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Diversity and Distribution of Urban Flora in Visakhapatnam City, Andhra Pradesh, India

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Abstract

Urban vegetation plays a crucial role in maintaining ecological balance, improving environmental quality, and enhancing the quality of life in rapidly expanding cities. Visakhapatnam City, a major coastal urban center in Andhra Pradesh, India, exhibits diverse urban flora due to its unique geographical location, tropical climate, and planned green initiatives. The present study documents and analyzes the plant species grown in Visakhapatnam urban area, including residential colonies, roadsides, parks, institutional campuses, and public spaces. Field surveys were conducted during 2024–2025 to record ornamental, avenue, medicinal, edible and other plant species commonly grown in the city. A total of 26 dominantly grown plant species belonging to 19 families were recorded, with representation from Fabaceae, Arecaceae, Apocynaceae, Euphorbiaceae, Poaceae, etc. Trees constituted the largest growth form, followed by shrubs, herbs, climbers, and grasses. The study highlights the ecological, aesthetic, and socio-economic importance of urban plants in Visakhapatnam and emphasizes the need for sustainable urban greening strategies to mitigate pollution, urban heat effects, and biodiversity loss. The findings provide baseline data useful for urban planners, environmentalists, and policymakers involved in sustainable city development.

Keywords: Urban Flora, Visakhapatnam, Ornamental Plants, Avenue Trees, Urban Ecology.

1. Introduction

Urbanization is one of the most significant global phenomena of the 21st century, resulting in rapid transformation of natural landscapes into built environments (Agarwal and Tandon, 2019) ^[1] (Singh and Gupta, 2016) ^[8]. While urban growth often leads to environmental degradation, the presence of urban vegetation plays a vital role in reducing its negative impacts. Urban plants contribute to air purification, temperature regulation, noise reduction, carbon sequestration, biodiversity conservation, and overall human well-being (Dash and Behera, 2018) ^[2].

India is witnessing unprecedented urban expansion, and coastal cities are particularly vulnerable to ecological stress due to industrialization, population pressure, and climate change (Manish and Ram, 2019) ^[5] (Singh and Gupta, 2016) ^[8]. Visakhapatnam, popularly known as the “City of Destiny,” is one of the fastest-growing metropolitan cities on the east coast of India. Despite rapid development, the city has retained considerable green cover in the form of parks, roadside plantations, home gardens, institutional campuses, and urban forests.

Urban plants in Visakhapatnam serve multiple purposes: aesthetic beautification, shade provision, medicinal use, religious significance, and food production. Many species are deliberately cultivated, while others have adapted naturally to urban conditions. Understanding the composition and

distribution of frequently grown urban plants is essential for biodiversity conservation and sustainable urban planning (Gopal and Chauhan, 2017) ^[4] (Rao, 2020) ^[7]. The present study aims to document commonly grown urban plant species in Visakhapatnam City, analyze their growth forms and uses, and highlight their ecological importance. This research contributes to urban botanical studies and provides baseline data for future ecological assessments.

2. Study Area

Visakhapatnam City is located on the eastern coast of India in Andhra Pradesh, along the Bay of Bengal, between 17°40'–17°56' N latitude and 83°11'–83°28' E longitude. The city is bounded by the Eastern Ghats on the western side and the sea on the east, giving it a unique combination of coastal and hilly ecosystems.

The climate of Visakhapatnam is tropical maritime, characterized by hot and humid summers, moderate winters, and substantial monsoon rainfall. The average annual temperature ranges from 22°C to 35°C, while annual rainfall averages around 1,100–1,200 mm, primarily from the southwest and northeast monsoons. These climatic conditions support luxuriant plant growth throughout the year.

Urban land use in Visakhapatnam includes residential areas, industrial zones, commercial hubs, educational institutions, parks, and transportation corridors. Green spaces such as

Kailasagiri Hill Park, Indira Gandhi Zoological Park surroundings, beach promenades, Kambalakonda, and neighbourhood parks significantly contribute to urban vegetation. The city also promotes avenue plantations along major roads and highways.

