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ASSESSMENT OF PHARMACOGNOSTIC, PHYTOCHEMICAL, PHYSICOCHEMICAL STANDARDS AND ANTIMICROBIAL ACTIVITY OF ROOTS OF *DRACAENA SANDERIANA*

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ABSTRACT: *Dracaena sanderiana*, commonly known as lucky bamboo, is an ornamental plant belonging to the family Asparagaceae, with potential medicinal properties that have been acknowledged in traditional medicine. The fresh as well as dried powdered specimens of roots were subjected to basic pharmacognostic examinations like morphological, and histological evaluations, qualitative phytochemical investigations, physicochemical evaluations including moisture content determination, ash values and extractive values to unveil the pharmacognostic characteristics this ornamental plant with ethnomedical properties. Macroscopy and Microscopy of the roots plant of *Dracaena sanderiana* was studied and various features were identified. In the present study, the phytochemical screening of ethanolic root extract of *Dracaena sanderiana* showed the presence of carbohydrates, proteins, amino acids, saponin, steroids and triterpenoids, glycosides, flavonoids and showed the absence of tannins and alkaloids. Concluding with the evaluation of antibacterial activity of ethanolic root extract of *Dracaena sanderiana*, it is evident that further research is needed to fully understand its potential in combating bacterial infections. The findings suggest a negative activity, yet additional studies are needed to elucidate a more confined result by increasing the concentrations and optimize its application in healthcare and pharmaceutical sectors.

INTRODUCTION: Medicinal plants have played a key role in the development of human culture, serving as a resource for traditional medicine. Herbal products have been crucial in treating, preventing, and controlling the spread of diseases globally. Many modern medicines are derived from natural sources such as plant extracts [1]. In recent years, there has been a growing interest in herbal medicine, with entire plants being used in systems like Ayurveda, Unani, Siddha, and homeopathy for treating diseases, boosting immunity, and providing essential vitamins and antioxidants [2].

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Ornamental plants, though primarily valued for their beauty, also serve an important role in traditional and modern medicine. Many ornamental species contain bioactive compounds with therapeutic properties, making them valuable in the treatment and prevention of diseases [3].

Dracaena is a genus of about 200 tree and succulent shrub species, native to Africa, Southern Asia, and Northern Australia. Dracaena species are relevant for both aesthetic and functional purposes in indoor and outdoor environments for various reasons which includes indoor decoration, air purification, symbolism, low maintenance etc. This genus includes notable species like *Dracaena marginata* (Madagascar Dragon Tree), *Dracaena fragrans* (Corn plant), *Dracaena draco* (Dragon's blood tree), *Dracaena reflexa* (Song of India), *Dracaena terniflora* (Manjakantha) and *Dracaena sanderiana* (Lucky Bamboo). Known for resilience and

aesthetic appeal, Dracaena plants are popular in home and office decor. *Dracaena draco*, the first species noted for medicinal uses, is valued for its resin, "dragon's blood," which has wound healing, anti-inflammatory, anti-microbial, gastrointestinal, and antioxidant properties [4].

Plant Profiling [5]: *Dracaena sanderiana*, commonly known as Lucky Bamboo, is a popular ornamental plant often grown indoors for its attractive appearance and low maintenance requirements.

Classification:

Scientific Name: *Dracaena sanderiana*

Family: *Asparagaceae*

Genus: *Dracaena*

Species: *D. sanderiana*

Common names include Lucky bamboo, Sander's dracaena, Ribbon dracaena, Curly bamboo, Chinese water bamboo, Goddess of Mercy's plant, Belgian evergreen plant etc.

Synonyms are *Dracaena sanderiana* Mast., *Pleomele sanderiana* (Mast) N.E.Br., *Dracaena poggei* Engl., *Dracaena vanderystii* De Wild, *Pleomelepoggei* (Engl.) N.E. Br.

Dracaena Sanderiana, commonly known as lucky bamboo, is a plant with potential medicinal properties that have been acknowledged in traditional medicine. Ethnomedical uses of *Dracaena sanderiana* [6] include:

Diarrhoea and Ulcer: In Cihanjuang Village, Indonesia, the plant's boiled leaves are used to treat ulcers and diarrhoea.

Skin Care: Extracts from leaves and stems are used as emollients and skin conditioners in cosmetics.

Air Purification: Known to remove benzene when grown as a houseplant.

