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Dracaena trifasciata (Prain) Mabb. – Traditional use, pharmacognosy, phytochemistry and pharmacology: A comprehensive review

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ABSTRACT

Dracaena trifasciata (Prain) Mabb. (Asparagaceae) is a perennial herb, commonly known as mother-in-law's tongue, cultivated as an ornamental plant in homes and parks, native to tropical West Africa. The leaves and rhizomes are traditionally used against acne, fungal infections, skin itches, allergy, ulcer, helminths, earache, pharyngitis, urinary diseases, jaundice, analgesic and antipyretic in various countries. This review comprehensively describes the botany, traditional use, pharmacognosy, phytochemistry and pharmacology of this multidimensional herb.

Keywords: *Dracaena trifasciata*, Asparagaceae, Ethnobotany, Pharmacognosy, Phytochemistry, Pharmacology.

INTRODUCTION

In current scenario, medicinal plants are worthy replacement for synthetic chemical drugs as an environmental renovation in the medical field. One of the major reasons for alternative is minimum side effects than synthetic chemical drugs. Also, the field of herbal products has significantly contributed to the advancement of pharmacology and medicine. The extraction and isolation of wide range of phytochemicals from numerous plants are still motivates many researchers globally to discover new bioactive compounds and their pharmacological actions [1].

Dracaena trifasciata (Prain) Mabb. (Syn: *Sansevieria trifasciata* Prain) belonging to the family Asparagaceae, is a perennial herb, native to tropical West Africa, but widely grown as an ornamental plant in houses, gardens and thickets in many parts of the world. The plant is commonly known as mother-in-law's tongue, snake plant, viper's bowstring hemp or Saint George's sword. Traditionally, it has important therapeutic use against acne, fungal infections, skin itches, ulcer, earache, allergy, helminths, jaundice, pharyngitis, urinary diseases, analgesic and antipyretic. It is used as a protective charm against evil or bewitchment in Africa and cultivated for its fibre in several tropical countries [2-4]. A study by NASA found that *D. trifasciata* is one of the best plants for improving indoor air quality by passively absorbing various types of pollutants in the air; hence it could produce a great refresher [5-6].

This comprehensive review describes the botany, pharmacognosy, traditional uses, phytochemistry, pharmacological and toxicological activities so far investigated in this plant.

TAXONOMY

The genus *Dracaena* Vand. ex L. (subfamily Nolinoideae; family Asparagaceae; order Asparagales) consisting around 120 species [7]. The taxonomic position of the genera *Sansevieria* and *Dracaena* have been debated for a long time and the two genera are still differentiated in the APG IV system of flowering plant classification (APG IV). However, recent molecular phylogenetic studies included the species formerly placed in *Sansevieria* within *Dracaena*. The species has two infraspecific taxa namely, *Dracaena trifasciata* subsp. *trifasciata* and *Dracaena trifasciata* subsp. *sikawae* (R.H.Webb & Yinger) Takaw.-Ny. & Thiede. Numerous variegated foliage cultivars have been developed with yellow or silvery-white stripes leaf margins and popular are Compacta, Goldiana, Hahnii, Laurentii, Silbersee, and Silver Hahnii [8-11].

Distribution

Native to tropical West Africa - Cameroon, Central African Repu, Congo, Nigeria, Zaïre. Introduced into Andaman Islands, Bangladesh, East Himalaya, Fiji, Florida, India, Jamaica, Malaya, Mauritius, Mexico Southeast, Mexico Southwest, Myanmar, Queensland etc. [11].

Morphological characters

Evergreen perennial herb, 0.5-1.0 m in height; rhizome horizontal; sympodial, producing leafy shoots at intervals, aerial shoots in a single clump. Leaves simple, tuft thick, upright fleshy to rigidly coriaceous, both surfaces shining smooth, dark green, with numerous very conspicuous, light or greyish green irregularly confined transverse bands, a narrow dark green margin, tapering to apex, acute, apiculate, linear-lanceolate or ensiform, 52.5-76.9 cm in length and 3.5-5.5 cm in breadth. Inflorescence raceme; Flowers in fascicles of 3-7, membranous bract, each flower with of a minute bract; pedicel cylinder, actinomorphic, regular, bisexual, trimerous, hypogynous. Tapels 3+3, united at the base, tapel tube short, cylindrical, pale yellowish green; limbs linear or narrowly lanceolate, revolute, pale greenish white, inferior. Stamens 3+3, epipetalous, filaments filiform, pale yellowish green; anther ditheous, dorsifixed, longitudinal dehiscence, sagittate at base, inferior. Ovary 3-carples, 3 loculi, with anatropous ovule in each locule, axile placentation; style filiform, pale yellowish green, stigma 3 lobed, exerted, superior. Fruit berry, globose, orange in colour when ripe. Seeds broadly ovoid, with horny endosperm^[12].



Habit



Rhizome

PHARMACOGNOSY

The macro and microscopical characters, physicochemical properties and thin layer chromatographic profile of leaf, rhizome and root of *D. trifasciata* were studied by Babu and Srinivasaprabhu^[13].

Macroscopic characters of leaf

Fresh leaves - up to 1 m or taller, clusters, erect, linear-lanceolate, sword-shaped, thick, hard, dark green with grey or white wavy cross striped, margin smooth, tip acute. Dried leaves - dull green to light brown, longitudinally wrinkled, curved towards inner, fibrous cut surface; bitter taste, no odour.

