



## Diversity and Ecological Role of Urban Ornamental Plants in Mahabubnagar, Telangana, India

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### Abstract:

Urbanization has resulted in the rapid transformation of natural landscapes, creating an urgent need for planned urban greenery to maintain ecological balance and environmental quality. Ornamental flowering plants play a vital role in enhancing urban ecosystems by improving aesthetic appeal, supporting biodiversity, and mitigating environmental stress.

The present study focuses on the diversity, distribution, and functional significance of ornamental plants in the urban landscapes of Mahabubnagar, Telangana. Field surveys were conducted in public parks, roadsides, residential colonies, and institutional gardens to document commonly cultivated ornamental species and their ecological contributions. A total of Sixty ornamental taxa belonging to 24 diverse families were recorded, representing trees, shrubs, climbers, and herbaceous forms. The study assessed their role in providing habitat for pollinators, reducing air pollution, moderating microclimate, and improving soil stability. Geographic Information System (GIS) tools were employed to map the spatial distribution of ornamental greenery and to evaluate green cover density across selected locations. Interviews with residents, horticulturists, and municipal authorities were conducted to understand planting preferences and management practices. The findings revealed that ornamental plants significantly contribute to urban aesthetics, psychological well-being, and environmental sustainability.

**Keywords:** Ornamental plants, Urban greenery, Biodiversity, GIS mapping, Sustainable landscaping, Mahabubnagar, Pollinators, Urban ecology.



## 1. Introduction:

Ornamental flowering plants are cultivated for their aesthetic value, typically grown in parks, gardens, and indoor spaces to add beauty, color, and fragrance. [13,14,18] These plants are chosen for their attractive foliage, flowers, or overall appearance. Examples of ornamental flowering plants include roses, petunias, carnations, chrysanthemums, and marigolds which are often used in landscaping, floral arrangements, and decorative displays to create visually appealing and fragrant environments. [2, 8, 28]

The history of international ornamental flowering plants dates back thousands of years, with ancient civilizations such as the Egyptians, Greeks, and Romans cultivating and trading plants for their beauty and fragrance. [1] In the 17th and 18th centuries, European explorers and botanists introduced exotic plants from Asia, Africa, and the Americas, leading to the development of ornamental horticulture as we know it today. The 19th century saw the rise of the international flower trade, with the Netherlands emerging as a major hub for the cultivation and export of ornamental plants. In the 20th century, advances in transportation and refrigeration enabled the global trade of cut flowers, and today, the international ornamental flowering plant industry is a multi-billion-dollar market, with countries such as the Netherlands, Colombia, and Kenya playing major roles in the production and export of ornamental plants. [16,17, 24, 26]

Ornamental flowering plants can be broadly classified into several types based on their growth habits, flower forms, and uses. Annuals, such as marigolds, and petunias, complete their life cycle in one year and are often used in seasonal displays. [4] Perennials, including roses, carnations, and chrysanthemums, live for more than two years and are popular for their longevity and low maintenance. Bulbous plants, such as tulips, daffodils, and hyacinths, store energy in bulbs and are often used in spring displays. [9, 11] Climbing plants, including roses, clematis, and honeysuckle, use support to grow upwards and are popular for their versatility and beauty. Ornamental flowering plants require well-draining, fertile soil that is rich in organic matter to thrive. The ideal soil should have a pH range of 6.0 to 7.0, which allows for optimal nutrient uptake. [10] A mix of clay, silt, and sand provides good drainage, aeration, and water-holding capacity. Loamy soil, silty loam soil, or compost-based potting mixes are suitable options. Soil amendments like compost, manure, peat moss, or coconut coir can also be added to improve soil fertility and overall health. [3,7]

Adequate water supply is essential for ornamental flowering plants. The plants require consistent moisture, especially during the flowering stage. However, overwatering can lead to root rot and other problems. The ideal watering schedule depends on the specific plant variety, climate, and soil type. Generally, ornamental flowering plants require about 1-2 inches of water per week, either from rainfall or irrigation. Drip irrigation or soaker hoses can help deliver water directly to the roots, reducing evaporation and runoff. [6,33]