Nutritional Value: Contains amino acids, fibre, magnesium, phosphorus, iron, and silica, supporting digestion, blood purification, and cholesterol management.

Antioxidant and Hydration: Protects skin from environmental stressors, improves moisture retention, and strengthens the skin barrier.

Anti-inflammatory: Contains flavonoids, phenolic acids, and terpenoids that reduce inflammation.

Edible Shoots: Consumed in Chinese cuisine.

Despite its traditional medicinal uses, *Dracaena sanderiana* remains underexplored in pharmacognostical and pharmacological research. This study aims to bridge this gap by investigating the plant's pharmacognostic characteristics, preliminary phytochemical composition, Physiochemical parameters and antimicrobial activity, thereby paving the way for its potential use in modern medicine.

MATERIALS AND METHODS:

Collection and Authentication of Plant Materials: *Dracaena sanderiana* plants were collected in February 2024 from Kalamassery, Ernakulam district, Kerala. Following standard protocols, the collected specimens were identified and authenticated by Dr. Sreeja Krishnan, Head of the Department of Botany at Sree Narayana College, Cherthala, Alappuzha, Kerala (Voucher specimen number HS122). The herbarium specimen was prepared and deposited in the herbarium section of Sree Narayana College, Cherthala, Alappuzha for future reference.

Preparation of the Sample: Fresh plant materials were thoroughly washed under running water to eliminate surface contaminants and potential toxins. The cleaned samples were then shade-dried to a constant weight to preserve phytoconstituents. Following drying, the plant was anatomically separated into roots and aerial parts.

For initial investigation, the roots were selected to assess their pharmacognostic characteristics, phytochemical and physiochemical profile. Roots separated from the aerial parts were coarsely ground to powder, passed through sieve 100 mesh sizes and stored in airtight containers for further study. Fresh sample of the roots were prepared for sectioning, while dried powdered roots were reserved for phytochemical and physiochemical analysis.

Pharmacognostical Studies of the Roots of *Dracaena sanderiana*:

Macroscopy: The organoleptic characters of the roots of *Dracaena sanderiana* like colour, odour and taste in addition to the macroscopic characters viz, size, shape, texture, surface, fracture was evaluated as per standard WHO guidelines. For the powder form, only colour, odour, and taste were evaluated, following the methods outlined by WHO (2011) and Evans *et al*., (2009) [7, 8].

FIG. 1: ROOTS OF DRACAENA SANDERIANA

Microscopy: Free hand transverse sections of fresh root of the plant *Dracaena sanderiana* were taken. For the T.S of root, thin sections were made directly without any pre-treatment stained using Phloroglucinol – HCl reagent, mounted on a glass slide and observed under a microscope.

Powder Analysis: A small portion of powdered roots of the plant *Dracaena sanderiana* was transferred into the drop of glycerol with the help of a moistened needle then stirred well to mix uniformly, a cover-glass was placed above, and the overflowing fluid was taken out by a piece of filter paper and observed under the microscope (WHO, 2011).

The samples were stained with N/50 iodine to examine starches, 0.1% w/v Phloroglucinol solution with a droplet of Con HCl to observe the lignified cells, and 5% $FeCl_3$ in alcohol was used for the observation of tannins (Evans, 2009) [7, 8].

Preliminary Phytochemical Screening: The dried and powdered root (25 g) was extracted with ethanol by reflux for 2 hours. Following extraction, the liquid extract was concentrated to yield dry residues. The extract was subjected to preliminary phytochemical screening using standard procedures outlined by Evans (2009) to determine the nature of phytoconstituents content. The phytochemical analysis helps to identify the secondary metabolites present in various parts of the plant [8, 9].

Physico-chemical Analysis: The physicochemical parameters like moisture content (loss on drying), ash values (total ash, water-soluble ash and acid insoluble ash), extractive values (Alcohol soluble extractive value, Water soluble extractive value and Ether soluble extractive value) were being carried out as per standard procedure [10, 11].

Preparation of Extract: The dried, coarsely powdered roots were extracted with ethanol (78.37°C) using the Soxhlet extraction method. Packed into a thimble within the Soxhlet apparatus, the sample was exposed to heated ethanol vapours that condensed and percolated through the material, dissolving its constituents.

After each cycle, the solvent returned to the distillation flask via a siphon. This exhaustive extraction continued for at least 10 cycles, until the thimble's extract turned colourless. The final extract was then collected filtered and evaporated to dryness.

