

REVIEW ARTICLE

Exploring *Dracaena angolensis* Welw. Ex Carriere: A Comprehensive Review of its Phytochemical Properties, Medicinal Applications and Environmental Benefits

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ABSTRACT

A versatile succulent native to West Africa, *Dracaena angolensis*, also called *Sansevieria cylindrica*, is well known for its therapeutic and environmental value. This review addresses its environmental uses, pharmacological potential, and phytochemical traits. Antioxidant, antibacterial, and anticancer properties are among the many pharmacological actions displayed by the plant, which is abundant in bioactive substances such as flavonoids, saponins, and alkaloids. Its traditional uses include, treating skin conditions, lung conditions, and inflammation, and recent studies have confirmed its effectiveness. Furthermore, its special capacity to absorb toxins like carbon monoxide and nicotine highlights its function as an environmentally beneficial air filter. Even though it is commonly utilized as an ornamentation, but further research is required to fully realize its therapeutic and ecological advantages. In order to create unique applications for drugs, further studies need to focus on identifying and separating certain bioactive ingredients and studying their mechanism of action. This review underscores *Dracaena angolensis* as a promising candidate for bridging traditional medicine with modern scientific advancements, offering insights for sustainable healthcare and environmental conservation.

Keywords: *Sansevieria cylindrica*, Traditional Uses, Bioactive ingredients, Pharmacological Potential

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INTRODUCTION

A large number of species in the genus *Dracaena* are native to Asia and Africa. The genus is characterized morphologically by thick, highly water-containing leaves with a range of leaf morphologies, from stiff sword-like blades to cylindrical ones. The patterns and hues also differ, ranging from white to yellow to green [1-2]. *Dracaena angolensis* Welw. ex-Carriere, also referred to as *Sansevieria cylindrica*, is the most widely used and easily grown species of *Dracaena*. A succulent indoor ornamental plant is the African spear, also known as the cylindrical snake plants. This plant has been used traditionally for coughing, influenza, and respiratory tract irritation as well as to its cosmetic appeal [3].

According to ethnobotanical study, various populations have used it, including the Buton tribe in the province of Southeast Sulawesi, Central Sulawesi, South Sulawesi, Liwa in Lampung, Lubuk Linggau in South Sumatra, Purwakarta in West Java, and Kaliurang Village in Yogyakarta. [4-6]

The leaves and roots of the species are used in indigenous medicine in Lampung and Lubuk Linggau to treat a number of ailments, including as malaria, anuria, asthma, Eczema, oedema, and cough. According to Purwakarta's, villagers use every part of this species of plant to cure conditions including jaundice, heart rate fluctuations, piles, colic, poor sexual ability, elevated blood pressure, infectious hepatitis, and snake and bug stings. In Buton and Sulawesi's southern region, the leaves were utilized as remedies for coughing illness, and gastroenteritis. In the Central Sulawesi location of Bulan Jaya, the roots are used to

recover from snake bites. On the slopes of Mount Merapi in Yogyakarta, villagers use *D. angolensis* to cure wounds, absorb pollutants, and purify the air. [6-9]

Dracaena angolensis, on the other hand, may absorb pollutants and lessen offensive Odors. Pregnane glycosides are steroidal compounds that may convert such toxins into naturally occurring acids, carbohydrates, and certain peptides. Each leaf blade contains these active substances. Saponin, ruscogenin, abamagenin, neoruscogenin, sansevierigenin, 1beta, and 3beta-dihydroxypregna-5,16-dien-20-one glycoside that are among the active ingredients that the National Aeronautical & Space Agency had studied. Up to 107 contaminants, including as dioxins, naphthalene, carbon monoxide, and nicotine from tobacco, can be absorbed by this plant.[10][11]. The information above indicates that *D. angolensis* has a number of advantages and contains active ingredients that are beneficial to both medicine and our surroundings.[12] Many activities have been carried out in this day and age by utilizing its many advantages, including anti-inflammation anti-oxidative, antimicrobial, anti-malarial, eczema, and oedema.

