

Review on the medicinal values of *Ageratum conyzoides* L.

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Abstract: *Ageratum conyzoides*, a member of the Asteraceae family, is a versatile medicinal plant with diverse traditional uses across various regions. Native to Central and South America, it has spread globally, thriving in diverse environments. The plant's phytochemical constituents, include alkaloids, coumarins, flavonoids, and terpenoids, contribute to its medicinal properties, including antimicrobial, anti-inflammatory, and antispasmodic effects. Traditional uses include treating wounds, fever, skin diseases, and respiratory issues, with specific applications documented in Africa, India, and South America. This review aims to provide a comprehensive overview of the plant's traditional therapeutic uses, phytochemical constituents, and potential therapeutic activities, highlighting its potential for future drug development. However, toxicity concerns of the plant, such as hepatotoxic pyrrolizidine alkaloids, necessitate further research to fully understand the plant's benefits and risks.

Keywords: Weed, traditional therapeutic, wounds, toxicity, phytochemical

Introduction

Ageratum conyzoides, a member of the Asteraceae family, is recognized globally by various common names, such as Billygoat Weed, Chick Weed, Goatweed, and Whiteweed. In India, the plant's diverse nomenclature mirrors the country's rich linguistic heritage. Depending on the region, it is known as Visamustih in Sanskrit, Visadodi in Hindi, Uralgidda in Kannada, Bheda Jhar in Nepali, Khongjainapi in Manipur, and Pokasunga in Odisha (Bosi et al., 2013; Devi and Kumar, 2022). These multiple names underscore the plant's extensive presence and cultural significance across different parts of India. It is native to Central and South America, as well as the West Indies, with its origin specifically traced back

to Mexico. Its original distribution ranged from Southeastern North America to Central America and the Caribbean (Mudduluru and Mahammad, 2023; Mere et al., 2020). However, the plant has now spread to various parts of the world, including tropical and subtropical regions in Africa, the Indian continent, Southeast Asia, and Malesia. It has become naturalized in Asia, temperate Brazil, and throughout Africa, except for arid areas, and is considered invasive in parts of East Africa, such as Kenya, Tanzania, and Uganda. Today, *A. conyzoides* is a worldwide weed, thriving in diverse environments, including moist uplands, hydromorphic lands, and temporary shallow flooded areas, with a preference for a range of soils. It typically grows in waste areas, gardens, forest edges, and near roadsides (Kamboj and Saluja, 2008; Okunade, 2002).

The plant's adaptability, reproductive capacity, and allelopathy have contributed to its successful spread across different regions. It is an annual herb that grows up to 1 meter in height, characterized by its stems and leaves covered with fine white hairs (Pokhrel et al., 2015). The leaves are ovate, measuring 2-6 cm in length, and have a stalked shape, reaching up to 7.5 cm in some cases. The flowers are white to mauve or sometimes purplish-blue, adding to the plant's aesthetic value. These morphological features make *A. conyzoides* a distinctive plant species (Mudduluru and Mahammad, 2023).

A. conyzoides (Figure 1) is a versatile plant with diverse medicinal applications. Traditionally, it has been used to treat various health issues, including wounds, cuts, burns, fever, headaches, digestive problems, respiratory issues, and skin conditions (Ogunjinmi et al., 2023). The plant's antimicrobial, anti-inflammatory, and antispasmodic properties contribute to its medicinal value (Pandey et al., 2022). Its uses vary across regions, with specific applications documented in Africa, India, Kenya, and South America. In these regions, it is valued for treating conditions such as leprosy, craw-craw, fever, rheumatism, headache, and ulcers (Chahal et al., 2021). Additionally, the plant's toxic properties make it useful as an insecticide and nematicide (Pokhrel et al., 2015). Overall, *A. conyzoides* is a valuable resource in traditional medicine, with its diverse properties and applications making it a sought-after treatment for various ailments. The present study aims to review the traditional therapeutic uses of *A. conyzoides*, phytochemical constituents, its potential therapeutic activities, toxicity to build a comprehensive data for screening of bioactive compounds in future drug development.

