohydrates and glycosides in the hexane, ethyl acetate and methanol extracts, with steroids not detected (41). Similarly, analysis of the leaves, stems and roots of *O. corymbosa*, *R. communis*, *I. aquatica*, *X. strumarium* and *Mentha piperita*, reported positive results for saponins, tannins, flavonoids, terpenoids, glycosides, alkaloids,

carbohydrates, steroids, coumarins and proteins (42). A high concentration of carbohydrates in *Clerodendrum viscosum* Vent. was reported using Fehling's test, underscoring its nutritional and therapeutic potential (43).

Phytochemical examination of raw *Hibiscus sabdariffa* seeds confirmed the occurrence of flavonoids, tannins, polyphenols, alkaloids and saponins, but did not show any traces of terpenes, steroids, or glycosides (44). A comprehensive review was summarized on the ethnomedicinal applications and phytochemical constituents of nine indigenous medicinal plants *O. corymbosa*, *R. communis*, *I. aquatica*, *T. bellirica*, *B. pinnatum*, *C. viscosum*, *Hibiscus sabdariffa L.*, *X. strumarium* and *Mentha piperita L*. Their results verified the occurrence of a wide range of bioactive groups, such as steroids, terpenoids, alkaloids, flavonoids, tannins, saponins, glycosides, coumarins and carbohydrates. These compounds are associated with a wide range of pharmacological properties such as antimicrobial, antioxidant, anti-*Salmonella*, hepatoprotective, antispasmodic and anticancer activities demonstrating their potential as candidates for novel drug development (45). A quantitative survey of medicinal plants traditionally utilised by the Mising community of Northeast India documented 153 species, each exhibiting substantial phytochemical diversity, including alkaloids, flavonoids, phenolics, saponins, polyphenols, tannins, arecoline, quinones, coumarins and glycosides (46).

Several ethnomedicinal plants reported across different studies are shared among various tribal communities, indicating a broader cultural consensus regarding their therapeutic efficacy (47). A comprehensive ethnobotanical survey further identified 102 plant species belonging to 57 families used by tribal populations for treating human and livestock ailments. Of these, 33 species had previously undocumented ethnobotanical applications, while 8 were used specifically for managing livestock diseases (48). An extensive review highlighting the bio-pharmacological and therapeutic significance of phyto-bioactive compounds, emphasizing their potential as natural alternatives to synthetic drugs in disease management was also conducted (21). Similarly, a documentation of 206 ethnomedicinal plant species from 72 families in the Baksa district of Assam demonstrated the region's remarkable diversity and its continued reliance on traditional herbal medicine (49). There was also a record of 33 plant species (32 genera, 24 families) used by tea tribe communities in Morigaon district, Assam, for managing rheumatoid arthritis. Quantitative ethnobotanical indices such as use value (UV) and fidelity level (FL) were employed to assess their therapeutic relevance (50). A meta-analysis documenting the use of 273 plant species from 83 families by Eastern Himalayan indigenous communities of Assam for treating 91 distinct ailments was also reported (14). This synthesis underscores the region's vast ethnomedicinal heritage and the continuing importance of these plants as reservoirs of bioactive compounds for future pharmacological exploration.

Pharmacological properties and therapeutic potentials

Plants synthesize a vast array of bioactive chemical compounds through secondary metabolism (34). These bioactive molecules such as alkaloids, flavonoids, tannins, terpenoids, saponins and phenolic acids are widely found in the medicinal plants used by tribal communities. Their presence underpins a broad spectrum of pharmacological activities including antioxidant, antimicrobial, anti-inflammatory and anticancer effects. Phytochemicals exert therapeutic actions by neutralizing free radicals, inhibiting carcinogen-activating enzymes and promoting detoxification pathways (51). Compounds like alkaloids, flavonoids, terpenoids and carotenoids exhibit diverse biological activities such as antidiuretic, anti-inflammatory, analgesic, anticancer, antiviral, antimalarial, antibacterial and antifungal effects, making them vital in disease prevention. Increasingly, plant extracts are gaining recognition for their effectiveness against growing antibacterial resistance (52), with crude extracts showing strong antibacterial properties (53). The purification and study of these bioactive compounds have become key areas of research (43). Recent research also highlights that natural antioxidant from medicinal plants help mitigate the harmful effects of oxidative stress and free radicals, exhibiting antimutagenic, antiallergic and anticarcinogenic properties along with free radical scavenging and antimicrobial activities (46). Recent studies showed that of the 4 medicinal plants reviewed, *Nigella sativa, Vernonia amygdalina, Azadirachta indica, and Eurycoma longifolia*, only *A. indica* showed preliminary in silico antiviral activity against SARS-CoV-2, while all demonstrated varying anti-inflammatory and immunomodulatory effects (54). Furthermore, bioactive compounds continue to be extensively used in traditional medicine systems for the management of diseases including type 2 diabetes (21). Among these compounds, berberine-a key plant-derived alkaloid exhibits significant therapeutic potential. Its broad pharmacological activities include anticancer, anti-inflammatory, antidiabetic, antimicrobial, cardioprotective and cholesterol-lowering effects. Collectively, these properties underscore their promise in managing conditions such as atherosclerosis, Alzheimer's disease and other chronic disorders, highlighting its potential for advancement in therapeutic applications (56).

Research gaps and standardization issues

Despite Assam's rich biodiversity and the extensive traditional knowledge surrounding its ethnomedicinal plants, several critical research gaps and challenges in standardization remain. A primary concern is the inadequate and fragmented ethnobotanical documentation. Much of the indigenous knowledge is transmitted orally through generations, with only a limited portion systematically recorded. This has led to the underrepresentation of many valuable plant species in scientific literature and databases. Additionally, the available information often lacks consistency regarding plant identification, specific plant parts used, methods of preparation, dosage and modes of administration-factors that hinder reproducibility, comparative analysis and scientific validation.