Microscopic characters of leaf

Cross section of leaf exhibited single layer epidermis with square to oval shaped cells. Cuticle thick in both surfaces and cuticular ornamentation is smooth, trichomes or any other appendages absent in both surfaces. Stomata amphistomatic and tetracytic type. Lamina

curved or D-shaped, 1-5 mm thickness. Mesophylls - isobilateral, separated into an outer region of chlorenchyma and inner water storage parenchymatous cells. Vascular bundles - oval shaped, closed, collateral, endarch, contains well-developed sclerenchyma cap above the phloem. Raphides crystals present in the chlorenchyma and the central mesophyll cells.

Macroscopic characters of rhizome

Fresh rhizome - cylindrical, fibrous, 1-2 cm thickness, 10 cm long with conspicuous leaf scars, outer surface light brown colour, smooth, shiny, mucilage present. Dried rhizome - longitudinally wrinkled, outer surface light brown colour, thin, cut surface white colour and fibrous; no odour and bitter taste.

Microscopic characters of rhizome

The cross section of rhizome is circular in outline. Epidermis - multi-layered, consist thin-walled, rectangular suberized cells. Ground tissue - undifferentiated, composed by parenchymatous cells which contain mucilage. Vascular bundles - numerous, closed, collateral, endarch, scattered in the ground tissue. Each vascular bundle surrounded by the sclerenchyma bundle cap. Xylem consists of 6-8 vessel elements, metaxylem found towards outside and protoxylem towards inside. Phloem consists of sieve tubes and companion cells, located just above the metaxylem.

Macroscopic characters of root

Roots - up to 15 cm long and 1.5-2.0 mm thickness, wiry, rough surface, brown colour; no taste and odour.

Microscopic characters of root

The transverse section of root markedly differentiated into outer epidermis, cortex, vascular ring and inner pith. Epidermis composed of thick-walled suberized cells which are cubical or triangle in shape. Cortex is wide consist thin-walled isodiametric parenchymatous cells. Endodermis and pericycle are present which distinctly separate the vascular region and cortex. Vascular region circle shaped, composed of xylem and phloem which are arranged alternatively. Pith composed of parenchymatous cells located in the centre region and calcium oxalate crystals are absent.

PHYTOCHEMISTRY

The leaves contain β -sitosterol, ruscogenin, neoruscogenin, and two spirostan saponin 25S-ruscogenin and sansevierigenin^[14].

Phytochemical analysis of the whole plant of *S. trifasciata* has resulted in the isolation of 12 steroidal saponins and 4 pregnane glycosides and identified as $1\beta,2\beta$ -dihydroxypregna-5,16-dien-20-one-1-O- α -L-rhamnopyranosyl-(1 \rightarrow 2)-O-[β -D-xylopyranosyl-(1 \rightarrow 3)]- β -D-glucopyranoside, $1\beta,2\beta$ -dihydroxypregna-5,16-dien-20-one-1-O- α -L-rhamno-pyranosyl-(1 \rightarrow 2)-O-[β -D-xylopyranosyl-(1 \rightarrow 3)]- α -L-arabinopyranoside^[15-16].

Rémy Bertrand Teponno et al.,^[17] isolated steroidal saponins, trifasciatosides A-J from the *n*-butanol fraction of the methanol extract of *S. trifasciata*. Their structures were elucidated on the basis 1H-NMR, 13C-NMR, 1H-1H spectroscopy and other various methods.

Tchegnitegni et al.,^[18-19] isolated homoisoflavonoids - trifasciatine-A-C and K-N together with 1,2-(dipalmitoyl)-3-O- β -D-galactopyranosylglycerol, aconitic acid and 1-methyl aconitic acid from the methanol extract ethyl acetate soluble fraction.

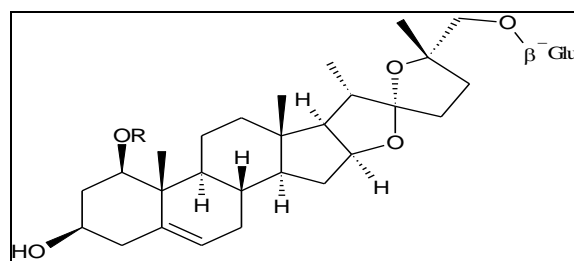
Seham Salah et al.,^[20] investigated the phenolic compounds in *S. trifasciata* by HPLC method and detected catechin and kaempferol are the major compounds. They also isolated chlorogenic acid,

kaempferol, quercetin, and catechin from ethyl acetate fraction. The preliminary phytochemical and physicochemical tests were carried out in leaves and the results showed the presence of alkaloid, α -amino acid, glycoside, carbohydrates, reducing sugar, phenolic compound, flavonoid, steroids and trace of terpenoids. The results of physicochemical properties are tabled below [12].