Percentage of extract = Weight of extract in grams / Weight of sample in grams × 100

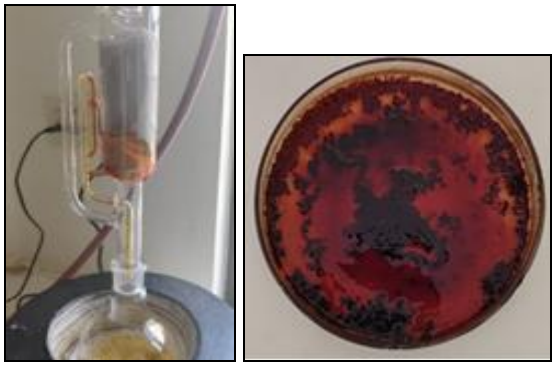

FIG. 2: EXTRACT OF *DRACAENA SANDERIANA* ROOT

Evaluation of Anti-bacterial Activity: A fixed amount of test micro-organisms (*S. aureus*-MTCC No.740 and *P. aeruginosa*-MTCC No.424) were inoculated in petri dishes containing sterile (Sterilized by autoclaving at 121°C for 20 min.) nutrient agar media. The accurately weighed crude extract was dissolved in DMSO to prepare a stock solution with concentration of 1mg/ml. From these different concentrations viz, (100µg/mL, 250µg/mL and 500µg/mL) were prepared by dilution and added into the 6mm diameter wells made in inoculated Petri dishes. Amoxicillin (25µg/mL) was used as the standard. The cultures were kept for 4 hours at 2–8°C for the antimicrobial metabolite diffusion and thereafter they were incubated for 24 hours at 37 °C for the growth of test micro-organisms. The zone of inhibition was measured in mm using a zone scale [12, 13].

RESULTS:

Pharmacognostical Evaluation of Roots of *Dracaena sanderiana:*

Organoleptic Evaluation: Morphological and organoleptic observations, utilizing sensory organs, play a crucial role in identifying specific plant species. For immediate documentation, fundamental characteristics of its roots such as size, shape, colour odour, taste were assessed. The organoleptic characteristics of root were shown in the **Table 1.**

TABLE 1: ORGANOLEPTIC CHARACTERS OF ROOTS OF *DRACAENA SANDERIANA*

Sl. no.	Parameters	Results
1	Colour	White to light yellow or orange
2	Shape	Thin and fibrous, extensive branching long and thread-like
3	Size	vary in length,
4	Odour	mild earthy smell
5	Taste	Bland, earthy /slightly bitter flavour

Microscopic Evaluation of Transverse Section of Roots:

Transverse Section of Root: Transverse section of root shows an outer layer of epidermis, normal but slightly eroded. Epidermis is made up of parenchymatous cells without intercellular space. Root hairs and cutin are present. Epidermis is followed by cortex which is well developed and with many layers. Cells are of oval shaped. Endodermis present as last layer of cortex which is made up of barrel shaped parenchyma cells. Next is a layer of vascular bundles which are collateral conjoint and closed. Vascular bundles are made up of xylem and phloem. Xylem is with several layers; vessels are thick and lignified. Tracheids are also present. Phloem cells are colourless. Pith is well developed, occupied the central portion. Pith is made up of parenchyma cells with intercellular space **Fig. 3**.

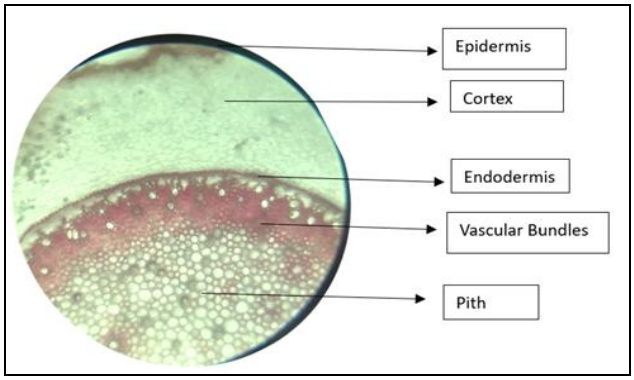

FIG. 3: TRANSVERSE SECTION OF ROOTS OF *DRACAENA SANDERIANA*

Powder Microscopy of Root Powder: Powder characteristics of the root powder were analysed and detected the presence of fragments of cortex, pith, xylem vessels, and root hairs.