Another key research gap is the insufficient phytochemical and pharmacological profiling of these medicinal plants. Although some preliminary investigations have identified general classes of bioactive compounds such as alkaloids, flavonoids and phenolics, the precise molecules responsible for therapeutic effects remain largely uncharacterised. Advanced analytical tools such as high-resolution mass spectrometry, nuclear magnetic resonance (NMR) and metabolomics are rarely utilized in the study of these species. Moreover, traditional herbal formulations often comprise complex mixtures, yet the synergistic or antagonistic interactions among their constituents are seldom explored, leaving a significant gap in understanding their comprehensive pharmacological effects.

Furthermore, the regulatory framework governing the use and commercialisation of herbal products in Assam and the broader Northeastern region is still in its nascent stage. There is a notable absence of a regional pharmacopoeia that recognizes and standardizes the medicinal plants unique to this area, posing an obstacle to quality control and wider application of these ethnomedicinal resources in formal healthcare systems.

Integration of traditional knowledge with modern science

The integration of traditional knowledge with modern scientific research presents significant potential for the discovery and development of bioactive molecules from the ethnomedicinal plants of Assam. Indigenous communities such as the Bodos, Karbis, Misings, Dimasas and others have cultivated a rich legacy of ethnomedicinal practices, with remedies passed down orally through generations. These communities possess extensive knowledge about the therapeutic applications of local flora in treating both common ailments and chronic diseases. However, a substantial portion of this traditional wisdom remains undocumented or insufficiently explored through scientific inquiry.

Bridging this knowledge gap necessitates a respectful, systematic and participatory approach that actively involves traditional healers in the research process. Scientific validation of these traditional remedies through pharmacognostic evaluation, phytochemical analysis and bioactivity assays can substantiate traditional claims and lead to the identification of potent bioactive compounds. The application of advanced analytical tools such as chromatography, spectroscopy, molecular docking and omics-based approaches (genomics, metabolomics and proteomics) further enhances the ability to isolate, characterize and elucidate the mechanisms of action of these compounds at the molecular level. Establishing collaborative frameworks that include ethnobotanists, phytochemists, pharmacologists and indigenous knowledge holders is crucial for promoting ethical knowledge sharing and equitable benefit distribution. Additionally, the development of standardized protocols inspired by traditional formulations can support the creation of safe, effective and affordable phytotherapeutic products. Thus, the integration of traditional knowledge with scientific rigor not only serves to validate cultural heritage but also contributes to novel drug discovery and the sustainable utilization of Assam's ethnomedicinal plant diversity.

Roadmap for future research

Since antiquity, phyto-bioactive compounds have played a vital role in traditional medicinal systems worldwide, serving as effective remedies for a broad spectrum of ailments. Numerous scientific studies have highlighted their therapeutic efficacy, establishing these natural compounds as promising candidates for the development of novel drugs with superior efficacy and biocompatibility. Contemporary research continues to uncover additional pharmacological properties, thereby expanding their already wide-ranging applications in modern medicine.

In today's fast-paced lifestyle, the prevalence of oxidative stress has markedly increased, contributing to the onset and progression of chronic conditions such as diabetes mellitus, cancer and cardiovascular diseases. Simultaneously, the overuse and misuse of antibiotics have exacerbated the global issue of antibiotic resistance, posing serious threats to public health, particularly within clinical environments. The growing limitations and side effects associated with synthetic pharmaceuticals have further emphasized the urgent need to explore plant-derived bioactive compounds as alternative therapeutic agents. Bioactive compounds including polyphenols, alkaloids and terpenoids have demonstrated significant therapeutic potential in mitigating oxidative stress, inflammation, microbial infections and chronic illnesses. Their efficacy in addressing complex diseases such as cancer, ulcers, diabetes, microbial resistance, platelet aggregation and tumor development is being increasingly recognized. Owing to their multitargeted mechanisms of action and low toxicity profiles, these compounds are considered promising candidates for future drug discovery and integrative healthcare strategies.

Conclusion

This review highlights the remarkable therapeutic potential of plant-derived bioactive compounds and their broad applicability across food, nutraceutical and pharmaceutical industries. These compounds play a pivotal role in the prevention and management of chronic health conditions, including cancer, cardiovascular disorders, neurodegenerative diseases, diabetes, obesity and other oxidative stress–related ailments. Their diverse biological properties encompassing antioxidants, anti-inflammatory, antidiabetic and neuroprotective activities collectively contribute to disease mitigation and overall health improvement. The growing incorporation of bioactive compounds into functional foods and nutraceuticals underscores their increasing global relevance in promoting long-term wellness. Moreover, the integration of ethnobotanical knowledge serves as a vital foundation for identifying and preserving traditional medicinal practices. Scientific validation of such traditional wisdom not only enriches our understanding of phytotherapeutics but also supports the harmonization of traditional healing systems with modern medical science. To fully realize this potential, future research must prioritize enhancing the bioavailability of these compounds through novel delivery systems, elucidating synergistic mechanisms of action and conducting large-scale clinical trials to ensure their safety and efficacy in human populations. Future research must prioritize the rigorous documentation of Assam's indigenous knowledge to prevent biopiracy, alongside developing sustainable agrotechnologies like tissue culture to conserve endangered species. Scientific efforts should focus on clinically validating traditional polyherbal formulations to translate ancient wisdom into safe, standardized therapeutics. This approach is essential to protect the region's biodiversity while elevating local ethnomedicinal practices to a global industrial scale.

Acknowledgements

The authors express their sincere gratitude to the Department of Botany, Gauhati University for their support in plant identification and for facilitating access to the necessary review articles. They also extend their thanks to the traditional healers for sharing valuable information that helped in authenticating the plant species.

Authors' contributions

SND drafted the initial manuscript and validated the data. RD participated in the design of the study and prepared the table. MB reviewed and revised the manuscript. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interest to declare.