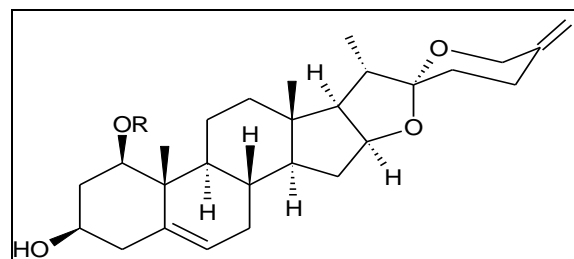
S. No.	Physicochemical properties	Average (%)
1	Moisture content	30.39
2	Total ash content	11.10
3	Water soluble ash content	30.17
4	Acid insoluble ash content	11.59
5	Aqueous soluble matter content	3.18
6	Methanol soluble matter content	2.92
7	Ethanol soluble matter content	2.52
8	Ethyl acetate soluble matter content	2.26
9	Chloroform soluble matter content	1.26
10	Petroleum ether soluble matter content	1.10
11	Acetone soluble matter content	2.68

The LC-MS/MS analysis of *S. trifasciata* leaf ethanolic extract sub-fractions obtained 7 compounds viz. alkaloids - 1-Acetyl- β -carboline, methyl pyrophaeophorbide A, oliveramine, flavonoids - (2S)-30, 40-methylenedioxy-5, 7-dimethoxyflavane, monoterpenes digiprolactone, phenolic methyl gallate, and trichosanic acid [21]. Also, they isolated 5-methyl-11-(2-oxopyridin-1(2H)-yl)undecaneperoxoic acid [22].

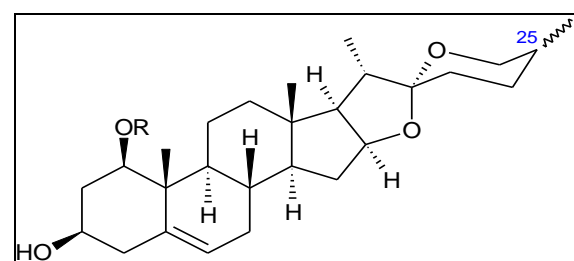
GC-MS analysis profiles of field and *in vitro* raised 2 varieties (Laurentii variegated and Laurentii variegated with yellow striped edges) of *S. trifasciata* showed various phytochemical constituents viz. 17-Pentatriacontene, Corynan-17-ol, 18,19-didehydro-10-methoxy-, acetate (ester), 3-(octadecyloxy) propyl ester, 7-Methyl-Z-tetradecen-1-ol acetate, Oleic acid, cis-13-Eicosenoic acid, Citronellol, tert-Hexadecanethio, 1-Monolinoleoylglycerol trimethylsilyl ether, Ethyl iso-allocholate, 1-Heptatriacotanol, E, E, Z-1,3,12-Nonadecatriene-5,14-diol, 2,3-bis[(trimethylsilyl)oxy] propyl ester, (Z, Z, Z), Rhodopin, 3-Pyridinecarboxylic acid, 14,15:21,23-diepoxy-7-hydroxy-4,4,8-trimethyl-, (5'a,7'a,13'a,14'a,15'a,17aa')-[23].



Trifasciatoside A: R = S₁

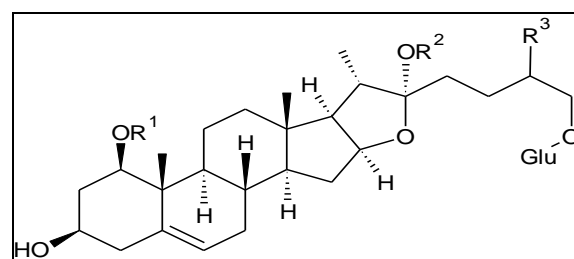


Trifasciatoside B: R = S₁



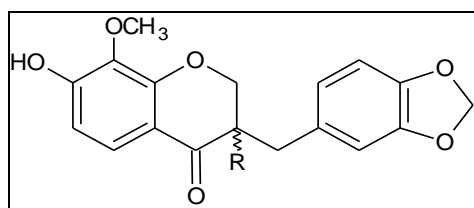
Trifasciatoside C: 25R, R = S₁

Trifasciatoside D: 25S, R = S₁



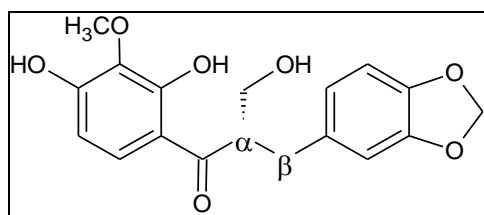
Trifasciatoside E: R = S₁, R₂ = H, R₃ = -CH₃(25S)

Trifasciatoside F: R = S₁, R₂ = CH₃, R₃ = -CH₃(25S)