Ornamental flowering plants thrive in temperate climates with moderate temperatures and humidity. Most plants prefer daytime temperatures between 18°C to 24°C and nighttime temperatures around 13°C to 18°C. Some plants, like orchids and bromeliads, require warmer temperatures, while others, like pansies and snapdragons, prefer cooler temperatures. [5] Ornamental flowering plants also require adequate

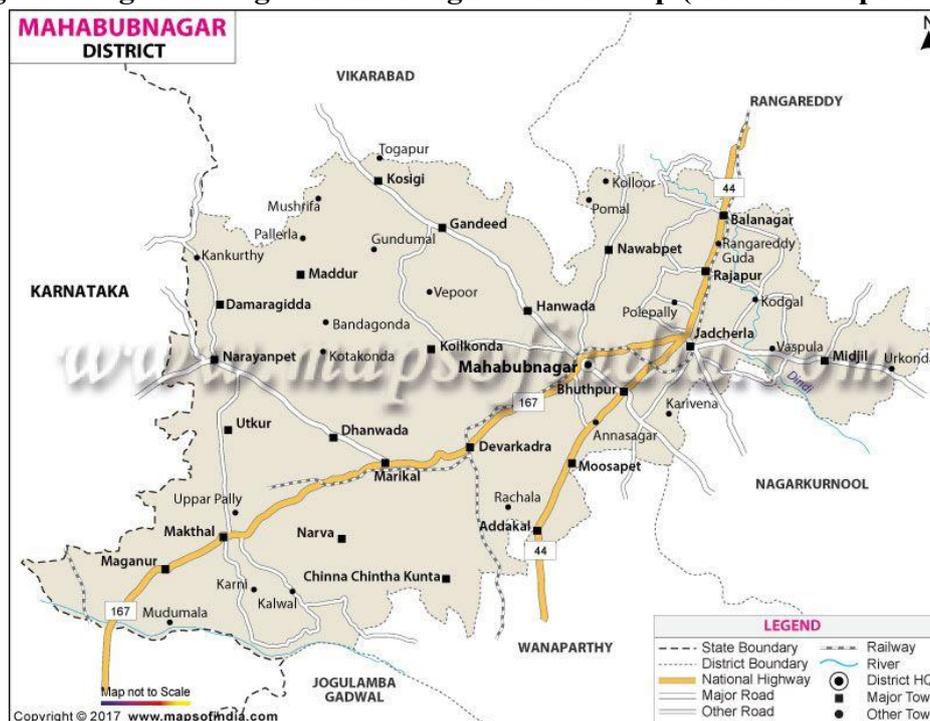
sunlight, with most plants preferring full sun to partial shade. In regions with intense sunlight, providing some shade during the hottest part of the day can help prevent scorching. [6,7]

## 2. Objectives of the Study:

1. To identify and document ornamental plant species commonly used in urban landscaping in Mahabubnagar, including parks, roadsides, and residential areas.
2. To map the distribution of ornamental greenery using GIS tools and assess its contribution to urban green spaces.

## Study Area: Mahabubnagar, Telangana

Image 1: Image showing Mahabubnagar District map ( Source: Maps of India)



The predominant soil type in Mahabubnagar is red sandy loam, which offers excellent drainage and aeration, along with moderate water-holding capacity. Local farmers employ a blend of traditional and modern agricultural practices, incorporating techniques such as mulching, drip irrigation, and integrated pest management to enhance plant growth while minimizing environmental impact. [23]

## 3. Research Methodology and Materials

### Research Methodology

The study adopted a mixed-method approach, combining qualitative and quantitative research techniques.



Field surveys & their analysis were conducted. [2,19, 20, 28]

Sampling Area: The research was conducted in Mahabubnagar, focusing on parks, residential areas, roadsides, institutional and office gardens, urban landscapes.

Sampling Method: A stratified random sampling technique was used to collect data from 9 selected areas of different urban locations to assess the diversity of ornamental plants. [22]

- Identification of ornamental plant species through Gambel floras.
- Documentation of ornamental plant species.