HABITAT AND CULTIVATION

The snake plant, or mother-in-law's tongue, *Dracaena angolensis*, is native to West Africa. Madagascar, India, and other tropical places have naturalised the plant, which is widespread in tropical nations ranging from eastern Nigeria to the Congo. Indoor plants usually reach a height of around two feet, but in their native habitat, the plant can reach up to four feet. There are sixty species of xerophytic perennial plants of the genus *Dracaena*, which are found in tropical Africa, Asia, and Arabia. Classifying plants in the genus *Dracaena* is challenging due to the large number of hybrid and horticultural variants.[13]

The most traded species in the nursery sector within the genus *Dracaena* is *D. Angolensis*. As decorative and fibre plants, at least 20 cultivars of this species are reportedly available for purchase in nurseries around the globe, including distributions to America, Asia, Australia, and the Pacific Islands. Additionally, the plant has spread across a range of regions in the Pacific (Cook Islands, Fiji, Palau, Western Samoa, and Hawaii), Australia, America (the United States, Puerto Rico, and the Virgin Islands), and Asian countries (India, Indonesia, Malaysia, Thailand, and Vietnam).[14]

Morphology of *Dracaena angolensis*:

The fleshy *Dracaena angolensis* species has a special look. It has irregular or tangled roots that emerge from the bottom of the stems. Rhizome of this plant emerge in the soil as well as on the ground's surface. The rhizome's Inside is white, but its outside is a bright orange.

Stem: The stem is located within the spreading rhizome and is quite thick in the soil.

Leaves: The stiff, inflexible, cylindrical leaves have tiny, greenish-grey dots. From the base of the rosette, the green leaves extend out in an asymmetrical shape, forming a compact, stiff, cylinder-shaped cluster that is 1.2–3 cm wide and 0.9–2.1 m high. The plant grows slowly and contains deep rhizomes that can sustain many leaves.

Flowers: The succulents have many blossoms that are clustered close to its peak. They develop along the flowering stem in clusters of one to three. The flower stalk, which is around 30–75 cm long, is erect, relatively fragile, and smaller than the leaves. The smooth, tube-shaped flowers vary in length from 2.5–4 cm and range in colour from pink to greenish-white. Growing to a size of 90 cm in abundant natural light, the plant has white flowers with pink budding that emerge once a year, and sometimes more frequently when the plant is younger.

Fruit: It includes either 2 or 3 groups of blooms. Each flower has six floral sepals that are partially fused into a tube 6–12 mm long, splitting into six lobes 15–20 mm tall at the end. The lobes curl downward and become thin while totally open.

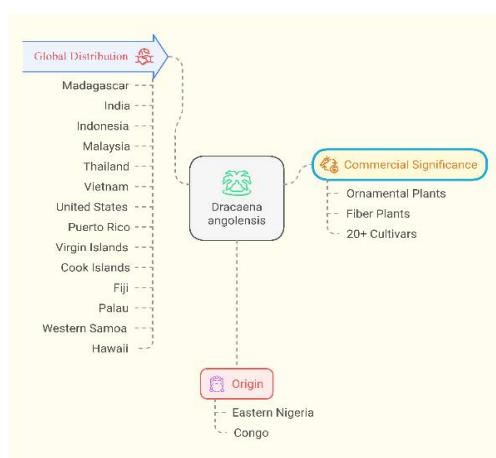
Seeds: Every bloom has 6 petals that are 7–8 mm lengthy and a pistil that is 15–18 mm tall with a tiny stigma at its tip, and a stamen branch 6–8 mm in length. [14-15].