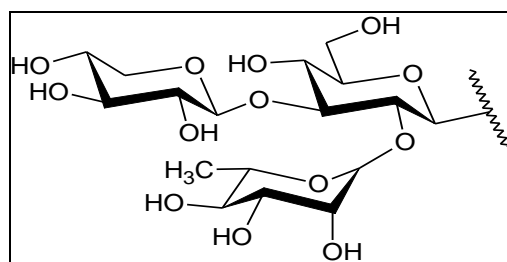


Trifasciatine A - R = α -H

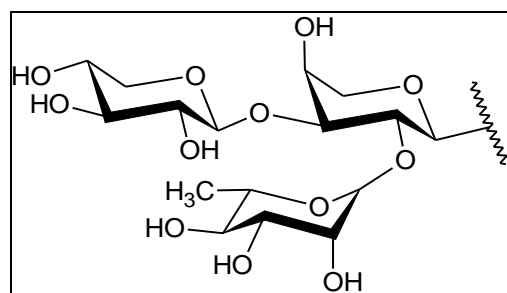
Trifasciatine B - R = β -OH



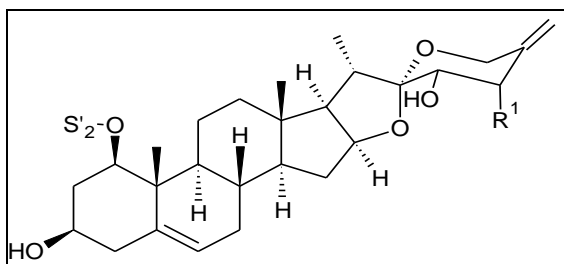
Trifasciatine C



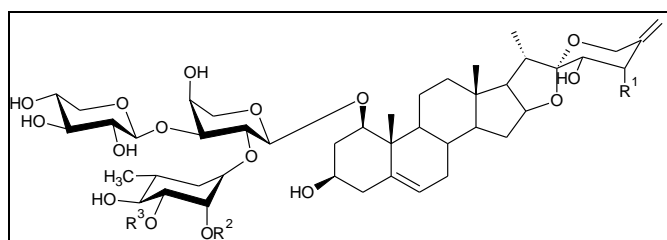
S₁



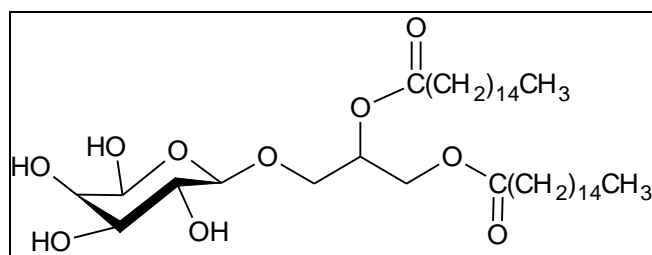
S₂



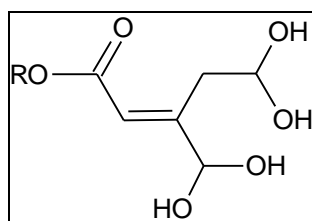
Trifasciatoside G: R₁ = OH, R₂ = Ac, R₃ = H, R₄ = Ac
 Trifasciatoside H: R₁ = OH, R₂ = H, R₃ = Ac, R₄ = Ac
 Trifasciatoside I: R₁ = O-β-Fuc, R₂ = Ac, R₃ = H, R₄ = Ac
 Trifasciatoside J: R₁ = O-β-Fuc, R₂ = H, R₃ = Ac, R₄ = Ac



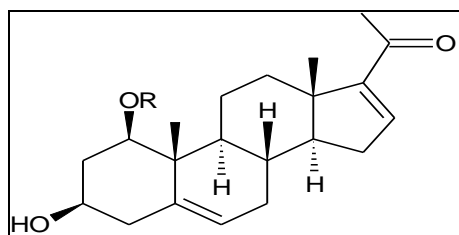
Trifasciatoside K - R₁ = H, R₂ = Ac, R₃ = H
 Trifasciatoside L - R₁ = H, R₂ = H, R₃ = Ac
 Trifasciatoside M - R₁ = OH, R₂ = Ac, R₃ = H
 Trifasciatoside N - R₁ = OH, R₂ = H, R₃ = Ac



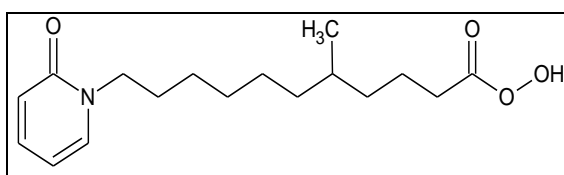
1,2-(dipalmitoyl)-3-O-β-D-galactopyrynosylglycerol



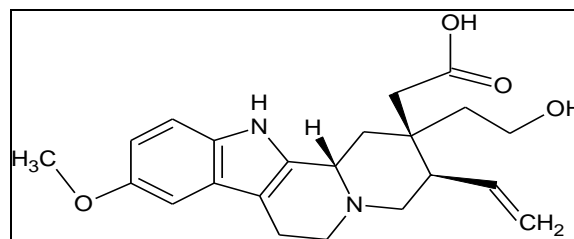
Aconitic acid - R = H
 1-methylaconitic acid - R = CH₃



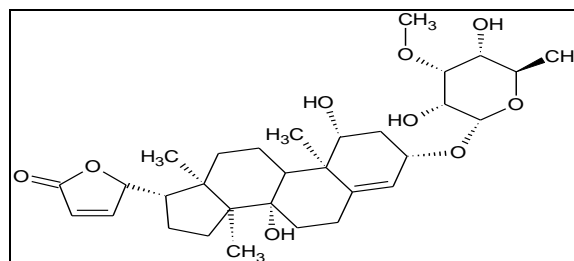
R = S₁: 1β,2β-dihydroxypregna-5,16-dien-20-one-1-O-α-L-rhamnopyranosyl-(1→2)-O-[β-D-xylopyranosyl-(1→3)]-β-D-glucopyranoside
 R = S₂: 1β,2β-dihydroxypregna-5,16-dien-20-one 1-O-α-L-rhamnopyranosyl-(1→2)-O-[β-D-xylopyranosyl-(1→3)]-α-L-arabinopyranoside