#### Materials Required

1. Camera and GPS device (to document plant species and locations)
2. GIS (for mapping plant distribution)
3. Excel (for organizing and visualizing data)
4. Questionnaires for public and expert interviews.

#### 4. Results, Analysis and Discussion

The Survey was conducted at 9 locations viz, Bandameedapally, Burgupally, Christianpally, District Collectorate MBNR, District Domestic Stadium, Housing Board Colony, Mettu Gadda, Rajeev Gruhakalpa, and Shah Sahab Gutta, Mahabubnagar., from July 2024 to June 2025. The survey revealed there were 60 plant species that were identified and the list of plant species is as follows.

**Table-1: List of Ornamental Plants observed at Mahabubnagar.**

S.N O	SCIENTFIC NAME	FAMILY	COMMON NAME	TYPE OF PLANT	COLLECTED AREA
1	<i>Abutilon grandifolium</i>	Malvaceae	Indian abutilon	Shrub	District Collectorate MBNR
2	<i>Adenium obesum</i>	Apocynaceae	Desert rose	Succulent shrub	Christianpally
3	<i>Allamanda blanchetii.</i>	Apocynaceae	yellow bell	Shrub	District Collectorate MBNR
4	<i>Allmamanda cathartica</i>	Apocynaceae	Yellow bell	Shrub	District Collectorate MBNR
5	<i>Bauhinia purpurea</i>	Fabaceae	Kachnar	Tree	District Collectorate MBNR



6	<i>Bougainvillea spectabilis</i>	Nyctaginaceae	Great bougainvillea	Tropical shrubby vine	Burgupally
7	<i>Butea superba</i>	Fabaceae	Flame vine	Vining Shrub	District Collectorate MBNR
8	<i>Caesalpinia pulcherrima</i>	Fabaceae	Peacock flower	Shrub or small tree	Christianpally
9	<i>Canna indica</i>	Cannaceae	Indian shot	Perennial herb	Shah Sahab Gutta
10	<i>Cascabela thevetia</i>	Apocynaceae	Yellow oleander	Large shrub	District Collectorate MBNR
11	<i>Catharanthus roseus</i>	Apocynaceae	Periwinkle	Herb	District Collectorate MBNR
12	<i>Chrysanthemum monifolium</i>	Asteraceae	Shevanthi florist's daisy	Herb	District Collectorate MBNR
13	<i>Clerodendrum paniculatum</i>	Lamiaceae	Pagoda flower	shrub	Bandameedapally
14	<i>Codiaeum variegatum</i>	Euphorbiaceae	Corton garden croton	Shrub	Shah Sahab Gutta
15	<i>Coleus amboinicus</i>	Lamiaceae	Indian borage	Succulent herb	District Collectorate MBNR
16	<i>Coreopsis grandiflora</i>	Asteraceae	Early Sunrise	Herb	District Collectorate MBNR
17	<i>Costus woodsoni</i>	Costaceae	Red buttn ginger	Herb	Shah Sahab Gutta
18	<i>Crossandra infundiformis</i>	Acanthaceae	Crossandra	Shrub	Burgupally
19	<i>Dahlia coccinea</i>	Asteraceae	Red dahlia	Herb	Shah Sahab Gutta
20	<i>Dahlia pinnata</i>	Asteraceae	Dahlia	Herb	Bandameedapally
21	<i>Dracaena trifasciata</i>	Asparagaceae	Snake plant	Herb	District Collectorate MBNR