Traditional therapeutic uses

A. conyzoides has diverse traditional medicinal uses across various regions. In Africa, it is used for wound dressing, constipation, fever reduction, and treating infectious diseases. In Kenya, it is valued for its anti-asthmatic, anti-spasmodic, and haemostatic properties (Mudduluru and Mahammad, 2023). In other parts of Africa, such as Togo and Nigeria, it is used to treat snake bites, measles, skin diseases, diarrhea, and wounds. In India, the plant is used to treat leprosy, purulent ophthalmia, stomach ailments, rheumatism, and fever (Kamboj and Saluja, 2008). A unique application in Northeast India, particularly in Manipur, involves boiling the plant's twigs and leaves with rice water to create a natural hair care treatment. In Brazil, the plant is used as an anti-inflammatory and analgesic, while in Vietnam, it is used to treat gynaecological diseases.



Figure 1: *Ageratum conyzoides* in its habitat

In some regions, the leaves are applied topically for wound healing, burns, and skin conditions. In some places, uses of the plant for management of HIV/AIDS are also revealed (Chahal et al., 2021). In Indonesia, it is used for wounds, eczema, ulcers and in bacterial infections. The plant's versatility and widespread use demonstrate its significance in traditional medicine across different cultures. Further, uses are listed in Table 1 (Baral et al., 2022; Devi and Kumar, 2022).

***In vitro* scientific validation of traditional medicinal uses**

Many researchers and scientist are considered the traditional therapeutic uses *A. conyzoides* for scientific validation through *in vitro* experiments at various levels. Some of the important experiments that revealed the potential bio-activity of the studied species include anticancer, analgesic, anthelmintic, antibacterial, antifungal (Baral et al., 2022), antipyretic, anti-inflammatory, antidiabetic, hepatoprotective, anti-ulcer, cytotoxic, radioprotective, antimicrobial, anticonvulsant, antitumor, insecticidal, antiulcerogenic, gastroprotective properties, nematocidal effect, anti-convulsant, acaricidal, hypoglycaemic, urolithiasis, anticoccidial and antioxidant (Chahal et al., 2021).

Phytochemical constituents

The plant contains a diverse range of compounds, including alkaloids, coumarins, flavonoids, chromenes, benzofuran, sterols, terpenoids, and pyrrolizidine alkaloids. Flavonoids in the plant may help protect against oxidative stress due to their antioxidant properties, while sterols may aid in inflammation and cardiovascular health (Mudduluru and Mahammad, 2023). Additionally, terpenoids and pyrrolizidine alkaloids have shown potential anti-inflammatory, antimicrobial, and antioxidant effects (Kumar and Hazarika, 2021). Other compounds like pyrrolone derivatives and pentacyclic triterpenoids have also been isolated, highlighting the plant's medicinal value. These phytochemicals collectively contribute to the plant's pharmacological properties, supporting its traditional uses in various medicinal applications (Mere et al., 2020). However, toxicity should be analyzed as hepatotoxic compounds such as Pyrrolizidine alkaloids have been reported from the plant (Kumar and Hazarika, 2021). The phytochemical constituents are listed in Table 2.

Table 1: Traditional therapeutic uses of *Ageratum conyzoides*

Traditional medicinal use(s)	Part(s) used	Source(s)
Cuts and wounds, menstrual cramps, arthritis, rheumatism, diarrhea	Aerial part	Bosi et al., (2013)
Hair care	Soft stems and leaves	Devi and Kumar, 2022
Wound dressing, constipation, Reducing fever	Not mentioned	Mudduluru and Mahammad, (2023)
Snake bites, measles treatment	Not mentioned	Mudduluru and Mahammad, (2023)
Skin diseases, diarrhea, children's naval pain	Not mentioned	Mudduluru and Mahammad, (2023)
Prevent tetanus	Leaves	Mudduluru and Mahammad, (2023)
Diarrhea, Infantile tumors, Lithiasis	Roots	Mudduluru and Mahammad, (2023)

Alleviate itching, insomnia, cough, and against parasites	Flowers	Mudduluru and Mahammad, (2023)
Fever, rheumatism, headache, and colic problems	Whole plant	Mere et al., (2020)
Pneumonia	Not mentioned	Mere et al., (2020)
Purulent ophthalmia in new born	Oil	Kamboj and Saluja, (2008)
Sleeping sickness, mouthwash, antitusive, vermifuge, tonic and killing lice	Flowers	Kamboj and Saluja, (2008)
HIV/AIDS		Kamboj and Saluja, (2008)
Antilithic and diarrhoea in infants	Roots	Kamboj and Saluja, (2008)
Insecticide, headache, leucorrhoea, painful gums, throat infection, prolaps of anus, malarial fever, uterine problems, ringworm	Leaves	Kamboj and Saluja, (2008)
Muscular pain, pneumonia, dysentery, and intestinal colic problems, post-partum skin disease, ecchymosis	Leaves	Baral et al., (2022)
Purgative, febrifuge, ophthalmia, dyspnea, uterine troubles, skin burns, asthma, spasmodic, leprosy,	Leaves	Okunade (2002)
Traditional ingredient of hair care for women	Aerial part / leaves	Devi and Kumar, (2022)
Analgesic and as painkiller during child birth		
Eye lotion	Juice of leaves and roots	Baral et al., (2022)