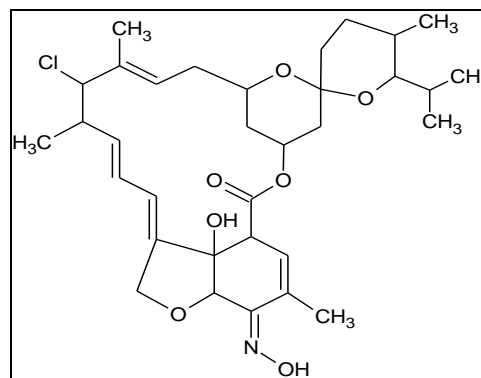
5-methyl-11-(2-oxopyridin-1(2H)-yl)undecaneperoxoic acid



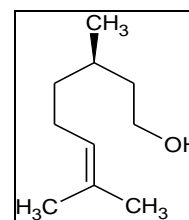
Corynan-17-ol, 18,19-didehydro-10-methoxy-, acetate (ester)



3-[(6-deoxy-3-O-methyl-α-D-allopyranosyl)oxy]-1,14-dihydroxy-, (1α, 3α)-Carda-4,20(22)-dienolide



Milbemycin b, 13-chloro-5-demethoxy-28-deoxy-6,28-epoxy-5-(hydroxyimino)-25-(1-methylethyl)-, (6R,13R,25R)-



Citronellol

TRADITIONAL USES

In traditional medicine the roots and leaves are used for the treatment of cough, asthma, colic, abdominal pains, diarrhoea, haemorrhoids, menorrhagia, piles, hypertension, sexual weakness, foot wounds, leprosy, nutritional deficiencies, glandular enlargement, rheumatism and snake bites. In China, decoction used for cough, bronchitis, detoxification, anti-inflammatory, boils, traumatic injuries and snake bites [24]. In Myanmar, root juice with honey is used for chronic cough and leaf juice treats mucous in throat for children [12].

PHARMACOLOGICAL ACTIVITIES

Sagorika Sing Pinky et al., [25] studied the *in vitro* antioxidant activity by DPPH, cytotoxic, hemolysis, anti-inflammatory and analgesic activity using leaves ethanolic extract of *S. trifasciata* by brine shrimp lethality and acetic acid induced writhing inhibition assay. In DPPH assay, the results showed IC₅₀ value of standard 1.39 μg/ml whereas the leaves extract 2.19 μg/ml. In hemolysis assay, the reference standard exhibited 30.57% inhibition whereas plant extract exhibited 39.27, 37.04 and 33.19% inhibition at 0.5, 1.0 and 2.0 mg/ml concentrations respectively. Furthermore, in cytotoxic and analgesic activity assay, the leaves extract exhibited potential actions in a

concentration-dependent manner. And they concluded that the ethanolic extract of leaves has potential antioxidant, anti-inflammatory, cytotoxic and analgesic activities.

Analgesic activity

Anbu Jeba Sunilson et al., [26] studied the analgesic activity of leaves ethanol and aqueous extracts of *S. trifasciata* using mice writhing test method. Both extracts exhibited a significant and dose-dependent manner of inhibition. The inhibition produced by the higher dose (200 mg/kg) of the extracts was significantly ($p < 0.01$) lower than the acetylsalicylic acid (100 mg/kg). It was observed that the both extracts showed a dose-dependent manner of pain inhibition and the ethanol extract was more active than the aqueous extract.

Antipyretic effects

The antipyretic activity of *S. trifasciata* leaves extracts were studied in rats. The ethanol and water extracts (100-200 mg/kg) were administered orally after yeast suspension induced pyrexia. The water extract did not show any significant effect on fever, but the ethanol extract (200 mg/kg) significantly ($p < 0.01$) reduced the fever condition [26].

Antiulcerative activity

The antiulcerative activity of *S. trifasciata* leaves ethanolic extract was evaluated in indomethacin-induced (i.p, single dose) ulcer model (Wistar rats 40 mg/kg BW). The extract was tested at two different concentrations (200 and 400 mg/kg BW) twice daily for 7 days before indomethacin administration. The leaves extract pretreated animals exhibited some improvement against ulceration. Also, the extract decreased the reduction of total acidity (35.6%), gastric volume (36.1%), and free acidity (55.3%) induced by indomethacin. Furthermore, the extract exhibited 17.92% and 14.96% ulcer protective potential at tested concentrations. This shows *S. trifasciata* leaves ethanolic extract has a promising antiulcerative potential [27].

Antibacterial Activity

The antibacterial activity of *S. trifasciata* leaves methanolic extract was tested by measuring zone of inhibition (ZOI) method in clinical isolates on Muller-Hinton agar plates. The 50 mg/mL-1 of dry extract with 100 μ l of concentration were loaded in to the well. The Petriplates were incubated for 24 hr and ZOI measured. The results showed good inhibition against *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* in ZOI 12 mm, 12 mm, and 15 mm respectively [28].

