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# EXPLORING THE ECOLOGICAL SIGNIFICANCE AND MEDICINAL POTENTIAL OF *Sphagneticola trilobata*: A REVIEW

**Shilna V C[1], Karunakar Hegde[2]**

PG Scholar[1], Professor and Head Department of Pharmacology[2]

[1,2]Department of Pharmacology, Srinivas College of Pharmacy, Valachil, Mangalore- 574143, Karnataka, India

**Abstract:** *Sphagneticola trilobata*, a member of the Asteraceae family native to tropical and subtropical regions, is a perennial herb known for its medicinal properties. Commonly referred to as *Wedelia trilobata*, it has been used in traditional herbal medicine across various cultures for centuries. This review explores its phytochemical composition and therapeutic uses.
**Objective**: The objective of this review is to summarize current knowledge on the phytochemicals present in *Sphagneticola trilobata* and their potential medicinal applications. It aims to provide insights into its traditional uses and scientific findings related to its pharmacological properties.
**Conclusion***: Sphagneticola trilobata* contains a diverse array of phytochemicals including alkaloids, steroids, flavonoids, and amino acids, as identified through phytochemical screening. These compounds exhibit significant medicinal potential, contributing to the plant's efficacy in treating a wide range of ailments such as ulcers, sore throats, fever, and gastrointestinal disorders. Further research into its specific bioactive components and their mechanisms of action could pave the way for developing novel therapeutic agents derived from this plant.

***Keywords – Sphagneticola trilobata, ulcers, Alkaloids, steroids, flavonoids***

## I.INTRODUCTION

About 75–80% of the world's population still relies mostly on herbal medicine for primary healthcare, particularly in underdeveloped nations where it is more widely accepted culturally and has fewer negative effects. Nonetheless, their use in the developed world has significantly increased during the past few years. [1] A significant number of herbs and herbal extracts are prescribed medications in Germany and France; sales of these products inside the European Union peaked in 1991 at $6 billion, and they may presently exceed $20 billion. Herbal medications are being offered in health food stores in the United States, with a $4 billion turnover in 1996 . India has a $1 billion market for herbal drugs, and it exports roughly $80 million worth of crude plant-based medications. The market for nutraceuticals, or health foods, which include herbal medications, is projected to be worth between $80 to $250 billion in the USA and Europe.[2]

India possesses an extensive and well-documented knowledge base of traditional herbal medicine. Despite their revived interest in herbal remedies, India, unlike China, has not been able to profit from this wealth of herbs by pushing their usage in the developed world. [3] This can be accomplished by carefully selecting products that are identified in accordance with the ailments prevalent in the developed world, for which there is either no treatment or just palliative care accessible; these countries will quickly acquire herbal remedies. Rich rewards will result from backward integration based on market demands. India may strategically penetrate the European, American, and Japanese markets by utilizing plant-based pharmaceuticals.[4]

According to a new definition provided by the World Health Organization (WHO), traditional medicine (which includes herbal medications) refers to treatment methods that have been used for hundreds of years, or even longer, before modern medicine developed and became widely accepted. Stated differently, traditional medicine is the culmination of generations of indigenous medical practitioner's therapeutic experiences.[5]

The traditional preparations include organic matter, minerals, and medicinal herbs. Only traditional medications that predominantly employ medicinal plant mixtures for therapy are considered herbal pharmaceuticals. Their usage can be seen in documents from over 5000 years ago that are found in Indian, Chinese, Egyptian, Greek, Roman, and Syrian languages. The Atherveda, Charak Samhita, Sushruta Samhita, and Rigveda are among the classical Indian texts. As such, the scientific legacy and rich customs of

past civilizations have been the source of the herbal medicines and traditional remedies. Consequently, the rich traditions of ancient civilizations and scientific legacy have been the source of medicines and traditional remedies.[6]

With more than 1600 genera and 25,000 species worldwide, the Asteraceae family—also referred to as the sunflower family—is one of the biggest families of flowering plants. Some members of the Asteraceae family have been grown for edible and medicinal reasons for over 3,000 years. The majority of these plants have therapeutic benefits and a lengthy history in traditional medicine. They are found all across the world, however they are most prevalent in dry and semiarid subtropical climates. Numerous anti-inflammatories, antibacterial, antioxidant, and hepatoprotective properties are exhibited by members of the Asteraceae family.[7]