Ethical issues: None

References

1. Dhar S. Socio-economic and demographic status of Assam: A comparative analysis of Assam with India. Int J Humanit Soc Sci. 2014;1(3):108–17.
2. Narzary H, Swargiary A, Basumatary S. Proximate and vitamin C analysis of wild edible plants consumed by Bodos of Assam, India. J Mol Pathophysiol. 2015;4(4):128–33. https://doi.org/10.5455/jmp.20151111030040
3. Jilani M, Bhatti H, Bhatti I, Shahid M. Chemical profiling and biological activities of basil essential oil. Oxid Commun. 2016;39 (4):2913–8.
4. Khalid S, Malik AU, Khan AS, Shahid M, Shafique M. Tree age, fruit size and storage conditions affect levels of ascorbic acid, total phenolic concentrations and total antioxidant activity of 'Kinnow' mandarin juice. J Sci Food Agric. 2016;96(4):1319–25. https://doi.org/10.1002/jsfa.7225
5. Radha R, Chauhan P, Puri S, Thakur M, Rathour S, Sharma A, et al. A study of wild medicinal plants used in Nargu wildlife sanctuary of district Mandi in Himachal Pradesh, India. J Appl Pharm Sci. 2021;11:135–44. https://doi.org/10.7324/JAPS.2021.110416
6. Okpuzor J, Adebesin O, Ogbunugafor H, Amadi I. The potential of medicinal plants in sickle cell disease control: A review. Int J Biol Health Sci. 2021;4(2):1–10.
7. Liaqat A, Zahoor T, Randhawa MA, Shahid M. Characterization and antimicrobial potential of bioactive components of sonicated extract from garlic (*Allium sativum*) against food borne pathogens. J Food Process Preserv. 2019;43(5):e13936. https://doi.org/10.1111/jfpp.13936
8. Riaz T, Abbasi MA, Siddiqui SZ, Shahid M, Fatima H, Ashraf M, et al. Enzyme inhibitory, antifungal, antibacterial and hemolytic potential of various fractions of Colebrookia oppositifolia. Pak J Pharm Sci. 2017;30(1):155–62.
9. Khairan K, Idroes R, Tallei TE, Nasim MJ, Jacob C. Bioactive compounds from medicinal plants and their possible effect as therapeutic agents against COVID-19: A review. Curr Nutr Food Sci. 2021;17(6):621–33. https://doi.org/10.2174/22123881MTEzCMjYDx
10. Tanweer S, Shehzad A, Butt MS, Shahid M. Probing the therapeutical potential of conventional and supercritical fluid extract of Zingiber officinale to mitigate ulcer, inflammation, hepatotoxicity and nephron toxicity. Prog Nutr. 2018;20:255–78.
11. Shang A, Gan RY, Xu XY, Mao QQ, Zhang PZ, Li HB. Effects and mechanisms of edible and medicinal plants on obesity: An updated review. Crit Rev Food Sci Nutr. 2021;61(12):2061–77. https://doi.org/10.1080/10408398.2020.1769548
12. Noreen A, Hussain F, Shahid M. Insights on the antioxidant, antidiabetic, antiamnesic, cytotoxic, thrombolytic and antibiofilm activities of *Stevia rebaudiana* leaves. Prog Nutr. 2020;22(3):1–9.
13. Mao AA, Hynniewta TM. Floristic diversity of North East India. J Assam Sci Soc. 2000;41:255–66.
14. Begum K, Mylliemngap W, Lyngdoh N. Quantitative ethnobotanical analysis of ethnomedicinal flora used by the Eastern Himalayan indigenous communities of Assam, India. Ethnobot Res Appl. 2024;27:1–39. https://doi.org/10.32859/era.27.43.1-39
15. Boro M, Das B, Boro KK, Nath M, Buragohain P, Roy S, et al. Quantitative ethnobotany of medicinal plants used by the Bodo community of Baksa District, BTR, Assam, India. Biodiversitas. 2023;24(6):3169–82. https://doi.org/10.13057/biodiv/d240610
16. Bhattacharjya DK, Akhtar J, Deka P, Bharadwaj A. An ethnobotanical survey on phytomedicines based on traditional knowledge in the Barpeta district, Assam, India. J Ayurveda Integr Med. 2023;14(4):100763. https://doi.org/10.1016/j.jaim.2023.100763
17. Kaphungkui NK, Nasrin T, Bharali S, Khan MM, Keishing S. Diversity of indigenous medicinal plants used by scheduled tribe communities of Dibrugarh District, Assam, India: A case study. Afr J Biomed Res. 2024;27(1S):733–41. https://doi.org/10.70135/seejph.vi.1760
18. Timungpi M. Ethnobotanical documentation of medicinal plant resources in Assam, Northeast India. J Agric Ecol. 2025;[Epub ahead of print]. https://doi.org/10.58628/JAE-2521-112
19. Baruah S, Borthakur SK, Gogoi P, Ahmed M. Studies on ethnomedicinal plants used by Adi-Minyong tribe of Arunachal Pradesh, Eastern Himalaya. J Nat Prod Resour. 2013;4(3):278–82.
20. Baruah S, Brahma D, Upadhya P. Phytochemical study of selected medicinal plants and their ethnobotanical uses. Int J Phytomed. 2018;10(2):145–50. https://doi.org/10.5958/0975-6892.2018.00023.0
21. Riaz M, Khalid R, Afzal M, Anjum F, Fatima H, Zia S, et al. Phytobioactive compounds as therapeutic agents for human diseases: A review. Food Sci Nutr. 2023;11:2500–29. https://doi.org/10.1002/fsn3.3308
22. Deka P, Baruah R, Sarma RN. Phytochemical composition and antimicrobial activity of *Acorus calamus* L. rhizomes collected from Assam, India. J Ethnopharmacol. 2019;235:293–301.
23. Das K, Saikia LR. Studies on ethnobotany, phytochemical constituents and antimicrobial activity of Curcuma caesia Roxb. and *Curcuma aromatica* Salisb. from Upper Brahmaputra Valley Zone of Assam, India. J Adv Sci Res. 2020;11(5):71–5.
24. Barman K, Borah S, Das B, Laskar T, Chakraborty DD, Chakraborty P, et al. Unveiling the anticancer potential of *Curcuma caesia* Roxb. against ovarian cancer. J Neonatal Surg. 2025;14(8S):781–7. https://doi.org/10.52783/jns.v14.2605
25. Rajkhowa R, Hazarika M, Goswami P. Phytochemical profiling and antioxidant potential of *Curcuma* species from Upper Assam using HPLC and GC-MS analysis. Nat Prod Res. 2021;35(14):2456–62.
26. Baruah BK, Goswami D. Comparative analysis of gingerol content and anti-inflammatory activity of *Zingiber officinale* Roscoe cultivars from Assam, India. Indian J Tradit Knowl. 2018;17(3):567–73.
27. Hazarika B, Sharma S, Bordoloi M. Tinosporaside quantification from *Tinospora cordifolia* Assam ecotype. J Herb Med. 2023;42:9–17.
28. Saikia R, Dutta K. Ethnomedicinal uses and phytochemical perspectives of *Clerodendrum serratum* and *Phlogacanthus thyrsiformis* in Assam, India. Indian J Nat Prod Resour. 2017;8(4):321–8.
29. Hano C, Tungmunnithum D. Plant polyphenols: oxidative stress, aging and age-related diseases. Antioxidants (Basel). 2020;7:26. https://doi.org/10.3390/medicines7050026
30. Den NZU, Mustafa G, Bukhari SA, Anjum F, Qasim M, Shahid M. Enhancement of nutraceutical and antioxidant potential of sunflower hybrid seed varieties through chemical priming. Pak J Pharm Sci. 2019;32(4):1901–7.
31. Sharif S, Atta A, Huma T, Shah AA, Afzal G, Rashid S, et al. Anticancer, antithrombotic, antityrosinase and anti-α-glucosidase activities of selected wild and commercial mushrooms from Pakistan. Int J Food Sci Nutr. 2018;6(8):2170–6. https://doi.org/10.1002/fsn3.781
32. Banwo K, Olojede AO, Adesulu-Dahunsi AT, Verma DK, Thakur M,