S. trifasciata root saponins extract and isolated compounds were tested for antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*. The root extract and the isolated compounds showed potent antibacterial activity against tested bacteria and the zone of inhibition were observed 18.67 and 24 mm at 200 ppm concentration [29].

The antimicrobial activities of various solvent extracts of leaves were performed by agar-well diffusion against on nine test organisms. Aqueous extract of leaves did not showed against on *Pseudomonas aeruginosa*, *Proteus mirabilis* and *Bacillus pumalis*. Ethanol extract of leaves showed activities against *Vibrio cholerae*, *Proteus mirabilis* and *Bacillus subtilis*. Ethyl acetate extract of leaves showed against on *Vibrio cholerae*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. The acetone extract of leaves did not showed against on *Pseudomonas aeruginosa*. Among them, ethanol extract of leaves showed the highest activity against on *Vibrio cholera* [12].

The leaves crude ethanolic extracts and fractions of *S. trifasciata* and *S. cylindrica* were evaluated for antibacterial activity against *Pseudomonas aeruginosa* by disk diffusion and minimum inhibitory concentrations (MIC) method. *S. trifasciata* showed a strong

antibacterial activity (ZOI 18.3 mm) compared to *S. cylindrica*. In MIC, various two-fold concentrations of extract viz. 4, 8, 16, 32, 64, 128 and 256 mg/mL were tested and the results showed that the *S. trifasciata* extract at a concentration of 32 mg/mL was able to inhibit bacterial growth [30].

Kasmawati et al., [22] evaluated the antibacterial activity of various components derived from *S. trifasciata* on two bacteria viz. *Streptococcus aureus* and *Escherichia coli*. The isolated compound 5-methyl-11-(2-oxopyridin-1(2H)-yl) undecaneperoxoic acid exhibited remarkable antibacterial activities. The extracts, fractions, sub-fractions and isolated compounds showed significant ($p < 0.05$) reduction in growth of bacteria.

Kaur and Mudgal, [23] screened the antimicrobial properties of tissue cultured plants of *S. trifasciata* two varieties (Laurentii variegated (STV) and Laurentii variegated with yellow striped edges (STY)) compared to their field raised counterparts. The crude leaf extracts from the respective plantlets were tested against *Bacillus subtilis* and *Pseudomonas aeruginosa* bacteria. The leaf extract from *in vitro* raised both varieties showed higher antimicrobial activity against *B. subtilis* compared to field raised plants. The field raised STV leaf extract exhibited negligible antimicrobial activity against *P. aeruginosa*, but *in vitro*-raised both varieties leaf extract showed a remarkable zone of inhibition.

Antioxidant activity

A study conducted on the antioxidant activity of *S. trifasciata* ethanolic and aqueous leaf extracts by phosphomolybdenum and DPPH methods and total phenolic content also measured. The results revealed that the total phenolic content was found to be higher in ethanolic extract (0.474 mg GAE/g) than the aqueous extract (0.285 mg GAE/g) and ethanol extract exhibited excellent antioxidant activity (2.417 mg) than aqueous extract (0.999 mg) at 100 mg/mL. The antioxidant potential of *S. trifasciata* was observed in dose-dependent manner at higher concentrations [31].

In vitro antioxidant activity of *S. trifasciata* was performed with DPPH radical scavenging method using Vit-C as positive control. The assays showed that the IC₅₀ value of the crude extract was five times greater than that of vitamin C [32].

Anthelmintic activity

An *in vitro* anthelmintic activity was studied in *S. trifasciata* leaf extracts against *Fasciola hepatica*. The experiment revealed that different concentration of the extract caused to death of the parasites at different mean time [33].

Cytotoxic activity

The *in vitro* cytotoxic activity of *S. trifasciata* was studied in three different cell lines viz. A-549, HepG-2 and CACO2. The various two-fold concentrations of alcoholic extract i.e. 0, 3.9, 7.8, 15.6, 31.25, 62.5, 125, 250, 500 μ g/ml were tested against these cell lines. The results showed that the low cytotoxic activities were observed against A-549 with IC₅₀ - 77.8 μ g/ml, HepG-2 with IC₅₀ - 81.0 μ g/ml and no significant activity against CACO2 cell lines [20].

Hepatoprotective activity

The hepatoprotective activity of *S. trifasciata* leaf and root extracts was evaluated in Thioacetamide-induced liver fibrosis rat model. The leaf and root extracts (at doses of 200 and 100 mg/kg/day) treated group showed significant decrease in aspartate transaminase, serum alanine transaminase and malondialdehyde level when compared with Thioacetamide-induced group. Moreover, the reduced level of glutathione content, hepatic mRNA levels of NQO-1, Nrf2, HO-1 and Keap-1 were significantly increased. Histological studies further confirmed the protective role of the leaf and root extracts against

Thioacetamide-induced liver fibrosis by activating Nrf2-ARE signalling pathways [34].

Antidiabetic activity

Antidiabetic activity of *S. trifasciata* leaf methanolic extract was studied in Swiss albino male rats. The extract was administered orally at a dose of 50, 100 mg/kg BW once a day for 15 days after diabetic induction by Streptozotocin (STZ) (60 mg/kg BW). Glibenclamide (0.5 mg/kg) standard drug also given once a day for 15 days. The STZ induced diabetic animals exhibited increased ROS production in cardiac tissue which was found to be reduced with the treatment of leaf extract. The observation on histopathological test also revealed that the leaf extract remarkably reduced the changes induced by STZ and brought the organ almost similar to that of normal condition [35].