*Sphagneticola trilobata* is a perennial herb and has a lengthy lifespan and a tendency to creep or climb. This mat-forming herb frequently forms a thick ground cover that stifles the growth of other species. It is typically 15–30 cm tall, but it can occasionally reach heights of 70 cm. It has the ability to ascend short distances on trees or other vegetation. Round in shape, the stems can have coarse hairs and can be green or reddish in color. Their maximum length is two meters, and at their nodes, they frequently produce roots—adventitious roots.[8]

These creeping stems produce short, semi-upright, blooming branches that rise. The leaves have an appealing appearance, are bright and shining green, simple, and slightly meaty. The blades are obovate to elliptic or oval, and they are either carried on short stalks (petioles) or stalkless (sessile). The term *trilobata* refers to the characteristic of these 2–9 cm long by 2–5 cm wide, acute at the tip, winged, and sessile at the base leaves that have irregularly toothed (serrated) borders. Their look is glossy, they are typically hairless (glabrous), and they have a succulent (slightly meaty) character. The solitary lovely bright yellow flower heads have a daisy-like appearance and are carried atop 2 to 9 cm long terminal and axillary stalks, or peduncles. The involucre at the base of the flower is formed by two to four sets of bracts. Each flower-head contains 8–13 yellowish "petals" (ray florets), each measuring 6–15 mm in length and having one to three pistillate, sharply serrated ends.[9]

Little golden tubular disc florets, measuring 4-5 mm in length, are scattered within chaffy bracts in the center of these flower heads. There is yellow in both the disc and ray florets. One-centimeter-long, narrow, lanceolate green bracts surround the base of each flower-head, or capitulum, in a row known as an involucre. While flowering happens all year round, it is most prevalent from spring through fall. The fruit is an achene with two to four angles, and the top is covered in small, narrow pappus scales. The seeds or achenes, are 4-5 mm long and have a crown of small, fringed scales on top when they are present. They are brown in color, elongated, and have a rough surface texture. But in farmed or naturally occurring plants, only few seeds ever mature.[10]

The abundant and continuous flowering of *Sphagticola trilobata* makes for incredibly beautiful flowers. They are frequently discovered beside houses, in abandoned gardens, beside streams, by the side of the road, or in oil palm fields. They can withstand salinity.[11]

With its anti-inflammatory, anti-microbial, analgesic, antioxidant, hepatoprotective, and anti-diabetic qualities, the plant *Wedelia trilobata* has gained popularity as a medicinal resource.

Many phytoconstituents, such as flavonoids, triterpenoids, luteolin, arachidonic acid, sterols, and other purported constituents of the essential oil, such as α-pinene, α-phellandrene, and limonene, have been isolated and identified from various portions of *Wedelia trilobata*.[12]

## II.GEOGRAPHICAL DISTRIBUTION

Originating in tropical South America (French Guiana, Guyana, Surinam, Venezuela, Brazil, Bolivia, Colombia, Ecuador, and Peru), it is native to Mexico, Central America (Belize, Costa Rica, Guatemala, Honduras, Nicaragua, and Panama), and the Caribbean, where it is known to be a weed in Trinidad, Puerto Rico, the Dominican Republic, Jamaica, and Panama. Naturalized in the Virgin Islands, Florida, Hawaii, Louisiana, South Africa, and Puerto Rico. South-eastern Queensland and North-Eastern New South Wales in Australia, the Pacific Islands (American Samoa, the Cook Islands, Fiji, French Polynesia, Guam, Kiribati, the Marshall Islands, Nauru, New Caledonia, Palau, Western Samoa, Tonga, and Hawaii), Malaysia, Indonesia, Thailand, India, and Papua New Guinea are just a few of the tropical regions in the world where they have escaped.[13]

## III.COMMON NAMES [14]

Bay Biscayne creeping oxeye, creeping daisy, Singapore daisy, gold cup, yellow dots, trailing daisy

## IV.SYNONYMS [15]

*Complaya trilobata* (L.) Strother, *Silphium trilobatum* L.,

## V.SCIENTIFIC CLASSIFICATION [16]

Kingdom : Plantae
Phylum : tracheophyta
Class : Magnoliopsida
Order : Asterales
Family : Asteraceae
Genus : *Sphagneticola*
Species : *Sphagneticola trilobata*

