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EXPLORING THE MEDICINAL LEGACY AND PHARMACOLOGICAL ACTIONS OF DRACAENA TRIFASCIATA

Sundhar S.[1*], Manisha M.[2], Dr. Jothimanivannan C.[3], Boopathi G[1]., Vishalatchi K.[1] and Mohammedkabeer A.[1]

[1]Student SS Institute of Pharmacy, Sankari, Salem, 637301.

[2]Assistant Professor SS Institute of Pharmacy, Sankari, Salem, 637301.

[3]Principal SS Institute of Pharmacy, Sankari, Salem, 637301.

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***Corresponding Author**
Sundhar S.
Student SS Institute of Pharmacy, Sankari, Salem, 637301.

ABSTRACT

Known as "mother-in-law's tongue," Dracaena trifasciata (Prain) Mabb. (Asparagaceae) is a perennial herbaceous species that is native to tropical West Africa and is widely grown as an ornamental plant in both public and domestic areas. In traditional medicine, its leaves and rhizomes have long been used to treat a variety of ailments, such as dermatophytosis, acne, pruritus, ulcers, helminthiasis, otalgia, pharyngitis, urinary tract disorders, jaundice, and for analgesic and antipyretic purposes. We summarize the most recent research on the plant's botanical traits, ethnomedical applications, pharmacognostic assessment, chemical makeup, and pharmacological actions in this thorough analysis. The review highlights D. trifasciata's multifaceted therapeutic potential and clarifies its prospects for further pharmacological and clinical investigation by combining evidence from several disciplines.

KEYWORDS: Phytochemistry, Pharmacology, Ethnomedicine, Analytical Chemistry, And Pharmacognosy.

INTRODUCTION

Because they have less adverse effects than synthetic medications, medicinal plants are becoming more and more regarded in today's healthcare system as ecologically friendly substitutes. Pharmacology has greatly benefited from herbal medicine's encouragement of the isolation and characterisation of many bioactive phytochemicals. New pharmacological

substances are still being discovered as a result of this continuous study. A perennial herbaceous species indigenous to tropical West Africa, Dracaena trifasciata (Prain) Mabb. (syn. Sansevieria trifasciata Prain) is a member of the Asparagaceae family. It is now widely cultivated as an ornamental plant in homes, gardens, and thickets worldwide. Common names include mother-in-law's tongue, snake plant, viper's bowstring hemp, and Saint George's sword. Traditionally, its leaves and rhizomes have been used to address conditions such as acne, fungal infections, pruritus, ulcers, earaches, allergies, helminthiasis, jaundice, pharyngitis, urinary disorders, and for analgesic and antipyretic purposes. In certain African cultures, it is also valued as a protective charm against evil or sorcery and is grown for its fiber in tropical regions. In sealed chamber trials, D. trifasciata was found to be capable of eliminating volatile organic pollutants such as trichloroethylene, formaldehyde, and benzene in a 1989 NASA Clean Air Study. Subsequent analyses, however, made it clear that these results cannot be applied to ordinary interior settings because, in practice, tens to thousands of plants per square meter would be required to replicate usual air exchange rates. In order to direct future pharmacological and clinical research into this adaptable medicinal plant, this thorough study looks at D. trifasciata's botanical traits, pharmacognostic and phytochemical profiles, traditional uses, pharmacological activity, and toxicological features.

History of Dracaena trifasciata

Origins and Nomenclature

Dracaena trifasciata is indigenous to the arid, rocky regions of West and Central Africa, including Nigeria, Congo, Cameroon, Gabon, and Tanzania. It has developed resistance to heat and drought, and its usual habitats include impoverished, well-drained soils. In 1753, Carl Linnaeus placed it in the genus Aloe. However, in the late 18th century, Carl Peter Thunberg moved it to the genus Sansevieria, which was named for the Italian lord Raimondo di Sangro. David Prain revised its classification under Dracaena in 1903, then in 2017, sophisticated DNA analysis definitively changed it to Dracaena trifasciata.

Global Dissemination

The expansion of European colonialism during the 18th–19th centuries facilitated the plant's movement from Africa to Europe and Asia. Its hardiness, aesthetic appeal, and ability to thrive indoors sparked widespread horticultural interest, popularizing it in botanical gardens and private collections by the mid-1800s. By the 20th century, it firmly established itself as a desirable houseplant in North America, even gracing the porch of Grant Wood's famous American Gothic painting (1930).

