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Ornamental Plants of Bignoniaceae Family: Source of Bioactive Compounds with Therapeutic Applications and Ecological Services

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The Bignoniaceae family, comprising over 100 genera and 800 species, is a rich source of ornamental plants with medicinal properties. This review focuses on the pharmacological uses, bioactive compounds, and future aspects of selected ornamental plants of the Bignoniaceae family, including *Pyrostegia venusta, Jacaranda mimosifolia, Tabebuia* spp., and others. These plants have been traditionally used to treat various ailments, and recent studies have confirmed their antimicrobial, anti-inflammatory, and antioxidant properties. The bioactive compounds responsible for these properties include alkaloids, flavonoids, and phenolic acids. This review highlights the potential of these plants as a source of new medicinal agents and their applications in sustainable agriculture and horticulture including their ecological significances. Further research into the cultivation, bioactive compounds, and medicinal properties of these plants is warranted to unlock their full therapeutic potential. This review aims to provide a comprehensive overview of the ornamental plants of the Bignoniaceae family and their potential uses in medicine and beyond.

Keywords: Ornamental plants; bioactive compounds; medicinal properties; horticulture.

1. INTRODUCTION

Ornamental plants have long been appreciated for their aesthetic value, but they also hold a hidden treasure trove of bioactive compounds with therapeutic applications (Schmitzer, et al., 2022). Plants have been an integral part of human civilization, serving not only as a source of food and shelter but also as a repository of medicinal agents (Dimri, et al., 2024, Bhat, et al., 2024). For centuries, plants have been used in traditional medicine to treat various ailments, from simple fever to complex diseases like cancer (Sethi, et al., 2024, Jena, et al., 2024). The Bignoniaceae family, comprising over 840 species (Cordeiro, et al., 2020), is a rich source of medicinal plants that have been used in traditional medicine for their antiseptic, anti-inflammatory, and antimicrobial properties (Assanti, et al., 2022). The Bignoniaceae family is also known for its ornamental value, with many species being cultivated for their showy flowers and attractive foliage. However, the medicinal properties of these ornamental plants have been largely overlooked. Recent studies have shown that plants of the Bignoniaceae family possess a wide range of bioactive compounds, including alkaloids, glycosides, and phenolic acids (Benvenuti & Mazzoncini, 2021). These compounds have been shown to exhibit various biological activities, including antimicrobial, antioxidant, and anti-inflammatory effects (Devi, et al., 2024). The discovery of these bioactive compounds has sparked interest in the Bignoniaceae family as a potential source of new medicinal agents. With the rise of antibiotic resistance and the need for new treatments, plants offer a valuable resource for the discovery of novel medicinal compounds. The Bignoniaceae family holds great promise as a source of bioactive compounds with medicinal properties. The common ornamental plants of Bignoniaceae family are *Crescentia cujete* (Fig. 1)*, Spathodea campanulata* (Fig. 2)*, Tecoma stans* (Fig. 3)*, Tabebuia rosea* (Fig. 4)*, Jacaranda mimosifolia* (Fig. 5) etc., In this context, exploring the ornamental plants of the Bignoniaceae family as a source of bioactive compounds with therapeutic applications is of great significance (Mukherjee, et al., 2024). This review aims to provide an overview of the medicinal properties of the Bignoniaceae family, with a focus on their ornamental plants, and to highlight their potential as a source of new medicinal agents including ecological services.

2. SOME COMMON ORNAMENTAL PLANTS OF BIGNONIACEAE FAMILY

Pyrostegia venusta (Flame Vine)

Medicinal uses: Antiseptic, anti-inflammatory, and antimicrobial properties (Kusmardiyani, et al., 2021).
Bioactive compounds: Flavonoids, phenolic compounds, and alkaloids. (Coimbra, et al., 2019).
Ecological significance: Attract butterflies.

Jacaranda mimosifolia (Jacaranda)

Medicinal uses: Antimicrobial activity (Aguirre, et al., 2020).
Bioactive compounds: Phenolic compounds and tannin (Leutcha, et al., 2025).

Ecological significance: Attract small birds.

***Tabebuia* spp. (Trumpet Tree)**

Medicinal uses: Antimicrobial, anti-inflammatory, and antioxidant properties (Barrios-Nolasco, et al., 2023).
Bioactive compounds: Phenolic compounds (Barrios-Nolasco, et al., 2023).
Ecological significance: Attract butterflies and small birds.

***Campsis radicans* (Trumpet Vine)**

Medicinal uses: Anti-hyperglycemic activity (Islam, et al., 2019).
Bioactive compounds: Phenolic compounds (Islam, et al., 2019).
Ecological significance: Attract butterflies.