Tripathy S, et al. Functional importance of bioactive compounds of foods with potential health benefits: A review on recent trends. Food Biosci. 2021;43:101320. https://doi.org/10.1016/j.fbio.2021.101320

33. Mehmood N, Zubair M, Rizwan K, Rasool N, Shahid M, Ahmad VU. Antioxidant, antimicrobial and phytochemical analysis of *Cichorium intybus* seeds extract and various organic fractions. Iran J Pharm Res. 2012;11(4):1145–51.

34. Bari MN, Zubair M, Rizwan K, Rasool N, Bukhari IH, Akram S, et al. Biological activities of *Opuntia monacantha* cladodes. J Chem Soc Pak. 2012;34(4):990–5.

35. Khan H, Nabavi SM, Sureda A, Mehterov N, Gulei D, Berindan-Neagoe I, et al. Therapeutic potential of songorine, a diterpenoid alkaloid of the genus *Aconitum*. Eur J Med Chem. 2018;153:29–33. https://doi.org/10.1016/j.ejmech.2017.10.065

36. Ashraf A, Sarfraz RA, Rashid MA, Mahmood A, Shahid M, Noor N. Chemical composition, antioxidant, antitumor, anticancer and cytotoxic effects of *Psidium guajava* leaf extracts. Pharm Biol. 2016;54(10):1971–81. https://doi.org/10.3109/13880209.2015.1137604

37. Chen Y, Zeng L, Yang J, Wang Y, Yao F, Wu Y, et al. Anti-DHAV-1 reproduction and immuno-regulatory effects of a flavonoid prescription on duck virus hepatitis. Pharm Biol. 2017;55(1):1545–52. https://doi.org/10.1080/13880209.2017.1309554

38. Chen C, Yu LT, Cheng BR, Xu JL, Cai Y, Jin JL, et al. Promising therapeutic candidate for myocardial ischemia/reperfusion injury: What are the possible mechanisms and roles of phytochemicals? Front Cardiovasc Med. 2021;8:792592. https://doi.org/10.3389/fcvm.2021.792592

39. Ullah AA, Munir H, Shahid M. Synthesis of Bombax malabaricum gum based silver and zinc nanoparticles and their application in controlled drug delivery. Mater Res Express. 2019;6(11):115414. https://doi.org/10.1088/2053-1591/ab5235

40. Yadav R, Agarwala M. Phytochemical analysis of some medicinal plants. J Phytol. 2011;3(12).

41. Phukan A, Borgohain R, Chutia P, Saikia E, Kardong D, Chetia B. Phytochemical and antimicrobial activity of some medicinal plants of North East India. Asian J Chem. 2014;26(12):1–3. https://doi.org/10.14233/ajchem.2014.16212

42. Minakshi B, Jharna D, Chanbi Devi E, Nayan T, Partha P, Kundal N, et al. Phytochemical analysis of traditional medicinal plants and their antimicrobial activity: An experience from North East India. J Pharm Res. 2016;1(1):1–7. https://doi.org/10.23880/OAJPR-16000104

43. Swargiary A, Roy MK, Daimari M. Survey and documentation of ethnobotanicals used in the traditional medicines system of tribal communities of Chirang District of Assam against helminthiasis. Biomed Pharmacol J. 2019;12(4). https://doi.org/10.13005/bpj/1824

44. Chukwu N, Ogunka-Nnoka CU, Akaninwor JO. Phytochemical composition, anti-nutrient properties and antioxidant potentials of raw Hibiscus sabdariffa seeds. Arch. 2019;17(3):1–10. https://doi.org/10.9734/acri/2019/v17i330113

45. Mazumder TZ, Sharma MK, Lal M. Phytochemical properties of some important medicinal plants of North-East India: A brief review. Pharma Innov J. 2022;11(2):167–75.

46. Borah D, Puranjoy M, Sarma J, Mili C, Narah D. Quantitative documentation of traditionally used medicinal plants and their significance to healthcare among the Mishing community of Northeast India. Ecol Quest. 2021;32(4):61–94.

47. Sarma J, Devi A. Role of dicot angiosperms in the livelihood of Mishing community in Sonitpur district, Assam, India. Trop Plant Res. 2016;3(3):662–72. https://doi.org/10.22271/tpr.2016.v3.i3.087

48. Borah P, Saikia M. Ethnobotanical study of medicinal plants used by the different tribal communities in Nilakh-Sripani area of Dhemaji district, Assam. Int J Pharm Sci Res. 2022;13(11):4586–607.