Cultural and Ethnobotanical Significance

Dracaena trifasciata has served diverse roles across cultures:

Dracaena trifasciata has served diverse roles across cultures:

- African traditions: Leaves were used to extract durable fibers for ropes, bowstrings, and textiles, while its structure lent symbolic protection in ritual contexts.
- Afro-Brazilian and Brazilian folklore: Referred to as "Espada de São Jorge" ("Saint George's sword"), it was planted at doorways for protection, especially in Umbanda, where it's associated with the orisha Ogum; yellow-edged cultivars symbolize Iansã.
- Other regions: Used in Malaysia for treating ear infections and swelling; in South Korea, it's gifted for opening ceremonies of businesses.

Scientific and Public Recognition

It was a staple in interior settings due to its resilience and capacity to withstand neglect. Despite its drawbacks in actual indoor environments, NASA's Clean Air Study from 1989 demonstrated its capacity to eliminate pollutants including trichloroethylene, formaldehyde, and benzene in enclosed systems, increasing its allure. Furthermore, its utilization of crassulacean acid metabolism (CAM), which enables CO_2 uptake in darkness through stomata opening at night, enhances its allure for use in bedrooms at night. This history follows D. trifasciata from its African origins to its current status as a beloved and culturally significant decorative and therapeutic plant on a global scale. If you would like to add more scholarly sources or elaborate on specific cultural situations, please let me know.

Taxonomy

Dracaena trifasciata (Prain) Mabb. is a member of the genus Dracaena Vand. ex L., which is a member of the Asparagales order, family Asparagaceae, and subfamily Nolinoideae. There are between 120 and 200 species of trees, shrubs, and herbaceous succulents in the genus.

Extensive molecular phylogenetic investigations revealed that D. trifasciata, which was previously placed under the genus Sansevieria, is really nested within Dracaena, making the latter paraphyletic if maintained apart. Although the divide in larger classification is still recognized by the APG IV system, molecular analysis, such as plastid and nuclear DNA studies.

The subspecies of D. trifasciata

• D. trifasciata subsp. sikawae (Webb & Yainger, R.H.) Takaw, Ny., and Thiede Variegated foliage, frequently with yellow or silvery-white edges, is a characteristic of many beautiful varieties that have been created. Notable varieties include "Compacta," "Goldiana," "Hahnii," "Laurentii," "Silbersee," and "Silver Hahnii." Many of these cultivars have also received the Award of Garden Meri from the Royal Horticultural Society.

Morphology

The evergreen perennial herb Dracaena trifasciata normally grows to a height of 0.5 to 1 m, yet under the right circumstances, individual leaves may grow to a height of more. The plant develops dense clusters of erect aerial shoots from a horizontal, creeping rhizome that is occasionally visible aboveground.

Leaves

The basal rosette gives rise to solitary, upright clusters of leaves. Mature leaves measure 52 to 90 cm in length and 3.5 to 6 cm in width, tapering to a pointed apex. They are coriaceous, thick, stiff, and sword-shaped (linear-lanceolate to ensiform). Light to gray-green transverse banding adorns their dark green lamina; variegated cultivars frequently have pronounced yellow or white edges. Fresh leaves have a shiny, smooth appearance; dried leaves have a fibrous texture, a bitter taste, and no smell.

Inflorescence and Flowers

Particularly in cultivation, flowering is rare and usually takes place in the spring or winter. A simple, upright raceme that is up to 75 cm tall emerges from the plant's mature foliage. Small bracts support the lowers, which are found in fascicles of three to seven. With reflexed narrow lobes that are pale greenish-white in color and six tepals (3+3) arranged at the base to form a short cylindrical tube, the flowers are actinomorphic, bisexual, and trimerous. A single anatropous ovule is found in each of the superior, trilocular ovary's six epipetalous stamens, which also have filiform filaments and pale yellowish-green dorsifixed anthers. The globose berry has ovoid seeds with horny endosperm and becomes orange when mature.