Anti-alopecia activity

Kasmawati et al., [21] studied the inhibitory activity of *S. trifasciata* leaf extract against androgen receptors at molecular level using docking and dynamics studies with synthetic drug minoxidil. Their LC-MS/MS analysis identified 7 new compounds, among these three alkaloid compounds viz. Methyl pyrophaeophorbide A, (2S)-30,40-Methylenedioxy-5,7-dimethoxyflavane, 1-Acetyl- β -carboline) and one flavonoid - Oliveramine had lower docking scores. The MM-PBSA approach binding energy prediction confirmed that the potency of the four compounds was better than minoxidil.

Wound healing activity

S. trifasciata leaf extract hydrogel formulations and its wound healing activity was evaluated in the incision wound model (mice). The different concentrations of leaf extract hydrogel formulations such as 15%, 20%, and 25% (w/w) were given for 15 days. Octenidine gel was used as a positive control. The results revealed that the leaf extract hydrogel formulations 20% and 25% showed significant ($p < 0.05$) wound closure from day 2 to 16 and no significant wound healing activity in 15% formulation. But when compared to negative control, 15% formulation had a higher closure area and concluded that *S. trifasciata* leaves extract has the potential wound-healing activity [36].

Toxicity and safety

The acute toxicity of ethanolic and water extracts of leaves have been studied by Anbu Jeba Sunilson et al., [26]. The LD₅₀ values of ethanolic and water extracts in mice was estimated as 1513.5 and 1426.0 mg/kg respectively. Laksmindra Fitria et al., [37] evaluated the *S. trifasciata* leaves chloroform extract in female Wistar rats with single-dose administration (2000 mg/kg bw) for oral acute toxicity and its safety. Results revealed that during the experiment neither mortality nor sublethal effects and no significant differences in clinical biochemistry parameters were detected between control and treated group.

In vitro Propagation

In vitro propagation of two varieties of *S. trifasciata* viz. Laurentii variegated (STV), and the yellow striped (STY) were studied. Healthy leaves from each variety were excised; surface sterilized, then trimmed and established over MS medium containing 3 % sucrose, Indole-3-butyric acid (1-10 mg/L), 0.8 % agar and pH 5.88. Cultures were maintained 60-65 % relative humidity and photoperiods 16:8 hr light/dark. *In vitro* raised plantlets were directly transferred in soil composed of a cocopeat, sterile garden soil and magic soil mixture in tray pots. These plantlets were maintained for 3-4 weeks in the incubation room and then transferred to a glass house or open fields. Cultures maintained in higher temperatures (30 and 45), a change to 37°C resulted in best shoot induction over STV [23].

CONCLUSION

The leaves and rhizomes of *Dracaena trifasciata* are traditionally used against various ailments. The modern scientific studies also proved the significant pharmacological activities in antialopecia, hepatoprotective, antidiabetic, antibacterial, wound healing etc. The plant is rich sources of steroidal saponins, isoflavones, flavonols and other phenolic compounds. However, furthermore studies are required to explore the more biological activities of their phytoconstituents with possible mechanisms of action.

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Conflict of interest

The authors declared no conflict of interest.

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REFERENCES

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. Julie B, Sheena ME, Cuenca, Diana Rose P, Cabilin, Marycris L, Manaban. 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):1000187. DOI: 10.4172/2329-9002.1000187.
7. Mabberly DJ. *Mabberley's Plant-book: A Portable Dictionary of Plants, their Classification and Uses*. 4th Edition, Cambridge University Press, 2017.
8. Angiosperm Phylogeny Group. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Botanical Journal of Linnean Society*. 2016;181:1-20.
9. Lu P.-L, Morden CW. Phylogenetic relationships among dracaenoid genera (Asparagaceae: Nolinoideae) inferred from chloroplast DNA loci. *Systematic Botany*. 2014;39:90-104.
10. Takawira-Nyanya R, Mucina L, Cardinal-McTeague WM, Thiele KR. *Sansevieria* (Asparagaceae, nolinoideae) is a herbaceous clade within *Dracaena*: Inference from non-coding plastid and nuclear DNA sequence data. *Phytotaxa*. 2018; 376:254-276.