49. Deka A, Kalita J, Ahmed S, Das PJ. A review on ethnomedicinal plants used in traditional medicine in Baksa district of Assam. J Dyn Control. 2024;8:204–39. https://doi.org/10.71058/jodac.v8i10017

50. Bhattacharyya R, Mehmud S, Medhi KK, Borkataki S. A report on ethnomedicinal plants used for the treatment of rheumatoid arthritis by the tea tribes of Morigaon district of Assam, India. Int J Ayurvedic Med. 2024;15(2):505–12. https://doi.org/10.47552/ijam.v15i2.4549

51. Saxena M, Saxena J, Nema R, Singh D, Gupta A. Phytochemistry of medicinal plants. J Pharmacogn Phytochem. 2013;1(6):168–82.

52. Safdar M, Naqvi SA, Anjum F, Pasha I, Shahid M, Jaskani MJ, et al. Microbial biofilm inhibition, antioxidants and chemical fingerprints of Afghani pomegranate peel extract documented by GC-MS and FTIR. J Food Process Preserv. 2021;45(7):e15657. https://doi.org/10.1111/jfpp.15657

53. Romano B, Lucariello G, Capasso R. Topical collection “Pharmacology of medicinal plants”: multidisciplinary. Biomolecules. 2021;11(1):101. https://doi.org/10.3390/biom11010101

54. Lim XY, Teh BP, Tan TYC. Medicinal plants in COVID-19: Potential and limitations. Front Pharmacol. 2021;12:355. https://doi.org/10.3389/fphar.2021.611408

55. Puertollano MA, Puertollano E, de Cienfuegos GA, de Pablo MA. Dietary antioxidants: immunity and host defense. Curr Top Med Chem. 2011;11(14):1752–66. https://doi.org/10.2174/156802611796235107

56. Singh AK, Singh SK, Nandi MK, Mishra G, Maurya A, Rai A, et al. Berberine: A plant-derived alkaloid with therapeutic potential to combat Alzheimer's disease. CNS Agents Med Chem. 2019;19(3):154–70. https://doi.org/10.2174/1871524919666190820160053

57. Abeysinghe DC, Wijerathne SMNK, Dharmadasa RM. Secondary metabolites contents and antioxidant capacities of *Acmella*, grown under different growing systems. World J Agric Res. 2014;2(4):163–7. https://doi.org/10.12691/wjar-2-4-5

58. Maity P, Hansda D, Bandyopadhyay U, Mishra DK. Biological activities of crude extracts and chemical constituents of bael, Aegle marmelos (L.) Corr. Indian J Exp Biol. 2009;47(11):849–61.

59. Kamboj A, Saluja AK. Isolation of stigmasterol and β-sitosterol from petroleum ether extract of aerial parts of *Ageratum conyzoides* (Asteraceae). Int J Pharm Pharm Sci. 2011;3(1):94–6.

60. Swargiary A, Roy B. Phytochemical screening and antioxidant property of shoot extracts of *Alpinia nigra* (Gaertn.) Burtt (Zingiberaceae). Int J Phytomed. 2015;7(1):48–54. https://doi.org/10.5958/0975-6892.2015.00007.6

61. Stintzing FC, Kammerer D, Schieber A, Adama H, Nacoulma OG, Carle R. Betacyanins and phenolic compounds from *Amaranthus spinosus* L. and Boerhavia erecta L. Z Naturforsch C. 2004;59:1–8. https://doi.org/10.1515/znc-2004-1-201

62. Chen JH, Jiang RL. Morphological and histological studies on *Andrographis paniculata* (Burm. f.) Nees and comparison with four other Acanthaceae herbs. Acta Pharm Sin. 1980;15(12):750–60.

63. Fuentes-Alventosa JM, Jaramillo-Carmona S, Rodriguez-Gutierrez G, Guillen-Bejarano R, Jimenez-Araujo A, Fernandez-Bolanos J, et al. Preparation of bioactive extracts from asparagus by-product. Food Bioprod Process. 2013;91(2):74–82. https://doi.org/10.1016/j.fbp.2012.12.004

64. Zainudin MAM, Hamid AA, Anwar F, Osman A, Saari N. Variation of bioactive compounds and antioxidant activity of carambola (*Averrhoa carambola* L.) fruit at different ripening stages. Sci Hortic. 2014;172:325–31. https://doi.org/10.1016/j.scienta.2014.04.007

65. Kraus W. Biologically active ingredients. In: Schmutterer H, editor. The neem tree: Azadirachta indica A. Juss. and other meliaceous plants. Weinheim: VCH; 1995. p. 35–74. https://doi.org/10.1002/3527603980.ch2a

66. Watcharatanon K, Ingkaninan K, Putalun W. Improved triterpenoid saponin glycosides accumulation in in vitro culture of *Bacopa*

monnieri (L.) Wettst with precursor feeding and LED light exposure. Ind Crops Prod. 2019;134:303–8. https://doi.org/10.1016/j.indcrop.2019.04.011