## VI.PHYTOCHEMISTRY

In addition to steroids, the primary secondary metabolites from this plant are terpenoids, flavonoids, and polyacetylenes. Kaurenoic acid, luteolin, and eudesmanolide lactones are found in the stem and leaves.From the aerial portion and flower of *W. trilobata*, sesquiterpenoids, triterpenoid and diterpenoid: sterols, flavonoids, and benzene derivatives are found.Wedelolactone has been shown to have antibacterial, antihemorrhagic, antiepileptic, and hepatoprotective properties. This make estimating wedelolactone in *Wedelia* species necessary in order to investigate its bioactivity.[17] Essential oils are precious plant products that are typically composed of the volatile plant components that are altered somewhat during the manufacturing procedure. The vast majority of oil's constituents are terpenes. The leaves include α-pinene, α phellandrene, and limonene, which are the essential oils.[19] From the essential oils of the leaves, stem, and flowers of *W. trilobata*, the fourteen volatile components were found. Hydrocarbon

monoterpenes, hydrocarbon sesquiterpenes, and low oxygenated sesquiterpene concentrations were the main characteristics of the essential oil. Germacrene D, α-phellandrene, α-pinene, E-caryophyllene, bicyclogermacrene, limonene, and α-humulene were the main ingredients of volatile oils. The monoterpenes limonene, α-pinene, and α phellandrene had an increase in content from the middle of the next dry season to the mid-rainy season.[20]

## VII.Ethnopharmacological Uses

In the Caribbean and Central America, the aerial parts of this plant are used in traditional medicine to treat dysmenorrhea, bronchitis, treat dysmenorrhea, bronchitis, colds, abdominal discomfort, and even to increase fertility. It is used in traditional medicine to treat arthritic painful joints, persistent wounds, rheumatism, muscle cramps, sores, and swelling. In Hong Kong, *W. trilobata* was employed in place of *W. chinensis*, a traditional Chinese remedy believed to heal infections, hepatitis, gastritis, and the common cold . In Vietnam, it is used to treat fever and malaria. Aqueous infusion has reportedly been used locally and empirically to treat diabetes in the southern region of Brazil, according to unpublished reporting. As a result of its proven antidiabetic qualities, it is really known by the common name insulina. For amenorrhea, labor, abortion, and placenta clearance postpartum, women utilized the plant's flowers and leaves. Backache, cramping in the muscles, rheumatism, and swellings were treated with baths made of boiling fresh stems and leaves. In South America, freshly crushed leaves and stems are placed to the affected area, wrapped tightly with a warm towel, and used to treat aching joints associated with arthritis. Lower Thailand treats fever and headaches with *Wedelia* species.[21]

## VIII.PHARMACOLOGICAL ACTIVITY

### Antimicrobial activity

*Sphagneticola trilobata* was reported to have strong antibacterial activity against *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Salmonella typhi*. It was observed that the ethanol extract of leaves and stem of *Sphagneticola trilobata* had antibacterial activity against *K. pneumoniae, S. pneumoniae, P. aeruginosa, E. coli, Xanthomonas oryzae, and X. axanopodis*. Additionally, it was discovered that the plant was efficient against *Microsporum canis* in an aqueous leaf extract and *Trichophyton rubrum* in a methanolic leaf extract.[22]

### Anti-inflammatory activity

When applied topically, the hydroalcoholic dry extract of *S. trilobata* demonstrated significant anti-inflammatory properties, including the prevention of leukocyte migration and plasma extravasation. Future research is necessary to fully understand the processes underlying the anti-inflammatory benefits of this medicinal extract, however they seem to entail interfering with PKC activation and/or the generation of AA-metabolites. *S. trilobata* may represent a novel and alluring Phyto therapeutic option for the treatment of inflammatory skin diseases in people.[23]

### Wound healing properties

In addition to grandiflorenic acid, *Sphagneticola trilobata* contains other bioactive compounds that contribute to its wound-healing properties. Flavonoids present in the plant, such as quercetin and kaempferol, possess antioxidant and anti-inflammatory effects that aid in reducing oxidative stress and inflammation at the wound site, thus promoting faster healing. Furthermore, the presence of phenolic compounds in *S. trilobata* extracts contributes to their antimicrobial activity, which helps prevent wound infections and supports the healing process.