Physical Evaluation of Roots of *Dracaena sanderiana:* The physicochemical parameters like percentage moisture content (loss on drying), ash values (total ash, water-soluble ash and acid insoluble ash) and extractive values (Water soluble extractive value, Alcohol soluble extractive value and Ether soluble extractive values) were determined by following the standard procedures (Anonymous, 2008) and is tabulated in **Table 2.**

TABLE 2: PHYSICOCHEMICAL PARAMETERS OF ROOTS OF *DRACAENA SANDERIANA*

Sl. no.	Parameters	Percentage (%)
1	Total ash value	5.39±0.07
2	Acid insoluble ash value	2.45±0.02
3	Water soluble ash value	1.58±0.04
4	Water soluble extractive value	41.47±0.93
5	Alcohol soluble extractive value	29.16±0.45
6	Ether soluble extractive value	3.23±0.36
7	Percentage Moisture content	9.61±0.08

Preliminary Phytochemical Screening: The preliminary phytochemical screening of ethanolic extracts of the roots of *Dracaena sanderiana* was carried out and the results obtained are shown in **Table 3.** The shade dried powder of roots was extracted with ethanol by the Soxhlet method. The extracts were found to contain different phytoconstituents like Carbohydrates, Flavonoids, Saponins, Proteins, Triterpenoids, Steroids, Glycosides, etc and showed the absence of Alkaloids and Tannins.

TABLE 3: PHYTOCHEMICAL SCREENING OF ETHANOLIC ROOT EXTRACT OF *DRACAENA SANDERIANA*

Sl. no.	Constituent	Name of the test	Result
1	Carbohydrate	Molisch's test	+
		Fehling's test	+
		Iodine test	+
		Benedict's test	+
2	Alkaloids	Dragendorff's test	-
		Mayer's test	-
		Wagner's test	-
3	Saponins	Foam test	–
		Liebermann- Burchard test	+
4	proteins	Biuret test	+
		Millon's test	+
5	Amino acids	Ninhydrin test	+
6	Steroids and triterpenoids	Salkowski's test	+
		Liebermann-Burchard test	+
7	Glycosides	Borntrager's test	-
		Keller-Kiliani test	+
		Baljet test	-
8	Flavonoids	Shinoda test	-
		Lead acetate test	+
		Sodium hydroxide test	+
9	Tannins	Ferric chloride solution test	-
		Gelatin test	-
		Lead acetate test	-

Percentage Yield: The Ethanolic root extract of *Dracaena sanderiana* was found to have a practical yield of 8.01%w/w.

Anti-Bacterial Evaluation of Roots of *Dracaena Sanderiana:*

TABLE 4: ANTI-BACTERIAL EVALUATION OF ROOTS OF *DRACAENA SANDERIANA*

Microorganism	Zone of inhibition in mm.			
	Amoxicillin (25µg/mL)	Test (100µg/mL)	Test (250µg/mL)	Test (500µg/mL)
S.aureus-MTCC No.740	25	-	-	-
Aeruginosa-MTCC No.424	23	-	-	-

FIG. 4: SCREENING OF ANTI-BACTERIAL ACTIVITY

Anti-bacterial activity of the ethanolic root extract of *Dracaena sanderiana* was assessed in terms of zone of inhibition of bacterial growth. The results were tabulated in **Table 4.** It was studied in three different concentrations- 100 µg/mL, 250 µg/mL, 500 µg/mL and neither of it possessed antibacterial activity. It was compared with amoxicillin (25µg/mL) as standard.

CONCLUSION: The current study on the roots of *Dracaena sanderiana* provides foundational data on pharmacognostic standardization, physicochemical properties, phytochemical profile, and elemental composition, marking a first-time investigation of these aspects. The macroscopic and microscopic analysis has uncovered distinctive features critical for the identification and authentication of this plant. Comprehensive physicochemical parameters and a detailed phytochemical screening have established a profile of key phytoconstituents and toxic elements. This data contributes significantly to the development of a monograph and serves as a reference for researchers, manufacturers, and consumers in ensuring quality control. Additionally, it paves the way for investigating related species that have yet to be thoroughly studied. However, further research is warranted to isolate individual phytochemicals and to conduct *in-vitro* screenings on various cell lines, which will deepen our understanding of the pharmacological properties of this rare endemic species.

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CONFLICT OF INTEREST: Nil

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