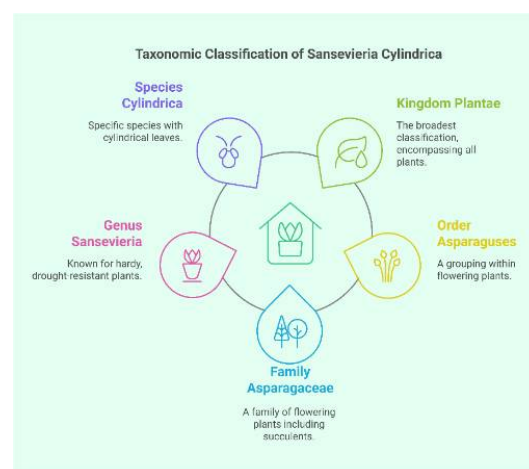
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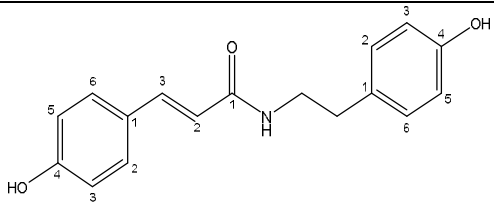
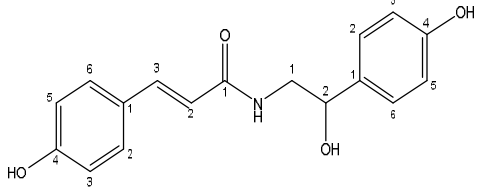
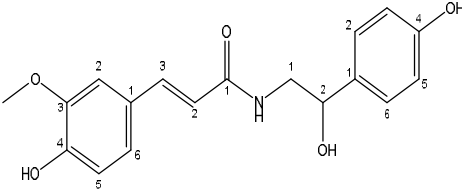
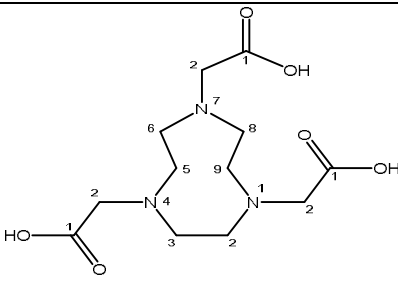
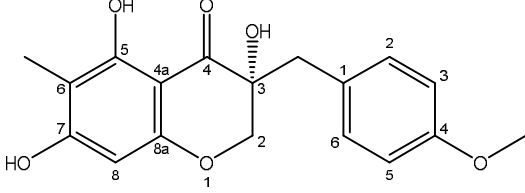


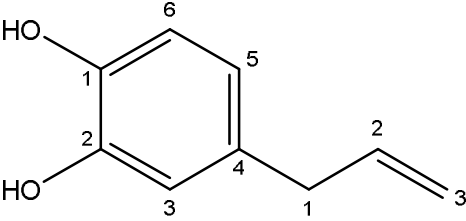
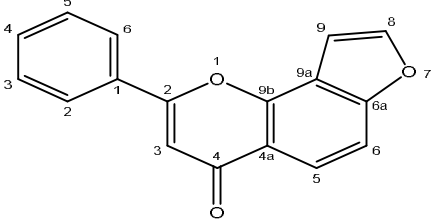
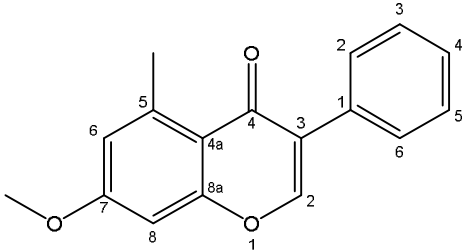
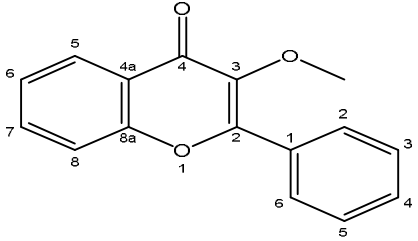
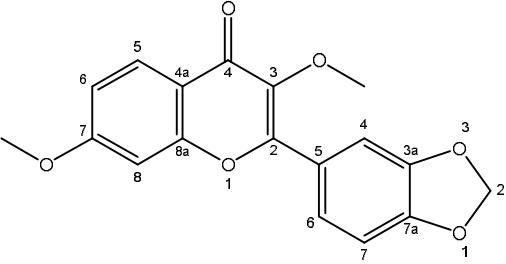
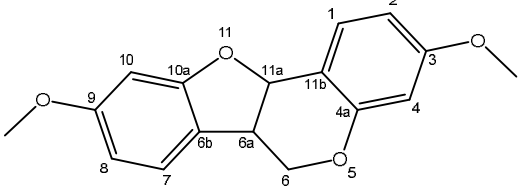
E.Fig.1. A. Roots and Rhizomes of *D.A*, B. Leaves of *D.A*, C. Cultivation Habitat of *D.A*, D. Taxonomic Classification of *D.A*, E. Morphology Characterization of *D.A*.