Moreover, the mucilage and gums found in *S. trilobata* extracts create a protective barrier over the wound, keeping it moist and facilitating the migration of epithelial cells for faster wound closure. The plant extracts may also enhance collagen deposition and remodeling, crucial processes in wound repair, through their stimulation of fibroblast activity. Additionally, the antiangiogenic properties of certain compounds in *S. trilobata* extracts help regulate blood vessel formation at the wound site, preventing excessive bleeding and promoting proper tissue regeneration. Overall, the multifaceted properties of *S. trilobata* make it a promising candidate for the development of natural wound-healing agents either alone or in combination with other therapeutic agents.[24]

### Antifungal activity

The bioactive compounds, including flavonoids, alkaloids, and phenolic compounds, are believed to contribute to its antifungal properties by disrupting fungal cell membranes, inhibiting fungal enzyme activity, and interfering with essential cellular processes. These findings highlight the potential of *S. trilobata* as a natural source of antifungal agents and underscore its importance in traditional medicine systems where it has been utilized for treating fungal infections. Further research into the specific mechanisms of action and isolation of active compounds from *S. trilobata* may lead to the development of novel antifungal therapeutics with broad-spectrum efficacy and reduced risk of resistance development.[25]

### Antioxidant activity

The ethanol leaf extract (87.14%), stem extract (86.76%), and flower extract (61.63%) all inhibited the denaturation of proteins. Fresh stem and flower water extracts showed more scavenging activity than dried *Sphagneticola trilobata* extracts, suggesting that they could function as primary antioxidants by inhibiting free radicals. The leaf's methanol extract was shown to have high antioxidant activity.[26]

### Antipyretic activity

Rats that were given yeast-induced hyperthermia found that ethanol leaf extracts of *Wedelia trilobata* had a significantly stronger antipyretic effect than the water extract. The extracts contain saponins and flavonoids, which may be responsible for inhibiting the creation of prostaglandins. The pathophysiology of fever is also supported by a number of mediators or multiprocessors. An antipyretic effect could result from inhibiting any of these mediators.[27]

### Antiulcer activity

The ethanolic extracts of *Wedelia trilobata* (L) A. Hitchc. leaves have been found to contain a diverse array of phytoconstituents, as mentioned, including carbohydrates, glycosides, phytosterols, fixed oils and fats, saponins, flavonoids, gums, and mucilage. Among these, flavonoids have gained particular attention for their potential role in the plant's antiulcer activity. Flavonoids are

known for their antioxidant properties, which can help protect against oxidative stress and inflammation, both of which are implicated in the development of ulcers.

Moreover, the antiulcer action demonstrated by ethanolic extracts of *Wedelia trilobata* leaves suggests its potential therapeutic application in gastrointestinal disorders. The presence of mucilage and gums in the extracts may also contribute to their mucosal protective effects, forming a barrier that shields the stomach lining from gastric acid and other irritants. Additionally, the presence of saponins in the extracts could potentially aid in enhancing mucosal healing and reducing inflammation.[28]

**Anticancer activity**

The extracts derived from *S. trilobata* possess significant cytotoxic effects against various cancer cell lines. The bioactive compounds present in this plant, such as flavonoids, alkaloids, and phenolic compounds, are believed to contribute to its cytotoxic properties by inducing apoptosis, inhibiting cell proliferation, and disrupting cell cycle progression. These findings suggest the potential of *S. trilobata* as a natural source of anti-cancer agents, shedding light on its significance in traditional medicinal practices where it has been utilized for addressing various health conditions. Further exploration of its cytotoxic mechanisms and isolation of active compounds may lead to the development of novel therapeutic interventions in oncology.[29]

## IX.CONCLUSION

In conclusion, the comprehensive review of *Sphagneticola trilobata* underscores its profound ecological significance and vast medicinal potential. This perennial herb, native to the Caribbean and found in tropical and subtropical regions, has been utilized for centuries in traditional medicine across various cultures, demonstrating efficacy in treating a wide array of ailments including ulcers, sore throats, fever, and even cancer.

Pharmacologically, *S. trilobata* exhibits a rich array of bioactive compounds such as alkaloids, flavonoids, and phenolic compounds, contributing to its antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. Notably, its efficacy against microbial pathogens including bacteria and fungi, along with its ability to modulate inflammatory responses and promote tissue repair, highlights its potential as a versatile therapeutic agent.

Moreover, ongoing research has unveiled its promising cytotoxic effects against cancer cell lines, suggesting a potential role in oncology. However, further exploration into its mechanisms of action, isolation of active compounds, and clinical studies are warranted to fully harness its anticancer potential.

Overall, *S. trilobata* represents a fascinating convergence of ecological resilience and medicinal prowess, emphasizing the intricate relationship between biodiversity conservation and human health. Continued investigation into this botanical treasure holds promise for the development of novel therapeutic interventions, further enriching our pharmacological arsenal and advancing holistic approaches to healthcare.

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