Micromorphology and Anatomy

A transverse leaf section shows a single-layered epidermis on both surfaces, devoid of trichomes, covered in a thick layer of cuticle, and displaying smooth cuticular ornamentation. Stomata are tetracytic and amphistomatic. The mesophyll is isobilateral, with an inner parenchyma that is specifically designed to store water and an outside zone that is chlorenchymatous. The thickness of leaves varies from about 1 to 5 mm. Each vascular bundle has a well-developed sclerenchyma cap on top, and they are oval, closed, collateral, and endarch. Chlenchyma and central mesophyll cells contain calcium oxalate raphides. Cross-sections of the rhizome reveal a mucilaginous parenchymatous cortex, a multilayered, suberized epidermis, and extensively dispersed collateral vascular bundles with noticeable sclerenchyma sheaths. Xylem vessels (6–8 per bundle) are composed of phloem, which includes sieve tubes and partner cells, and metaxylem on the exterior, with protoxylem facing inward.

Phytochemistry

The traditional and pharmacological relevance of Dracaena trifasciata (Prain) Mabb. is attributed to its abundance of many bioactive substances, especially phenolic acids, flavonoids, pregnane glycosides, and steroidal saponins.

Steroidal Saponins

β-sitosterol, ruscogenin, neoruscogenin, and two spirostan sapogenins, 25S-ruscogenin and sansevierigenin, are found in the plant's leaves. Twelve steroidal saponins and four pregnane glycosides have been isolated from the entire plant as a result of thorough phytochemical investigations. Notably, the n-butanol fraction of the methanol extract yielded a series of steroidal saponins known as trifasciatosides A–J. Using 1H-NMR, 13C-NMR, and 1H–1H COSY spectroscopy, these compounds were described. Additionally, trifasciatine C, a dihydrochalcone derivative, was identified, along with monoacetylated steroidal saponins trifasciatosides K/L and M/N.

Pregnane Glycosides

1β,2β-dihydroxypregna-5,16-dien-20-one-1-O-α-L-rhamnopyranosyl-(1→2)-O-[β-D-xylopyranosyl-(1→3)] is one of the pregnane glycosides that were isolated. The counterpart of β-D-glucopyranoside conjugated with arabinose.

Flavonoids and Phenolic Compounds

The plant has been found to contain phenolic acids like chlorogenic acid and flavonoids like catechin and kaempferol. These substances support the plant's antibacterial and antioxidant qualities.

Other Bioactive Compounds

Alkaloids, steroids, and phenols have been found in D. trifasciata's leaves and roots using phytochemical screening. These ingredients have antibacterial properties, particularly against the common bacterium Staphylococcus aureus, which causes a number of illnesses.

Macroscopic Characters of Rhizome

The fresh rhizome is cylindrical and fibrous, with a thickness of 1-2 cm and a length of up to 10 cm. It has noticeable leaf scars on its surface and a light brown, smooth, glossy, and mucilaginous outer surface. The dried rhizome has longitudinal wrinkles, a thin, light brown outer surface, a white, fibrous cut surface, no smell, and a bitter taste.

Microscopic Characters of Rhizome

In cross-section, the rhizome appears circular in form.

• Epidermis: Multilayered, made up of rectangular, suberized cells with thin walls.

• Ground tissue: Comprised of mucilage-containing parenchymatous cells, it is undifferentiated.

• Vascular bundles: Found in the ground tissue, these bundles are numerous, collateral, endarch, and closed. A sclerenchymatous bundle cap encloses every vascular bundle.

• Xylem: Made up of six to eight vessel components. Protoxylem is situated near the center, whereas metabolylem is orientated toward the periphery.

• Phloem: Made up of companion cells and sieve tubes, it is situated directly above the metaxylem.

Macroscopic Characters of Root

Up to 15 cm in length and 1.5–2.0 mm in diameter, the roots are wiry and slender. The surface has a dark hue and is rough. They have no flavor or smell.

Microscopic Characters of Root

The root can be distinguished into four primary parts in a transverse section: the central pith, vascular ring, cortex, and epidermis.

• Epidermis: Made up of cuboidal or triangular cells with thick walls and suberization.

• Core: Wide, made up of isodiametric, thin-walled parenchyma cells.

• Endodermis and pericycle: Clearly defined layers that separate the cortex from the vascular tissue.