Phytochemical Components:

A variety of phytoconstituents found in *D. Angolensis* and *S. cylindrica* are commonly utilised to treat a wide range of medicinal conditions. Typically, this plant contains compounds such as volatile oil, steroids, alkaloids, glucose, flavonoids, saponins, tannins, and phenol. All of these phytoconstituents have been studied and reported in the past, but none of them have ever been studied for the treatment of any disease. The following table presents the findings from experiments conducted to verify the existence of phytoconstituents using three different kinds of extracting solvents: alcoholic, water, and hydroalcoholic combination.[16]

Table 1: Phytoconstituents of *Dracaena angolensis*

Name of Constituents	Structure of Compounds	References
(trans-N-p-Coumaroyl tyramine)	 (E)-3-(4-hydroxyphenyl)-N-[2-(4-hydroxyphenyl)ethyl]prop-2-enamide	[17]
(trans-N-p-Coumaroyl octopamine)	 (E)-N-[2-hydroxy-2-(4-hydroxyphenyl)ethyl]-3-(4-hydroxyphenyl)prop-2-enamide	[30]
(trans-N-feruloyl octopamine)	 (E)-N-[2-hydroxy-2-(4-hydroxyphenyl)ethyl]-3-(4-hydroxy-3-methoxyphenyl)prop-2-enamide	[31]
trifasciatine A	 2-[4,7-bis(carboxymethyl)-1,4,7-triazonan-1-yl]acetic acid	[16], [21]
cambodianol	 [(3R)-3,5,7-trihydroxy-6-methyl-3-(4'-methoxybenzyl)-4-chromanone]	[34]

Hydroxychavicol (ACP)	 4-(Prop-2-en-1-yl)benzene-1,2-diol	[21]
Lanceolatin B	 2-Phenyl-4H-furo[2,3-h]chromen-4-one	[37]
Pongaglabol methyl ether	 7-Methoxy-5-methyl-3-phenyl-4H-1-benzopyran-4-one	[38]
3-Methoxyflavone	 3-methoxy-2-phenylchromen-4-one	[31]
De(s) methoxy kanugin	 2-(1,3-benzodioxol-5-yl)-3,7-dimethoxychromen-4-one	[31]
(6aR, 11aR)-homopterocarpin	 3,9-dimethoxy-6a,11a-dihydro-6H-benzofuro[3,2-c][1]benzopyran	[34]

Phytochemistry of *D. Angolensis*: The Asparagaceae subfamily *Dracaena angolensis* indicates medicinal potential through its unique phytochemical constituents. Flavonoids, glycosides, tannins, phenolic compounds, and alkaloids can be found in the leaves of the plant. The bioactive constituents had been verified by advanced tools such as FTIR, GC-MS, and NMR; the phenolic and flavonoid contents, which focus on the properties of antioxidants, was determined at 84.2 µg GAE/mg and 56.9 µg QE/mg, correspondingly. Phthalic acid esters are one of among the substances that highlight its pharmacological complexity. The therapeutic possibilities for antibacterial, anticancer, and hypoglycaemic treatments are suggested by those results, which are consistent with its traditional therapeutic usage and require standardization and more investigation. [14-16]