22	<i>Euphorbia milii</i>	Euphorbiaceae	Christ plant	Shrub	District Collectorate MBNR
23	<i>Gaillardia aestivalis</i>	Asteraceae	Lanceleaf blanket flower	Perennial herb	Shah Sahab Gutta
24	<i>Gaillardia pulchella</i>	Asteraceae	Firewheel	Shrub	District Collectorate MBNR
25	<i>Galphimia gracilis</i>	Malapighiaceae	Spray of Gold	Evergreen shrub	Bandameedapally
26	<i>Gomphrena globosa</i>	Amaranthaceae	Bachelors button	Annual herb	District Collectorate MBNR
27	<i>Hemelia patens</i>	Rubiaceae	Firebush	Evergreen shrub	Rajeev Gruhakalpa
28	<i>Hibiscus hirtus</i>	Malvaceae	Lesser mallow	Shrub or a small tree	Shah Sahab Gutta
29	<i>Hibiscus radiatus</i>	Malvaceae	Monarch- Rose mallow	Shrub	District Domestic Stadium
30	<i>Hibiscus rosa-sinsis</i>	Malvaceae	Chinese hibiscus	Shrub or a small tree	Shah Sahab Gutta
31	<i>Hymenocallis littoralis</i>	Amaryllidaceae	Mangrove spider lily	Perennial herb	Christianpally
32	<i>Ixora chinensis</i>	Rubiaceae	West india jasmine	Shrub	District Collectorate MBNR
33	<i>Ixora coccinea</i>	Rubiaceae	Flame of the woods	Shrub	Rajeev Gruhakalpa
34	<i>Jasminum auriculatum</i>	Oleaceae	India jasmine	Herb	District Collectorate MBNR
35	<i>Jatropha integerrima</i>	Euphorbiaceae	Spicy Jatropha	Shrub	Mettu Gadda
36	<i>Kalanchoe laetivirens</i>	Crassulaceae	Mother of thousands	Succulent perennial herb	Christianpally
37	<i>Kigelia africana</i>	Bignoniaceae	Morro tree	Tree	Christianpally



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38	<i>leucophyllum frutescens</i>	Scrophulariceae	Silverleaf	Shrub	District Collectorate MBNR
39	<i>Millingtonia hortensis</i>	Bignoniaceae	Indian cork tree	Tree	Rajeev Gruhakalpa
40	<i>Mirabilis jalapa</i>	Nyctaginaceae	Beauty-of-the - night	Shrub	District Domestic Stadium
41	<i>Murraya paniculata</i>	Rutaceae	China box	Herb	District Collectorate MBNR
42	<i>Nerium oleander</i>	Apocynaceae	Nerium	Shrub	Bandameedapally
43	<i>Opuntia monacanthos</i>	Cactaceae	Pricky pear cactus	Shrub	District Collectorate MBNR
44	<i>Plumeria pudica</i>	Apocynaceae	Fiddle leaf plumeria	Deciduous shrub	District Collectorate MBNR
45	<i>Plumeria rubra</i>	Apocynaceae	Pagoda	Shrub	District Collectorate MBNR
46	<i>Podranea ricasoliana</i>	Bignoniaceae	Queens trumpet vine	Scrambler shrub	Housing Board Colony
47	<i>Portulaca umbraticola</i>	Portulacaceae	Pigweed	Annual herb	District Collectorate MBNR
48	<i>Portulaca grandiflora</i>	Portulacaceae	Sun rose	Rushilike shrub	Shah Sahab Gutta
49	<i>Pseuderanthemum laxiflorum</i>	Acanthaceae	Shooting star	Shrub	Shah Sahab Gutta
50	<i>Pseuderanthemum maculatum</i>	Acanthaceae	Black varnish plant	Herb	Shah Sahab Gutta
51	<i>Pyrostegia venusta</i>	Bignoniaceae	Flame vine	Shrub and vines	Housing Board Colony
52	<i>Rosa chinensis</i>	Rosaceae	China rose	Shrub	District Collectorate MBNR

53	<i>Rudbeckia laciniata</i>	Asteraceae	Golden glow	Herb	District Collectorate MBNR
54	<i>Ruspolia seticalyx</i>	Acanthaceae	Bristly-sepal ruspolia	Shrubby herb	Bandameedapally
55	<i>Senna auriculata</i>	Fabaceae	Tanner's Cassia	Shrub	District Collectorate MBNR
56	<i>Sphagneticola trilobata</i>	Asteraceae	Creeping daisy	Herb	MettuGadda
57	<i>Tabebuia rosea</i>	Bignoniaceae	Pirk trumpet tree	Neotropical tree	Mettu Gadda
58	<i>Tagetes erecta</i>	Asteraceae	Marigold	Herb	District Collectorate MBNR
59	<i>Thunbergia grandiflora</i>	Acanthaceae	Indian sky flower	Shrub	District Collectorate MBNR
60	<i>Turnera ulmifolia</i>	Passifloraceae	Saga rose	Shrub	Rajeev Gruhakalpa