***Bignonia capreolata* (Crossvine)**

Medicinal uses: Bark is used to cure headache (Temperate Plants Database, Ken Fern. temperate.theferns.info. 2025-01-11)
Bioactive compounds: Indole alkaloids (Clark & Lund, 2012)
Ecological significance: Attract insects.

***Catalpa bignonioides* (Catalpa)**

Medicinal uses: Leaves are used to treat skin infections (Mingarro, et al., 2003).
Bioactive compounds: Saponin and phenols (Mingarro, et al., 2003).
Ecological significance: Attract butterflies.

***Tecoma stans* (Yellow Bells)**

Medicinal uses: Used in treating skin infections (Bakr, et al., 2019).
Bioactive compounds: Flavonoids and phenolic compounds (Anand & Basavaraju, 2021).
Ecological significance: Attracts small pollinators.

***Podranea ricasoliana* (Pink Trumpet Vine; Fig. 6)**

Medicinal uses: It has antibacterial and antioxidant potentials (Araujo, et al., 2020).
Bioactive compounds: Essential oils (Araujo, et al., 2020).
Ecological significance: Attracts butterflies.

***Dolichandra unguis-cati* (Cat's Claw Creeper)**

Medicinal uses: It is used in the treatment of snake bites and used as folk medicines (Calil, et al., 2017).
Bioactive compounds: Chlorogenic acid (Brondani, et al., 2020).
Ecological significance: Attracts butterflies.

***Crescentia cujete* (Calabash tree)**

Medicinal uses: Anti-inflammatory activities (Parvin, et al., 2015).
Bioactive compounds: Flavonoids, saponins, tannins, alkaloids, cardenolides and terpenoids (Balogun & Sabiu, 2021).

Ecological significance: It attracts bats (Lima, et al., 2022).

Fig. 1. Flower of *Crescentia cujete*

Fig. 2. Flowers of *Spathodea campanulata*

Fig. 3. Leaves and flowers of *Tecoma stans*

Fig. 4. Flowers of *Tabebuia rosea*

Fig. 5. Flowers and leaves of *Jacaranda mimosifolia*

Fig. 6. Flowers of *Podranea ricasoliana*

3. PHARMACOLOGICAL POTENTIAL

The Bignoniaceae family exhibits significant pharmacological potential, with various species demonstrating antimicrobial, anti-inflammatory, antioxidant, and anticancer activities (Nabatanzi, et al., 2020). The bioactive compounds present in these plants, including alkaloids, flavonoids, and phenolic acids, have been shown to inhibit the growth of microorganisms, reduce inflammation, and scavenge free radicals (Nascimento, et al., 2022). Additionally, some species have been found to possess antiproliferative and pro-apoptotic effects, making them potential candidates for cancer therapy (Lima, et al., 2024, Ravikumara, et al., 2024, Nkumah, et al., 2024). Further research is needed to fully explore the pharmacological potential of the Bignoniaceae family and to develop novel therapeutic agents from these plants.

4. CONCLUSION

The Bignoniaceae family of plants offers a rich source of bioactive compounds with potential therapeutic applications. The ornamental plants of this family, such as *Pyrostegia venusta, Jacaranda mimosifolia*, and *Tabebuia* spp., have been found to possess antimicrobial, anti-inflammatory, and antioxidant properties, making them valuable for the development of new medicines and therapies. Further research into the cultivation, bioactive compounds, and medicinal properties of these plants is warranted, as they hold great promise for addressing

various health challenges and promoting sustainable agriculture and horticulture practices having ecological significances.

5. FUTURE ASPECTS

The plants of the Bignoniaceae family, particularly those mentioned earlier, hold great promise for future research and development. With the increasing demand for natural products and the need for new medicinal agents, these plants offer a rich source of bioactive compounds with potential therapeutic applications. Future research should focus on isolating and characterizing these compounds, as well as investigating their mechanisms of action and potential uses in medicine. Another important aspect of these plants is their potential for use in sustainable agriculture and horticulture. Many of these plants are ornamental and can be cultivated for their aesthetic value, providing a source of income for farmers and gardeners. Additionally, some of these plants have been shown to have pest-repellent and fertilizer properties, making them useful for organic farming practices. Further research into the cultivation and uses of these plants could lead to new opportunities for sustainable agriculture and horticulture. In the future, it is also expected that these plants will play a significant role in the development of new medicines and therapies. With the rise of antibiotic resistance and the need for new treatments, the bioactive compounds found in these plants offer a promising solution. Additionally, the use of these plants in traditional medicine provides a valuable source of knowledge and experience that can inform modern medical research. As research into these plants continues to advance, it is likely that we will see new and innovative uses for these plants in medicine and beyond.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that, Meta AI is used in writing only for getting standard language not in data collection from the field and literature. The version is Meta Llama 3.1. and source is WhatsApp.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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