11. POWO. *Dracaena trifasciata* (Prain) Mabb., Plants of the World Online, published on the Internet; 2024.
12. Myint HH, Swe TT. Study on morphological, physicochemical investigation and antimicrobial activities of *Sansevieria trifasciata* hort. ex Prain. (na-gar-set-gamon) Journal of Myanmar Academy of Arts and Science. 2019;17(4):483-500.
13. Babu K, Srinivasa Prabhu DK. Studies on anatomy, physico-chemical and thin-layer chromatography of rhizome, root and leaf of *Dracaena trifasciata* (Prain) Mabb. Journal of Pharmacognosy and Phytochemistry. 2023;12(1):668-671.
14. González AG, Freire R, García-Estrada MG, Salazar JA, Suárez E. New sources of steroid saponin - XIV: 25S-ruscogenin and sansevierigenin, two new spirostan saponins from *Sansevieria trifasciata*. Tetrahedron. 1972;28(5):1289-1297.
15. Mimaki Y, Inoue T, Kuroda M, Sashida Y. Steroidal saponins from *Sansevieria trifasciata*. Phytochemistry. 1996;43(6):1325-1331.
16. Mimaki Y, Inoue T, Kuroda M, Sashida Y. Pregnane glycosides from *Sansevieria trifasciata*. Phytochemistry. 1997;44(1):107-111.
17. Teponno RB, Tanaka C, Jie B, Taponjdjou LA, Miyamoto T. Trifasciatosides A-J, Steroidal Saponins from *Sansevieria trifasciata*. Chemistry and Pharma Bulletin. 2016;64:1347-1355.
18. Tchegnitegni BT, Teponno RB, Tanaka C, Gabriel AF, Taponjdjou LA, Miyamoto T. Sappanin-type homoisoflavonoids from *Sansevieria trifasciata* Prain. Phytochemistry Letters. 2015;12:262-266.
19. Tchegnitegni BT, Teponno RB, Jenett-Siems K, Melzig MF, Miyamoto T, Taponjdjou LA. A dihydrochalcone derivative and further steroidal saponins from *Sansevieria trifasciata* Prain. Zeitschrift für Naturforschung C – Journal. 2017;72:477-482.
20. El-Hawarya SSE, El-Tantawy ME, Rabeha MA, Alic ZY, Albohdy A, Fawazb NE. *Sansevieria*: An evaluation of potential cytotoxic activity in reference to metabolomic and molecular docking studies. Egyptian Journal of Chemistry. 2021;64(2):835-849.
21. Kasmawati H, Mustarichie R, Eli H, Ruslin R, Arfan A, Nurramadhani A, Sida NA. Unrevealing the potential of *Sansevieria trifasciata* Prain fraction for the treatment of androgenetic alopecia by inhibiting androgen receptors based on LC-MS/MS analysis, and in-silico studies. Molecules. 2022;27:4358. <https://doi.org/10.3390/molecules27144358>.
22. Kasmawati H, Ruslin R, Arfan A, Sida NA, Saputra DI, Halimah E, Mustarichie R. Antibacterial potency of an active compound from *Sansevieria trifasciata* Prain: An integrated in vitro and in silico study. Molecules. 2023;28:6096. <https://doi.org/10.3390/molecules28166096>.
23. Kaur J, Sanjoy KD, Arjun C, Sweta Y, Gaurav M, Asyakina L, Victor A, Gholamreza A. GC-MS validated phytochemical up-leveling with in vitro-raised *Sansevieria trifasciata* Prain: The Mother in Law's tongue gets more antibacterial. Current Plant Biology. 2023;35–36, 100308.
24. Julie B, Sheena ME, Cuenca, Diana Rose P, Cabilin, Marycris Manaban. Preliminary phytochemical screening and toxicity test of leaf and root parts of the snake plant (*Sansevieria trifasciata*), Journal of Phylogenetics and Evolutionary Biology. 2017;5:3. DOI: 10.4172/2329-9002.1000187.
25. Pinky SS, Monira S, Hossain MA, Hossain A. Antioxidant, anti-inflammatory, cytotoxic and analgesic activities of *Sansevieria trifasciata*. Bangladesh Pharmaceutical Journal. 2020;23(2):195-200.
26. Anbu JS, Jayaraj P, Varatharajan R, Thomas J, Jisha J, Muthappan M. Analgesic and antipyretic effects of *Sansevieria trifasciata* leaves. African Journal of Traditional, Complementary and Alternative Medicines. 2009;6:529.
27. Ighodaro OM, Adeosun AM, Ojiko BF, Akorede AT, Fuyi-Williams O. Toxicity status and antiulcerative potential of *Sansevieria trifasciata* leaf extract in Wistar rats. Journal of Intercultural Ethnopharmacology. 2017;6:234-239.
28. Daniel K, Ritika C, Pamela S, Jayanthi A. Screening and characterization of antimicrobial agents from *Sansevieria roxburghiana* and *Sansevieria trifasciata*. Asian Journal of Plant Sciences. 2013;12(5):224-227.
29. Dewatisari WF, Subandi, Desmawati. Antibacterial activity of saponins from *Sansevieria trifasciata* prain cv. golden hahnii roots on *Escherichia coli* and *Staphylococcus aureus* African Journal of Biochemistry Research. 2017;11(5):22-27.
30. Dewatisari WF, Nugroho LH, Retnaningrum E, Purwestri YA. The potency of *Sansevieria trifasciata* and *S. cylindrica* leaves extracts as an antibacterial against *Pseudomonas aeruginosa*. Biodiversitas. 2021;22(1):408-415.
31. 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.
32. Vivi A, Dwita LP, Istikomah. Antioxidant and alpha-amylase inhibitory study of *Sansevieria trifasciata* Prain. leaves extract. Pharmacia. 2019;9(1):41-46.
33. 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.
34. Raslana MA, Abdel-Rahmanb RF, Fayedb HM, Ogalyc HA, Taher MF. 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.
35. 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.
36. 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>.
37. Laksmindra F, Isma CPG, Wilda BTS, Maura IM. Single-dose 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

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