3. Materials and Methods:

- i). **Field Survey:** Field surveys were conducted across Visakhapatnam City from October 2025 to December 2025. Surveys covered residential colonies, roadside plantations, public parks, institutional campuses, religious places, and urban open spaces.
- ii). **Plant Collection and Identification:** Plants were recorded through direct observation. Species were identified based on morphological characters such as leaves, flowers, fruits, and growth habit. Identification was confirmed using standard regional floras, botanical keys, and comparison with herbarium records.
- iii). **Data Analysis:** Recorded species were classified according to:
 - Family
 - Growth form (trees, shrubs, herbs, climbers, grasses)
 - Primary use (ornamental, medicinal, edible, shade, religious)

Frequency of occurrence was assessed based on repeated observations across multiple locations.

4. Results and Discussion

- i). **Species Diversity:** The present study documented 26 plant species belonging to 19 families majorly grown in urban areas of Visakhapatnam. The most dominant families were Fabaceae (14 species), Arecaceae (9 species), Apocynaceae (8 species), Euphorbiaceae (7 species), and Poaceae (6 species). The dominance of these families reflects their adaptability to urban environments and preference in landscaping.
- ii). **Growth Form Distribution:** Trees constituted the largest group, followed by shrubs, herbs, climbers, and

grasses. The dominance of trees is attributed to extensive avenue plantations and public park development. Commonly observed tree species include *Azadirachta indica*, *Delonix regia*, *Peltophorum pterocarpum*, *Polyalthia longifolia*, and *Terminalia catappa* (Gamble and Fischer, 1935) (Nair and Henry, 1983).

Table 1: List of Some Commonly Grown Avenue and Shade Trees in Visakhapatnam City

S. No.	Botanical Name	Common Name	Family	Growth Form	Major Use
1	<i>Azadirachta indica</i> A. Juss.	Neem	Meliaceae	Tree	Medicinal, shade
2	<i>Delonix regia</i> (Boj. Ex Hook.) Raf.	Gulmohar	Fabaceae	Tree	Ornamental, avenue
3	<i>Peltophorum pterocarpum</i> (DC.) K. Heyne	Copper Pod	Fabaceae	Tree	Avenue, shade
4	<i>Polyalthia longifolium</i> Sonn. B. Xue & R.M.K. Saunders	Ashoka	Annonaceae	Tree	Ornamental
5	<i>Terminalia catappa</i> L.	Indian Almond	Combretaceae	Tree	Shade, coastal
6	<i>Ficus religiosa</i> L.	Peepal	Moraceae	Tree	Religious, shade
7	<i>Ficus benghalensis</i> L.	Banyan	Moraceae	Tree	Shade
8	<i>Samanea saman</i> (Jacq.) Merr.	Rain Tree	Fabaceae	Tree	Avenue
9	<i>Cassia fistula</i> L.	Golden Shower	Fabaceae	Tree	Ornamental
10	<i>Casuarina equisetifolia</i> L.	Casuarina	Casuarinaceae	Tree	Windbreak