Particularly bioactive steroidal saponins are identified in *Sansevieria cylindrica*. Furostanol tetra-desmoside saponin, an essential component that was extracted from the leaves of the plant, has a significant level of glycosylation. Due to its molecular trait, it has greater bioactive and less hydrophobic, which reduces haemolytic effects, a disadvantage that many of the steroidal saponins possess. Studies show that it has anti-inflammatory properties via blocking vascular permeability, as shown in experimental studies. The non-haemolytic properties of steroidal saponin and its power to control inflammation indicate possible medicinal uses. This component also plays a part in the plant's traditional ethnomedical usage, particularly in the treatment of inflammation and associated ailments. [21-22]

COMPARATIVE ANALYSIS WITH RELATED SPECIES

Anti-Bacterial comparison: *S. trifasciata* reveals significantly more antibacterial properties than *S. cylindrica*. For example, the ethanolic extract of *S. trifasciata* leaves inhibited *Pseudomonas aeruginosa* to 18.33 mm, but *D. Angolensis* show only a 10.33 mm of the zone. This demonstrates that *S. trifasciata* could possess larger quantities or a greater variety of bioactive chemicals, such as terpenoids and phenols, which contributes to its enhanced antibacterial efficacy. Both species, however, have the potential in applications where antibacterial characteristics are required.[18]

In comparison, *Sansevieria zeylanica* has strong antibacterial properties because its methanolic extracts target comparable strains of bacteria, with variations in inhibitory effects associated with different amounts of phytochemicals. Similar to this, *Sansevieria roxburghiana* has antibacterial activity, especially against gram-positive bacteria, demonstrating the potency of its abundant triterpenoids and tannins. Different phytochemical profiles and extraction techniques are associated with differences in antibacterial activity among species. According to these results, *S. cylindrica* has potential that is on par with or better than that of its relatives, highlighting its use in the development of antimicrobial therapies. [19-20]

Fibre and Mechanical Properties: *Sansevieria cylindrica* fibers are renowned for their exceptional mechanical qualities and renewability due to their high cellulose content (up to 97.6%) and low lignin content (0.6%). By removing non-cellulosic components by mechanical decortication and ethanol treatment, the technique improves the tensile strength and smoothness of the fibre. These fibers are useful in many different sectors because they are lightweight, versatile, and appropriate for purposes such as wound healing sutures and polymeric composites.[24] Compared to *S. cylindrica*, *Sansevieria trifasciata* fibres possess a extremely distinct physiological characteristics, with lower tensile strength as well as elasticity. They comprise a mixture of 56% cellulose, 34% hemicellulose, and 6% lignin. These sustainable fibres undergo extraction using water and chemical retting, and their silky texture and elasticity make them ideal for fabrics, ropes, and composites of polymers. They also possess greater commercial significance due to their unique structure and durable interaction with polymer. [25-28]

S. cylindrica fibers are perfect for advanced uses like wound healing sutures because of their smoother surfaces and enhanced durability due to their reduced lignin content and higher cellulose content. *S. trifasciata* fibers, on the other hand, are more elastic and more suitable for more soft uses like fabrics due to their elevated hemicellulose concentration. Both species serve distinct industrial demands while demonstrating the adaptability as well as durability of natural fibers. [26]

Phytochemical Comparison: Secondary metabolites, includes alkaloids, flavonoids, and saponins that are widespread in both species, although *S. trifasciata* often has a greater range of these bioactive compounds. Its enhanced pharmacological advantages, including as antioxidant and antibacterial effects, are correlated with this variety. *S. trifasciata* frequently leads in functional diversity, and comparative chromatographic tests demonstrate the uniqueness of their phytochemical compositions.[18]

The phytochemical constitute of *Sansevieria cylindrica* is quite potent when compared to other genera in the *Sansevieria* genus. It has a significant antioxidant, and antibacterial properties that are attributed to its richness of alkaloids, glycosides, phenolic compounds, flavonoids, and saponins. The significant

quantities of flavonoids and phenols found in *Sansevieria trifasciata* are also known to provide therapeutic benefits, including anti-inflammatory and anti-tumor actions. *S. cylindrica* has a particular abundance of phthalic acid esters, determined by GC-MS analysis, which may explain its unique therapeutic characteristics. Comparative investigations reveal that both species share similar bioactive components, such as tannins and steroids.[23]