67. Wani MA, Prasad S, Prakash O. Qualitative phytochemical analysis of various parts of bamboo (*Bambusa balcooa*) for possible therapeutic usages in bovine reproductive disorders. J Pharmacogn Phytochem. 2019;8(1):217–21.
68. Audu BS, Ofojekwu PC, Ujah A, Ajima MNO. Phytochemical, proximate composition, amino acid profile and characterization of marijuana (*Cannabis sativa* L.). J Phytopharmacol. 2014;3(1):35–43. https://doi.org/10.31254/phyto.2014.3106
69. Hausen BM. *Centella asiatica* (Indian pennywort), an effective therapeutic but a weak sensitizer. Contact Dermatitis. 1993;29:175–9. https://doi.org/10.1111/j.1600-0536.1993.tb03532.x
70. Kankeaw U, Masong M. The antioxidant activity from hydroquinone derivatives by the synthesis of *Cinnamomum verum* J. Presl bark extract. Int J Chem Eng Appl. 2015;6:91–4. https://doi.org/10.7763/IJCEA.2015.V6.458
71. Patil JR. Studies on isolation and characterization of bioactive compounds in lime *Citrus aurantifolia* (Christm.) Swingle, their antioxidant and anticancer properties [thesis]. Dharwad: University of Agricultural Sciences; 2009. p. 110.
72. Gonzalez-Molina E, Dominguez-Perles R, Moreno DA, Garcia-Viguera C. Natural bioactive compounds of citrus. J Pharm Biomed Anal. 2010;51(2):327–45. https://doi.org/10.1016/j.jpba.2009.07.027
73. Reshmi SK, Sudha ML, Shashirekha MN. Starch digestibility and glycemic index of paranthas supplemented with *Citrus maxima* (Burm.) Merr. fruit segments. J Food Sci Technol. 2017;54:4370–7. https://doi.org/10.1007/s13197-017-2909-9
74. Dey P, Dutta S, Chaudhuri TK. Comparative phytochemical profiling of *Clerodendrum infortunatum* L. using GC-MS method coupled with multivariate statistical approaches. Metabolomics. 2015;5:147. https://doi.org/10.4172/2153-0769.1000147
75. Kanchanapoom T, Chumsri P, Kasai R, Otsuka H, Yamasaki K. A new iridoidiglycoside from *Clerodendrum chinense*. J Asian Nat Prod Res. 2005;7(3):269–72. https://doi.org/10.1080/10286020410001690145
76. Das A, Chaudhuri D, Ghate NB, Chatterjee A, Mandal N. Comparative assessment of phytochemicals and antioxidant potential of methanolic and aqueous extracts of *Clerodendrum colebrookianum* Walp. leaf from North-East India. Int J Pharm Pharm Sci. 2013;5(4):420–7.
77. Subhash C, Sarla S, Jaybardhan S. Phytochemical screening of Garhwali Himalaya wild edible tuber *Colocasia esculenta*. Int Res J Pharm. 2012;3(3):181–6.
78. Mahadkar S, Valvi S, Jadhav V. Gas chromatography mass spectroscopic (GC-MS) analysis of some bioactive compounds from five medicinally relevant wild edible plants. Asian J Pharm Clin Res. 2013;6(1):136–9.
79. Petropoulos SA, Levizou E, Ntatsi G, Fernandes A, Petrotos K, Akoumianakis K, et al. Salinity effect on nutritional value, chemical composition and bioactive compounds content of *Cichorium spinosum* L. Food Chem. 2017;214:129–36. https://doi.org/10.1016/j.foodchem.2016.07.080
80. Narzary H, Islary A, Basumatary S. Phytochemicals and antioxidant properties of eleven wild edible plants from Assam, India. Med J Nutr Metab. 2017;9(3):191–201. https://doi.org/10.3233/MNM-16116
81. Behar N, Tiwari KL, Jadhav SK. Comparative phytochemical screening of bioactive compounds in *Curcuma caesia* Roxb. and *Curcuma longa*. Res J Med Plants. 2013;7:113–8. https://doi.org/10.3923/rjmp.2013.113.118
82. Dutta P, Gogoi J. Cynodon dactylon Pers.: A review on forage crop and medicinal herb. J Pharm Res Int. 2021;33(58B):344–50. https://doi.org/10.9734/jpri/2021/v33i58B34210
83. Gandhi D, Mehta P. Dillenia indica Linn. and *Dillenia pentagyna* Roxb.: Pharmacognostic, phytochemical and therapeutic aspects. J Appl Pharm Sci. 2013;3(11):134–42.
84. Sakthidevi G, Mohan VR. Total phenolic, flavonoid contents and in vitro antioxidant activity of *Dioscorea alata* L. tuber. Int J Pharm Sci Res. 2013;5(5):115–9.
85. Nono NR, Nzowa KL, Barboni L, Tapondjou AL. *Drymaria cordata* (L.) Willd (Caryophyllaceae): Ethnobotany, pharmacology and phytochemistry. Asian Pac J Trop Biomed. 2014;4:160–7. https://doi.org/10.4236/abc.2014.42020
86. Cherdtrakulkiat R, Boonpangrak S, Pingaew R, Prachayasittikul S, Ruchirawat S, Prachayasittikul V. Bioactive triterpenoids, antimicrobial, antioxidant and cytotoxic activities of *Eclipta prostrata* Linn. J Appl Pharm Sci. 2015;5(3):46–50. https://doi.org/10.7324/JAPS.2015.50308
87. Gopinath SM, Rakesh CK, Patil GMA, Dayananda KS. Preliminary phytochemical evaluation of leaf extracts of *Euphorbia hirta* and *Syzygium cumini*. Int J Pharma Bio Sci. 2012;3(2):431–5.
88. Joseph B, Raj SJ. Phytopharmacological properties of Ficus racemosa Linn.: An overview. Int J Pharm Sci Rev Res. 2010;3(2):134–8.
89. Gogoi G, Das AK. Ethnomedicobotany and phytochemical screening of Garcinia pedunculata Roxb. ex Buch.-Ham. from Arunachal Pradesh, India. J Bioresour. 2016;3(1):1–8.
90. Joseph KS, Dandin VS, Murthy HN. Chemistry and biological activity of *Garcinia xanthochymus*: A review. J Biol Act Prod Nat. 2016;6(3):173–94. https://doi.org/10.1080/22311866.2016.1199285
91. Senthilkumar M. Phytochemical screening of *Gloriosa superba* L. from different geographical positions. Int J Sci Res Publ. 2013;3(1):1–5.
92. Roy DS, De S, Maity D, Maity W, Das DC. Phytochemical screening, isolation of flavonoids from *Hellenia speciosa* (J. Koenig) S.R. Dutta and study of its antibacterial activity in vitro. Int J Pharm Bio Sci. 2019;9(3):641–7.
93. Meng J, Leung KSY, Dong X, Zhou Y, Jiang Z, Zhao Z. Simultaneous quantification of eight bioactive components of *Houttuynia cordata* and related Saururaceae medicinal plants by HPLC-DAD-ESI-MS. Fitoterapia. 2009;80(8):468–74. https://doi.org/10.1016/j.fitote.2009.06.013
94. Sood K, Yadav RNS. Phytochemical screening and antimicrobial activity of four members of family Apiaceae. Int J Phytomedicine. 2014;6(2):232–6.
95. Kalita T, Dutta U. Phytochemistry, antioxidant activity and traditional uses of *Ipomoea aquatica* Forssk among the people of Lower Assam, India. Int J Ayurvedic Med. 2023;13(4):896–904. https://doi.org/10.47552/ijam.v13i4.3096
96. Chanu WS, Sarangthem K. Phytochemical constituents of Justicia adhatoda L. Indian J Plant Sci. 2014;3(2):19–21.
97. Nwali BU, Okaka AN, Ibiam UA, Aja PM. Phytochemical composition of *Bryophyllum pinnatum* leaves. Int J Appl Biol Res. 2012;2(4):614–6.
98. Kankanamge SU, Amarathunga AAMDDN. Phytochemical and ethnopharmacological properties of *Lasia spinosa*: A review. World J Pharm Res. 2017;6(13):1–9.
99. Chew AL, Jessica JJA, Sasidharan S. Antioxidant and antibacterial activity of different parts of *Leucas aspera*. Asian Pac J Trop Biomed. 2012;2(3):176–80. https://doi.org/10.1016/S2221-1691(12)60037-9
100. Suresh R, Saravanakumar M, Suganyadevi P. Anthocyanins from Indian cassava (*Manihot esculenta* Crantz) and its antioxidant properties. Int J Pharm Sci Res. 2011;2(7):1819–28.
101. Chetia J, Saikia A, Duarah P. Antimicrobial activity assay and phytochemical study of different aerial parts of *Mentha arvensis* L. collected from Dibrugarh, Assam. J Sci Res Assoc. 2020;64(1):1–6. https://doi.org/10.37398/JSR.2020.640115
102. Ishak AH, Shafie NH, Esa NM, Bahari H, Ismail A. From weed to medicinal plant: antioxidant capacities and phytochemicals of various extracts of *Mikania micrantha*. Int J Agric Biol. 2018;20:561–