• Vascular area: Having a circular shape, this region is made up of alternating xylem and phloem.

• Pith: Composed of parenchymatous cells, it is situated in the middle. There are no crystals of calcium oxalate.

Traditional Medicinal Uses

The ability of Dracaena trifasciata to heal wounds has led to its traditional use. Plant extracts are useful in the treatment of a variety of wounds because they have been shown to expedite tissue regeneration, decrease inflammation, and encourage wound closure.

D. trifasciata is utilized in traditional medical systems like Ayurveda and Traditional Chinese Medicine (TCM) to treat colds, coughs, and bronchitis. Its mucilaginous qualities facilitate expectoration and relieve sore throats.

Various plant parts, especially the leaves and rhizomes, are used in traditional African medicine to treat respiratory, gastrointestinal, and skin illnesses. Additionally, in a number of nations, including India, Nigeria, Ghana, Congo, Indonesia, the Philippines, Myanmar, Yemen, China, Vietnam, Cambodia, Thailand, and Malaysia, D. trifasciata has long been used to treat influenza, cough, respiratory conditions, inflammation, earaches, stomach ulcers, jaundice, pharyngitis, skin itching, and urinary disorders.

The herb has also been recognized for its analgesic and antipyretic (fever-lowering and pain-relieving) qualities. A thorough overview of its customary applications across many nations is provided in Table**.**

Table 1: Traditional Medicinal Uses of Dracaena trifasciata Across Various Countries.

Continent & Country	Ethnomedicinal Use / Therapeutic Significance	Plant Part Used	Form of Preparation
Africa Nigeria (West Africa)	Used for treating hemorrhage, dysentery, diarrhea, stomach and external ulcers, wounds, leucorrhea, fractures, piles, diabetes, and tumors	Leaves and rhizomes	Brewed, decoction, paste
Asia Indonesia	Snake bite, cough, cold, diarrhea, wound healing	Leaves and rhizomes	Crushed, infusion, decoction
India	Bronchitis, asthma, food poisoning, toxemia, cough, snake bite, insect bites	Leaves and rhizomes	Brewed, decoction, paste
Myanmar	immune support, treatment of tumors, digestive issues (e.g., constipation), skin diseases	Leaves and rhizomes	Not specified
Yemen	Treatment of hemorrhage, dysentery, ulcers, wounds, leucorrhea, fractures, piles, diabetes, tumors; also promotes skin repair and blood circulatio	Leaves and rhizomes	Brewed, decoction, paste
China	Pain relief, hemorrhage control; substitute for dragon's blood ("Long-Xue-Jie")	Leaves and rhizomes	Brewed, decoction
Vietnam, Cambodia, Thailand	Cough, leprosy, rheumatism, glandular swelling, nutritional deficiencies, snake bites	Leaves and rhizomes	Brewed, decoction, paste
Malaysia	Ear pain, swellings, boils, and fever	Leaves and rhizomes	Paste, brewed, decoction
Philippines	Asthma, abdominal pain, colic, diarrhea, hemorrhoids, hypertension, menorrhagia, sexual weakness, leprosy, rheumatism, glandular enlargement, nutritional deficiencies, snake bite, foot wounds, cough	Leaves and rhizomes	*N*ot specified

Antipyretic Effects

Leaf extracts from Sansevieria trifasciata have antipyretic qualities. After inducing pyrexia with a yeast suspension, ethanol and aqueous (water) extracts were given orally at rates of 100–200 mg/kg. While the water extract exhibited no discernible antipyretic action, the ethanol extract at 200 mg/kg considerably ($p < 0.01$) decreased fever.

Antibacterial Activity

Sansevieria trifasciata root saponin extract and its separated constituents are tested for their antibacterial qualities against Escherichia coli and Staphylococcus aureus. Zones of inhibition of 18.67 mm and 24 mm at a concentration of 200 ppm demonstrated the potent antibacterial activity of both the crude root extract and the separated chemicals.

Investigation of the Zone of Inhibition (ZOI) method's antibacterial activity of S. trifasciata methanolic leaf extract on clinical isolates cultured on Mueller-Hinton agar plates. 100 µL of the dry extract at a concentration of 50 mg/mL was added to each well. Following a 24-hour incubation period, ZOI measurements showed significant antibacterial activity, measuring 12 mm for Escherichia coli, 12 mm for Pseudomonas aeruginosa, and 15 mm for Staphylococcus aureus.