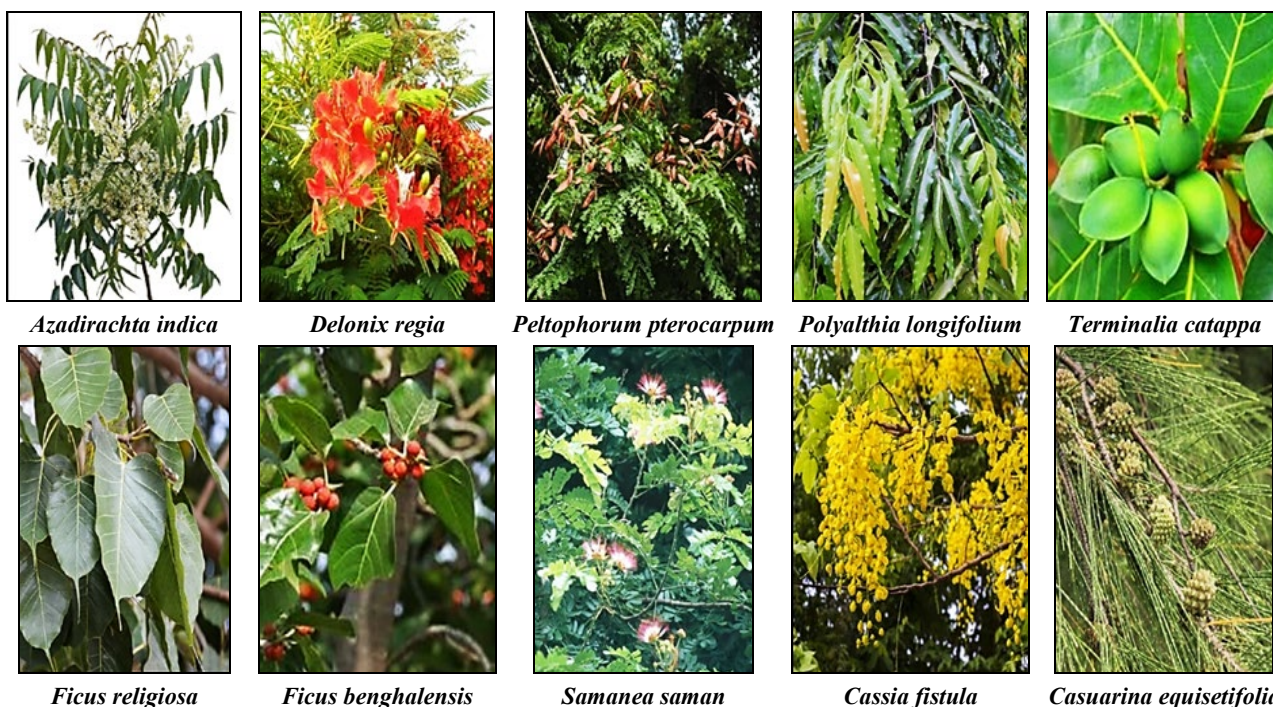


Fig 1: List of Some Commonly Grown Avenue and Shade Trees in Visakhapatnam City

Table 2: Some Ornamental Shrubs and Flowering Plants Grown in Visakhapatnam Urban Area.

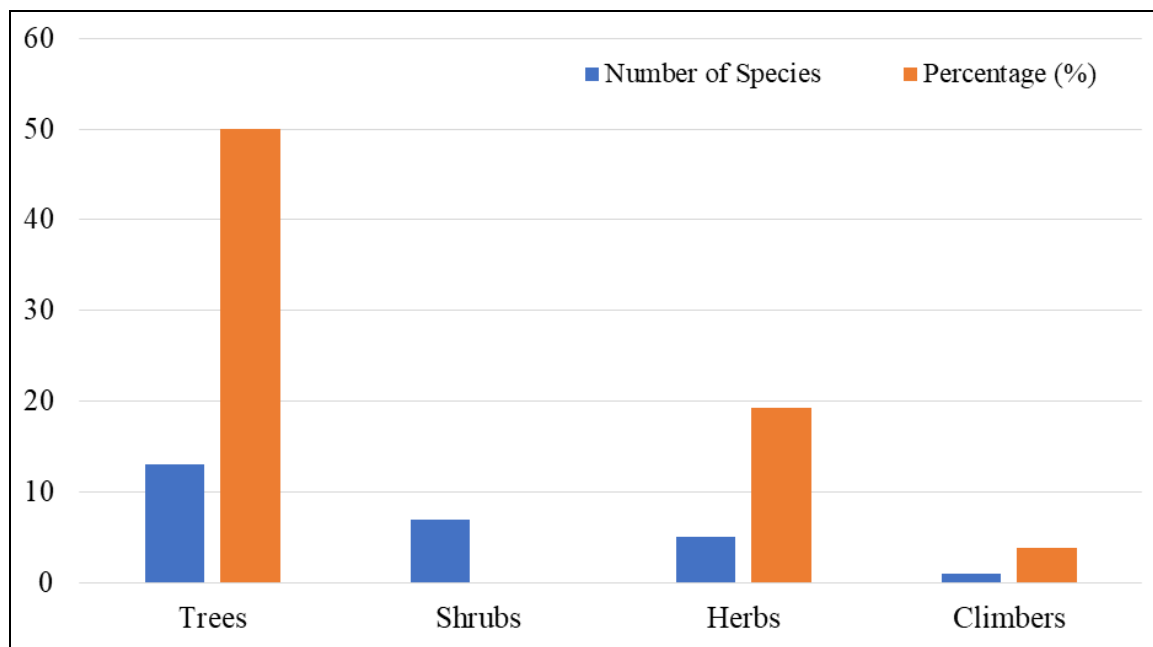
S. No.	Botanical Name	Common Name	Family	Growth Habit	Use
1	<i>Hibiscus rosa-sinensis</i> L.	Hibiscus	Malvaceae	Shrub	Ornamental
2	<i>Bougainvillea spectabilis</i> Willd	Bougainvillea	Nyctaginaceae	Shrub/Climber	Ornamental
3	<i>Ixora coccinea</i> L.	Ixora	Rubiaceae	Shrub	Ornamental
4	<i>Nerium oleander</i> L.	Oleander	Apocynaceae	Shrub	Avenue
5	<i>Rosa</i> spp.	Rose	Rosaceae	Shrub	Ornamental
6	<i>Chrysanthemum</i> spp.	Chrysanthemum	Asteraceae	Herb	Ornamental
7	<i>Jasminum sambac</i> (L.) Aiton	Jasmine	Oleaceae	Shrub	Ornamental
8	<i>Gardenia jasminoides</i> J.Ellis	Gardenia	Rubiaceae	Shrub	Ornamental