8. https://doi.org/10.17957/IJAB/15.0522

103. Ferreira PMP, Farias DF, Oliveira JTDA, Carvalho AFU. Moringa oleifera: Bioactive compounds and nutritional potential. Rev Nutr. 2008;21 (4):431–7. https://doi.org/10.1590/S1415-52732008000400007

104. Jain V, Momin M, Laddha K. Murraya koenigii: An updated review. Int J Ayurvedic Herb Med. 2012;2(4):607–27. https://doi.org/10.3389/fphar.2016.00102

105. Kalita H, Boruah DC, Deori M, Hazarika A, Sarma R, Kumari S, et al. Antidiabetic and antilipidemic effect of *Musa balbisiana* root extract: A potent agent for glucose homeostasis in streptozotocin-induced diabetic rat. Front Pharmacol. 2016;7:102.

106. Apriasari ML, Iskandar SE. Bioactive compound and antioxidant activity of methanol extract *Mauli bananas* (Musa sp.) stem. Int J Biosci Biochem Bioinform. 2014;4:110–5. https://doi.org/10.7763/IJBBB.2014.V4.321

107. Vyas A, Sarin R. Analysis of the phytochemical content and antimicrobial activity of *Nyctanthes arbor-tristis*. Int J Pharma Bio Sci. 2013;4(1):201–6.

108. Tahira R, Rehan T, Rehman A, Naeemullah M. Variation in bioactive compounds in different plant parts of lemon basil (*Ocimum basilicum* var. *citriodorum*). Int J Innov Sci Mod Eng. 2013;1(1):1–6.

109. Palla R, Elumalai A, Eswaraiah MC, Kasarla R. A review on Krishna Tulsi, *Ocimum tenuiflorum* L. Int J Res Ayurveda Pharm. 2012;3 (2):291–3.

110. Samatha T, Srinivas P, Shyamsundarachary R, Rajinikanth M, Swamy NR. Phytochemical analysis of seeds, stem bark and root of an endangered medicinal forest tree *Oroxylum indicum* (L.) Kurz. Int J Pharm Biol Sci. 2012;3(3):1063–75.

111. Aruna K, Rajeswari PDR, Prabu K, Ramkumar M, Chidambaram R, Sankar RS. Quantitative phytochemical analysis of *Oxalis corniculata* L. (Oxalidaceae). World J Pharm Pharm Sci. 2014;3 (5):711–6.

112. Upadhyaya S. Screening of phytochemicals, nutritional status, antioxidant and antimicrobial activity of *Paederia foetida* Linn. from different localities of Assam, India. J Pharm Res. 2013;7(1):139–41. https://doi.org/10.1016/j.jopr.2013.01.015

113. Banno N, Akihisa T, Tokuda H, Yasukawa K, Higashihara H, Ukiya M, et al. Triterpene acids from the leaves of Perilla frutescens and their anti-inflammatory and antitumor-promoting effects. Biosci Biotechnol Biochem. 2004;68(1):85–90. https://doi.org/10.1271/bbb.68.85

114. Ayaz M, Ahmad I, Sadiq A, Ullah F, Ovais M, Khalil AT, et al. Persicaria hydropiper (L.) Delarbre: A review on traditional uses, bioactive chemical constituents and pharmacological and toxicological activities. J Ethnopharmacol. 2019;6:251. https://doi.org/10.1016/j.jep.2019.112516

115. Shankar R, Lavekar GS, Deb S, Sharma BK. Traditional healing practice and folk medicines used by Mishing community of North East India. J Ayurveda Integr Med. 2013;3(3):124–9. https://doi.org/10.4103/0975-9476.100171

116. Suky MG, Shanthi TP, Ruby RGD, Sowmiya S, Yasodha M. Isolation and identification of bioactive compounds in chloroform extract of *Phyla nodiflora* (L.) Greene. Eur J Technol Innov Res. 2019;6(1):275–86.

117. Chakraborty R, Biplab D, Devanna N, Sen S. Anti-inflammatory, antinociceptive and antioxidant activities of *Phyllanthus acidus* L. extracts. Asian Pac J Trop Biomed. 2012;2(2):953–61. https://doi.org/10.1016/S2221-1691(12)60343-8

118. Sukanya MK, Shimi S, Aruna SR. Phytochemical analysis, antimicrobial screening and antihelminthic properties of *Phyllanthus emblica*. Int J Pharm Biol Sci. 2013;4(4):5–64.