Cytotoxic Activity

Three distinct human cancer cell lines were used to assess the in vitro cytotoxic potential of Sansevieria trifasciata: A-549 (lung carcinoma), HepG-2 (liver carcinoma), and CACO2 (colorectal adenocarcinoma). The alcoholic extract was tested against these cell lines at different twofold serial dilutions (0, 3.9, 7.8, 15.6, 31.25, 62.5, 125, 250, and 500 µg/mL). The extract showed low cytotoxic activity, with IC_{50} values of 77.8 µg/mL for A-549 and 81.0 µg/mL for HepG-2, while no discernible cytotoxic effect was seen against the CACO2 cell line.

Antioxidant Activity

Sansevieria trifasciata leaf extracts' antioxidant qualities are investigated by assessing their total phenolic content and activity using phosphomolybdenum and DPPH tests. The ethanolic extract had a greater total phenolic content (0.474 mg GAE/g) than the aqueous extract (0.285 mg GAE/g), according to the data. The ethanolic extract showed higher antioxidant activity (2.417 mg) than the aqueous extract (0.999 mg) at a concentration of 100 mg/mL. At greater extract levels, S. trifasciata's antioxidant ability rose in a concentration-dependent (or dose-responsive) way.

Antidiabetic Activity

Male Swiss albino rats were used to test the methanolic extract of Sansevieria trifasciata leaves for its antidiabetic properties. Streptozotocin (STZ) was used to induce diabetes at a dose of 60 mg/kg body weight (BW). The extract was then taken orally once daily for 15 days at doses of 50 and 100 mg/kg BW. For comparison, Glibenclamide (0.5 mg/kg BW), a common antidiabetic medication, was also administered regularly. After receiving the leaf extract, the formation of reactive oxygen species (ROS) in the heart tissue of STZ-induced diabetic rats was considerably decreased. Histopathological analysis also shown that the extract significantly reduced the tissue damage caused by STZ, returning the organ morphology to a state that was very similar to normal.

CONCLUSION

Often referred to as mother-in-law's tongue or snake plant, Dracaena trifasciata (Prain) Mabb. Is a hardy perennial herb that originated in West Africa and is currently used as a decorative and therapeutic plant all over the world. Throughout its long ethnobotanical history, it has been used to cure a wide range of illnesses, such as fevers, gastrointestinal problems, respiratory conditions, and skin infections. Numerous bioactive chemicals, including phenolic acids, flavonoids, pregnane glycosides, and steroidal saponins, have been discovered in the plant through contemporary phytochemical research. These substances help explain the plant's proven antibacterial, antipyretic, and wound-healing qualities. Additional pharmacological and clinical study is required to fully understand its therapeutic potential and assure safety for wider pharmaceutical application, even if laboratory research supports many traditional usage.

REFERENCE

1. Hashemloian Delnavaz BA. Medicinal and edible plants. The first national conference on new issues in agriculture Saveh, Iran; 2010.
2. Stafford GI, Pedersen ME, Van Staden J, Jäger AK. Review on plants with CNS-effects used in traditional South African medicine against mental diseases. Journal of Ethnopharmacology, 2008; 119: 513-37.
3. Qomariyah N. Antidiabetic effects of a decoction of leaves of Sansevieria trifasciata in alloxan-induced diabetic white rats (Rattus norvegicus L.). ITB Science, 2012; 44: 308-316.
4. Rwawiire S, Tomkova B. Morphological, thermal, and mechanical characterization of Sansevieria trifasciata fibers. Journal of Natural Fibers, 2015; 12: 201- 210.
5. Csurhes S, Edwards R. Potential environmental weeds in Australia: Candidate species for preventative control. Queensland Department of Natural Resources, 2006.
6. BerameJS, CuencaSM, CabilinDR, ManabanML. Preliminary phytochemical screening and toxicity test of leaf and root parts of the snake plant (Sansevieria trifasciata). Journal of Phylogenetics & Evolutionary Biology, 2017; 5(3): 1-6.
7. PinkySS, MoniraS, HossainMA, HossainA.Antioxidant, anti-inflammatory, cytotoxic and analgesic activities of Sensevieria trifasciata. Bangladesh Pharmaceutical Journal, 2020; 23(2): 195-200.