According to FTIR research, *Sansevieria roxburghiana* contains alkaloids and saponins that are comparable of its versions, although in different amounts and with distinct functional groups. With an excessive flavonoid content (56.9 µg QE/mg) and phenolic concentration (84.2 µg GAE/mg), *S. cylindrica* signifies at among the phytochemical variety of the genus *Sansevieria*, indicating its ability to serve as an agent of bioactive components and making it an excellent option for future pharmacological research.[24]

MEDICINAL USES

Traditional Uses: The plant has been utilised for centuries for a variety of functional and medicinal purposes, especially in Asian and African civilizations. The plant's medicinal qualities are determined by the great number of bioactive substances found in its rhizomes and leaves, such as flavonoids, saponins, and phenolics. The extracts from the leaves have long been used to treat skin disorders because they are thought to contain antibacterial and wound-healing properties. The juice of this plant has also been used to speed up treatment for wounds and burns. Because of its anti-inflammatory and antioxidant properties, the plant is additionally related to reducing inflammation and issues with breathing.[1]

PHARMACOLOGICAL ACTIVITIES

Anti-Oxidant Properties: This plant's leaves include multiple bioactive compounds, such as phenols, flavonoids, saponins, and tannins. Based on studies, the methanol extract of *Dracaena angolensis* contains highest phenolic content of all of its portions, which is an important indication of antioxidant activity. The antioxidant activity was assessed using the DPPH (1,1-diphenyl-2-picrylhydrazyl) test. The methanol extract inhibited free radicals by 83.6% at a dosage of 100 µg/ml, equivalent to normal ascorbic acid. Ethanol extracts also shown significant efficacy, blocking 80.5% of DPPH radicals. These data indicate that antioxidant activity is significantly linked to the phenolic content of the extracts. Phenolic chemicals are widely recognised for their ability to scavenge free radicals, reducing oxidative stress, which has been linked to long-term diseases such as diabetes and cardiovascular diseases. The plant's antioxidant capacities not only support its traditional uses for medicine but also make it an ideal choice for natural antioxidant treatments. The work emphasises the potential for further investigation into *D. Angolensis* pharmaceutical uses, notably in addressing oxidative stress-related illnesses.[27]

Anti-Cancer Activity: *Sansevieria cylindrica* is rich in phytochemical constituents, which includes distinct dihydrochalcones and steroidal saponins that show slight significant cytotoxicity against cancer cell lines which include HT116, MCF7, and HepG2, is responsible for its anti-cytotoxic action. These compounds' IC50 values are equivalent to those of conventional anticancer medications, suggesting a strong potential for activating apoptosis and thereby affecting the survival of cancerous cells.[23] whereas *Sansevieria trifasciata* also has anticancer qualities; its methanol and ethyl acetate extracts have been observed to exhibit significant activity against RD and KYSE 150 cancerous cells.[25] Comparative research suggests that, in contrast to *S. cylindrica*, which has more cytotoxicity across a range of cell lines, *S. trifasciata* is selective for cancer cells and has less toxicity to healthy cells.[30-31]

They differ in their phytochemical profiles: *S. trifasciata* has flavonoids, tannins, and phenolic chemicals that are more specifically targeted against particular cancer cell types, whereas *S. cylindrica* has distinctive steroidal saponins and dihydrochalcones with broad-ranging effects. Their complementing potentials in anticancer research are demonstrated by this analysis, with *S. trifasciata* showing specific therapeutic promise and *S. cylindrica* presenting more diverse actions. [30,32]