119. Syahidah CRS, Hassan MD, Rukayadi Y, Norazian MH, Kamarudin MS. Phytochemical analysis, identification and quantification of antibacterial active compounds in betel leaves, Piper betle methanolic extract. Pak J Biol Sci. 2017;20:70–81. https://doi.org/10.3923/pjbs.2017.70.81

120. Li CR, Hu H, Li X, Zhang P, Xu Y, Yang J, et al. Essential oils composition and bioactivities of two species leaves used as packaging materials in Xishuangbanna. Food Control. 2014;51:9–14. https://doi.org/10.1016/j.foodcont.2014.11.009

121. Tamuly C, Dutta PP, Bordoloi M, Bora J. Antifungal and antioxidant pyrrole derivative from Piper pedicellatum. Nat Prod Commun. 2013;8(10):1451–4. https://doi.org/10.1177/1934578X1300801029

122. Rao VRS, Raju SS, Sarma VU, Sabine F, Babu KH, Babu KS, et al. Simultaneous determination of bioactive compounds in *Piper nigrum* L. and a species comparison study using HPLC-PDA. Nat Prod Res. 2011;25(13):1288–94. https://doi.org/10.1080/14786419.2010.535158

123. Latha M, Ramkumar KM, Pari L, Damodaran PN, Rajeshkannan V, Suresh T. Phytochemical and antimicrobial study of an antidiabetic plant: Scoparia dulcis L. J Med Food. 2006;9(3):391–4. https://doi.org/10.1089/jmf.2006.9.391

124. Bodoira R, Velez A andreatta AE, Martinez M, Maestri D. Extraction of bioactive compounds from sesame (*Sesamum indicum* L.) defatted seeds using water and ethanol under sub-critical conditions. Food Chem. 2017;237:114–20. https://doi.org/10.1016/j.foodchem.2017.05.102

125. Elekofehinti OO, Kamdem JP, Bolingon AA, Athayde ML, Lopes SR, Waczuk EP, et al. African eggplant (*Solanum anguivi* Lam.) fruit with bioactive polyphenolic compounds exerts in vitro antioxidant properties and inhibits Ca2+ induced mitochondrial swelling. Asian Pac J Trop Biomed. 2013;3(10):757–66. https://doi.org/10.1016/S2221-1691(13)60152-5

126. Jeyasree J, Jenifer S, Priya S, Sukumaran V, Laveena DK. HPLC spectral analysis of phytochemicals in *Solanum nigrum* L. and target protein identification. World J Pharm Pharm Sci. 2014;3(12):1182–92.

127. Nithyadevi J, Sivakumar R. Phytochemical screening and GC-MS, FT -IR analysis of methanolic extract leaves of *Solanum torvum* Sw. Int J Res Stud Biosci. 2015;3(9):61–6.

128. Tril U, Fernandez-Lopez J, Alvarez JAP, Viuda-Martos M. Chemical, physicochemical, technological, antibacterial and antioxidant properties of rich-fibre powder extract obtained from tamarind (*Tamarindus indica* L.). Ind Crops Prod. 2014;55:155–62. https://doi.org/10.1016/j.indcrop.2014.01.047

129. Chatha SAS, Hussain AI, Asad R, Majeed M, Aslam N. Bioactive components and antioxidant properties of *Terminalia arjuna* L. extracts. J Food Process Technol. 2014;5(2):1–5.

130. Ram J, Moteriya P, Chanda S. Phytochemical screening and reported biological activities some medicinal plants of Gujarat region. J Pharmacogn Phytochem. 2015;4(2):192–8.

131. Ismail LD, El-Azizi MM, Khalifa TI, Stermitz FR. Iridoid glycosides from *Thunbergia grandiflora*. Phytochemistry. 1996;42:1223–5. https://doi.org/10.1016/0031-9422(96)00071-4

132. Tiwari P, Nayak P, Prusty SK, Sahu PK. Phytochemistry and pharmacology of *Tinospora cordifolia*: A review. Syst Rev Pharm. 2018;9(1):70–8. https://doi.org/10.5530/srp.2018.1.14

133. Girish TK, Pratape VM, Rao UJS. Nutrient distribution, phenolic acid composition, antioxidant and alpha-glucosidase inhibitory potentials of black gram (*Vigna mungo* L.) and its milled by-products. Food Res Int. 2012;46(1):370–7. https://doi.org/10.1016/j.foodres.2011.12.026

134. Bakht J, Panni MK, Shafi M. Antimicrobial potential and phytochemical analysis of different solvent extracted samples of *Viola pilosa*. Pak J Bot. 2017;49(4):1485–9.

135. Vishwanathan AS, Basavaraju R. A review on *Vitex negundo* L. – A medicinally important plant. J Biol Sci. 2010;3(1):30–42.

136. Kamboj A, Atri P, Saluja AK. Phytochemical screening and in-vitro antioxidant activity of *Xanthium strumarium* L. J Pharm Res Int. 2014;4(1):1–22. https://doi.org/10.9734/BJPR/2014/3667

137. Liang M, Zhang W, Hu J, Liu R, Zhang C. Simultaneous analysis of

alkaloids from *Zanthoxylum nitidum* by high performance liquid chromatography–diode array detector–electrospray tandem mass spectrometry. J Pharm Biomed Anal. 2006;42(2):178–83. https://doi.org/10.1016/j.jpba.2006.03.031

138. Aruoma OI, Spencer JPE, Warren D, Jenner P, Butler J, Halliwell B. Characterization of food antioxidants, illustrated using commercial garlic and ginger preparations. Food Chem. 1997;58(4):345–50. https://doi.org/10.1016/S0308-8146(95)00254-5

Additional information

Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

Reprints & permissions information is available at https://horizonepublishing.com/journals/index.php/PST/open_access_policy

Publisher's Note: Horizon e-Publishing Group remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Indexing: Plant Science Today, published by Horizon e-Publishing Group, is covered by Scopus, Web of Science, BIOSIS Previews, Clarivate Analytics, NAAS, UGC Care, etc
See https://horizonepublishing.com/journals/index.php/PST/indexing_abstracting

Publisher information: Plant Science Today is published by HORIZON e-Publishing Group with support from Empirion Publishers Private Limited, Thiruvananthapuram, India.