8. Myint HH, Swe TT. Study on morphological, physicochemical investigation and antimicrobial activities of Sansevieriatrifasciatahort. ex Prain.(na-gar-set-gamon) Journal of Myanmar Academy of Arts and Science, 2019; 17(4): 483-500.
9. AnbuJS, JayarajP, VaratharajanR, ThomasJ, JishaJ, MuthappanM.Analgesicand antipyretic effects of Sansevieria trifasciataleaves. African Journal of Traditional, Complementary and Alternative Medicines, 2009; 6: 529.
10. Dewatisari WF, Subandi, Desmawati. Anti bacterial activity of saponins from Sanseviera trifasciata prain cv. golden hahnii roots on Escherichia coli and Staphylococcus aureus African Journal of Biochemistry Research, 2017; 11(5): 2227.
11. Shelah M, Lontoc H, Charlene S, Shiela A, Mae Comia M, Ariane F, Hernandez, Oliver SR, Dumaoal. In vitro antioxidant activity and total phenolic content of Sansevieria trifasciata (Snake plant) crude ethanolic and aqueous leaf extracts. Asia Pacific Journal of Allied Health Sciences, 2018; 1: 35-58.
12. Vivi A, Dwita LP, Istikomah. Antioxidant and alphaamylase inhibitory study of Sansevieria trifasciata Prain. leaves extract. Pharmaciana, 2019; 9(1): 41-46.
13. Wambugu FK, Waweru WR. In vitro anthelmintic activity of Sansevieria trifasciata leaves extract against Fasciola hepatica. World Journal of Pharmaceutical Sciences, 2016; 4(11): 136-139.
14. Raslana MA, Abdel-Rahmanb RF, Fayedb HM, Ogalyc HA, Taher RF. Metabolomic profiling of Sansevieria trifasciata hort ex. Prain leaves and roots by HPLC-PAD-ESI/MS and its hepatoprotective effect via activation of the NRF2/ARE signaling Pathway in an experimentally induced liver fibrosis rat model. Egyptian Journal of Chemistry, 2021; 64(11): 6647-6671.
15. Dey B, Bhattacharjee R, Mitra A, Singla RK, Pal A. Mechanistic explorations of antidiabetic potentials of Sansevieria trifasciata. Indo Global Journal of Pharmaceutical Sciences, 2014; 4: 113-122.
16. Nia Y, Himyatul H, Neni SG, Anggun Hari K, Farhamzah F, Asman S, Maulana YA. Evaluation of wound-healing activity of hydrogel extract of Sansevieria trifasciata leaves (Asparagaceae). Advances in Pharmacological and Pharmaceutical Sciences. 2023; Article ID 7680518, 10 pages https://doi.org/10.1155/2023/7680518.
17. Laksmindra F, Isma CPG, Wilda BTS, Maura IM. Singledose acute oral toxicity study of chloroform extract of snake plant (Sansevieria trifasciata Prain.) leaf in Wistar rats (Rattus norvegicus Berkenhout, 1769). Journal of Tropical Biodiversity and Biotechnology, 2022; 7(1): jtbb69389.

18. Babu K, Prabhu DS. Studies on anatomy, physico-chemical and thin-layer chromatographyofrhizome, root and leaf of Dracaenatrifasciata(Prain)Mabb. Journal of Pharmacognosy and Phytochemistry, 2023; 12(1): 668-71.
19. Hashemloian Delnavaz BA. Medicinal and edible plants. The first national conference on new issues in agriculture Saveh, Iran; 2010. 3. POWO. Dracaena trifasciata (Prain) Mabb., Plants of the World Online, published on the Internet, 2024.
20. Myint HH, Swe TT. Study on morphological, physicochemical investigation and antimicrobial activities of Sansevieria trifasciatahort. ex Prain.(na-gar-set-gamon) Journal of Myanmar Academy of Arts and Science, 2019; 17(4): 483-500.
21. Babu K, Prabhu DS. Dracaenatrifasciata (Prain) Mabb.–Traditional use, pharmacognosy, phytochemistry and pharmacology: A comprehensive review.