Table 2: Phytochemical constituents present in *A. conyzoides*

Phytochemical constituent(s)	Potential action	Source(s)
Pyrrolizidine alkaloids & licopsamine	haemorrhagic liver necrosis (rare in humans) & tumorigenic activity	Bosi et al., (2013); Mere et al., (2020)
Phenolic components (coumaric acid, protocatechuic acid & gallic acid)	Herbicidal	Mudduluru and Mahammad, (2023)
Essential oils	Anti-aflatoxin activity	Mudduluru and Mahammad, (2023)
Essential oil component	Anti-neuropathic pain activity	Mudduluru and Mahammad, (2023)
Tannins	Antibacterial activity	Mudduluru and Mahammad, (2023)
Flavonoids (polymethoxyflavones)	Antibacterial activity, antifungal activity	Mudduluru and Mahammad, (2023)
Precocene II	Antifungal activity	Mudduluru and Mahammad, (2023)
5-hydroxytryptamine	Anti-serotonergic activity	Mudduluru and Mahammad, (2023)
Quercetin	Anti- inflammation activity	Mudduluru and Mahammad, (2023)

Essential oil (rhamnoside, scutellarin, kaempferol, chromene, quercetin, stigma-7-en-3-ol, caffeic acid, fumaric acid, stigma sterol, sitosterol, agerato chromene derivatives, and pyrrolidine alkaloid)	Not mentioned	Mudduluru and Mahammad, (2023)
Precocene I and precocene II	Antijuvenile hormones leading to sterile adult in insects	Mere et al., (2020)
Monoterpenes (sabinene, β -pinene, β -phellandrene, 1,8-cineole and Limonene, terpinen-4-ol, α -terpineol, linalool, α -pinene eugenol and methyleugenol)	Not mentioned	Kamboj and Saluja, (2008)
Sequiterpenes (β -caryophyllene, caryophyllene epoxide, β -sesquiphellandrene δ -cadinene and τ -cadinene)	Not mentioned	Kamboj and Saluja, (2008)
Phenylpropanoids	Not mentioned	Kamboj and Saluja, (2008)
Benzenoids	Not mentioned	Kamboj and Saluja, (2008)
Essential oils (Bicyclo [3.1.0] hexane, 6-methylene, 1,5-Heptadiyne, N-Methyl-7-azabicyclo (2,2,1) hept-2, 4-Oxo-4,5,6,7-tetrahydrobenzofurazan, and Tricyclo [3.2.2.0] nonane-2-carboxylic acid)	Not mentioned	Kamboj and Saluja, (2008)
Flavonoids, alkaloids, coumarins, terpenoids, benzofurans, tannins and chromenes	anti-inflammatory, gastro protective, cytotoxic, smooth muscle relaxant, antibacterial, antifungal and antimalarial	Pokhrel et al., (2015)
Terpenoids, alkaloids, flavonoids, coumarins, tannins, essential oils, anthraquinones	Wound healing, anticancer, antifungal activity	Pandey et al., (2022)
Pyrrolone (5-ethoxy-1H-pyrrol-2(5H)-one), pentacyclic triterpenoid, (+) Sesamin, ecnecanescins, caryophyllene oxide, coumarin, Inderoflavone B, eupalestin, lupeol, pyrrolone	Not mentioned	Ogunjinmi et al., 2023

Conclusion

Ageratum conyzoides is a commonly available weed that possesses medicinal values with a rich history of traditional use across various regions. Its diverse phytochemical constituents, including alkaloids, coumarins, flavonoids, and terpenoids, contribute to its potential medicinal properties. The plant's traditional uses in treating various health conditions, such as wounds, fever, and skin diseases, are supported by its pharmacological activities. However, further research is needed to fully understand the

plant's potential benefits and risks, as well as to explore its potential applications in modern medicine. Overall, *Ageratum conyzoides* is a promising plant species that warrants further investigation and development.

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