Table 3: Some Important, Medicinal and Edible Plants Grown in Home Gardens

S. No.	Botanical Name	Common Name	Family	Plant Type	Use
1	<i>Ocimum tenuiflorum</i> L.	Tulsi	Lamiaceae	Herb	Medicinal
2	<i>Aloe vera</i> (L.) Burm.f.	Aloe	Asphodelaceae	Herb	Medicinal
3	<i>Catharanthus roseus</i> (L.) G.Don	Periwinkle	Apocynaceae	Herb	Medicinal
4	<i>Tinospora cordifolia</i> (Thunb.) Miers	Giloy	Menispermaceae	Climber	Medicinal
5	<i>Moringa oleifera</i> Lam.	Drumstick	Moringaceae	Tree	Edible
6	<i>Carica papaya</i> L.	Papaya	Caricaceae	Tree	Edible
7	<i>Mangifera indica</i> L.	Mango	Anacardiaceae	Tree	Edible
8	<i>Musa paradisiaca</i> L.	Banana	Musaceae	Herb	Edible

Table 4: Growth Form Distribution of Visakhapatnam Urban Plants

Growth Form	Number of Species	Percentage (%)
Trees	13	50
Shrubs	07	26,9
Herbs	05	19,2
Climbers	01	3,8

**Fig 2:** Growth Form Distribution of Visakhapatnam Urban Plants**iv). Ornamental Plants**

Ornamental plants formed a major component of urban vegetation. Popular ornamental shrubs and herbs included *Hibiscus rosa-sinensis*, *Bougainvillea spectabilis*, *Ixora coccinea*, *Rosa* spp., and *Chrysanthemum* spp. These plants are favored for their vibrant flowers, ease of maintenance, and aesthetic appeal (Gamble and Fischer, 1935).

v). Medicinal and Edible Plants

Several medicinal plants were recorded, such as *Ocimum tenuiflorum*, *Aloe vera*, *Catharanthus roseus*, and *Tinospora cordifolia*, commonly grown in home gardens. Edible plants like *Moringa oleifera*, *Carica papaya*, *Mangifera indica*, and *Musa paradisiaca* were also frequently observed, highlighting

the role of urban gardening in food security (Nair and Henry, 1983).

v). **Ecological Importance**

Urban plants significantly contribute to environmental health by improving air quality, reducing dust and noise pollution, and mitigating urban heat island effects. Coastal species such as *Casuarina equisetifolia* and *Cocos nucifera* play an important role in wind protection and soil stabilization along beachfronts.

The presence of diverse plant species also supports urban biodiversity by providing habitat for birds, insects, and small mammals. However, increasing construction activities and replacement of native species with exotic ornamentals pose challenges to urban ecological sustainability.

5. Conclusion

The present study highlights the rich diversity of urban plants frequently grown in Visakhapatnam City. The city supports a wide range of ornamental, medicinal, edible, and shade-providing plant species that contribute significantly to ecological balance and human well-being. Trees dominate the urban landscape, emphasizing their importance in city planning.

To ensure sustainable urban development, emphasis should be placed on conserving native plant species, promoting biodiversity-friendly landscaping, and increasing green cover. The findings of this study provide valuable baseline information for urban planners, environmental managers, and policymakers aiming to enhance green infrastructure in Visakhapatnam and similar coastal cities.

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