Anti-Bacterial Activity: *Dracaena angolensis* shows potential as an alternative antimicrobial agent due to its significant antibacterial properties. Ethanolic extracts of its leaves were tested using the disc diffusion method against *Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus aureus*. The extract exhibited the highest activity against *S. aureus* (16.4–22.5 mm inhibition zones), moderate activity against *P. aeruginosa* (17.8 mm), and minimal impact on *E. coli* (15.1–16.8 mm). Its antibacterial effects are attributed to bioactive phytochemicals that disrupt bacterial membranes and vital functions. Variability in inhibitory zones suggests differing bacterial susceptibility, emphasizing the need for further research to identify the most active compounds, evaluate safety and toxicity, and explore synergistic effects with existing antibiotics. These findings highlight *D. Angolensis* as a promising source for developing new antibacterial therapies, particularly against Gram-positive bacteria like *S. aureus*. [33]

Anti-Inflammatory Activity: Several in-vitro investigations demonstrate its potent anti-inflammatory abilities of *Sansevieria cylindrica*'s hydro-alcoholic extracts. The protein denaturation inhibitions and membrane stabilization methods, including tests for heat-induced and the hypotonic haemorrhage were used for assessing this activity. The extract established dose-dependent effects; at a dosage of 1 mg/ml, a maximum inhibition for protein denaturation was 85.33%. Meanwhile, the extract established a 68.66% inhibition of hypotonicity-induced lysis and a 77.88% inhibition of heat-induced lysis, which are similar to the effects of common medications like diclofenac, indicating its ability to keep intact red blood cell membrane. These outcomes indicate the theoretical value of *Sansevieria cylindrica* as a natural anti-inflammatory treatment. This is likely because of the plant's high phenolic, flavonoid, and tannin composition.[34,35]

Environmental Benefits:

Dracaena angolensis (*Sansevieria Cylindrica*) promotes the environment by working as a plant-based "living sensor" and pollution mitigator. This species possesses a unique capacity to absorb pollutants from the atmosphere, including carbon dioxide, by photosynthesis, and this contributes to reduced emission levels of greenhouse gases and improved air quality. It can absorb up to 107 contaminants, including the nicotine, carbon monoxide, and dioxins, making it an all-natural air cleanser. The plant's metabolic activity also promotes soil health through modifying redox potential via root exudates, which affect microbial habitats. *Dracaena angolensis* is an eco-friendly, non-toxic, and biodegradable solution for environmental applications, reducing the demand for synthetic devices as well as encouraging sustainable practices. [36,37]

Futuristic Investigation: In addition to its decorative and air-purifying qualities, *Dracaena angolensis* is becoming more well-known in drug development for its wide range of bioactive compounds. Using phytochemicals such as flavonoids and saponins, studies show its promise in antibacterial, anti-inflammatory, and antioxidant treatments. The effectiveness of the plant against oxidative stress and its capacity to inhibit acetylcholinesterase have been discovered by contemporary methods such as GC-MS profiling and molecular docking, indicating potential uses in neuroprotective therapies. Extracts from *D. Angolensis* also show potential as a natural remedy for snake venom, increasing its use in emergency care. With further development, the plant could be utilized as the starting point for revolutionary therapeutic formulations that concentrate on neurological disorders and chronic illnesses like diabetes.[38, 39]

CONCLUSION

Dracaena angolensis (*Sansevieria Cylindrica*) is a multipurpose Asparagaceae plant known for its distinctive cylindrical leaves, adaptability, and decorative appeal. It is a perennial succulent that performs several functions, including indoor air purification by eliminating pollutants such as formaldehyde and benzene, and it survives in dry circumstances, thus making it an excellent for urban greening and soil stabilizer.

Usually, this plant was traditionally utilized for its medicinal properties, which are supported by a diverse phytochemical composition that includes alkaloids, flavonoids, saponins, and phenolics. Modern research has highlighted its anticancer, antibacterial, and antioxidant properties, indicating the possibility of producing novel medications. Comprehensive phytochemical tests reveal the existence of bioactive compounds, emphasizing its therapeutic qualities and highlighting the need for further research into its mechanisms of action.

The development of new propagating strategies for expanded uses, the exploration of the environmental opportunities for conservation, and the isolation of certain bioactive components for medication development should be the top concerns of future research. This versatile species has the potential to bring improvements in environmental and health care by bridging traditional knowledge and modern research.

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