**Plate: 1- Some Enumerated Plant Pictures**





*Clerodendrum paniculatum*



*Euphorbia milii*



*Hemelia patens*



*Plumeria pudica*

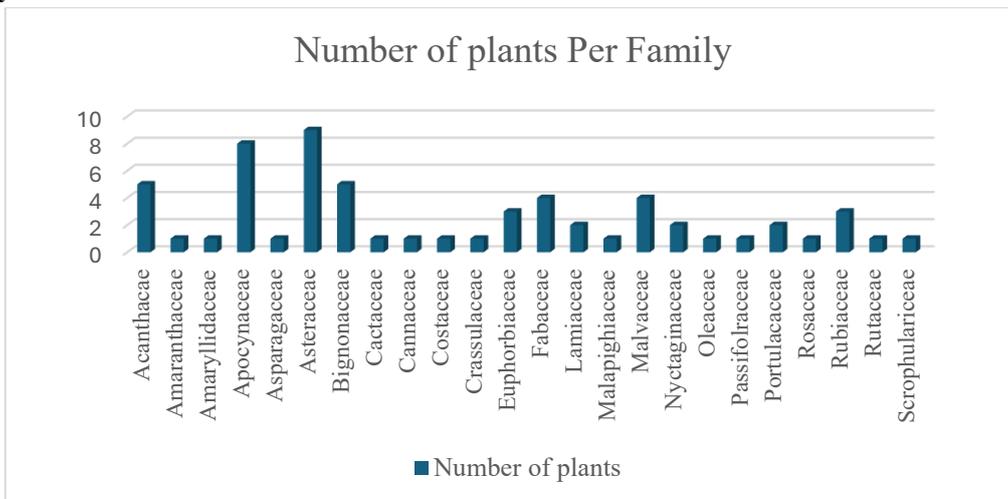


*Sphagneticola trilobata*

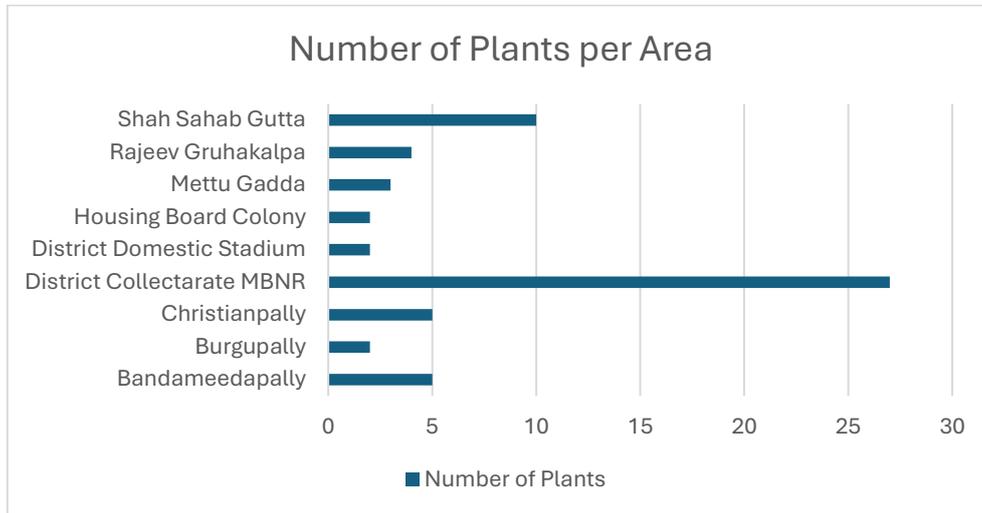


*Thunbergia grandiflora*

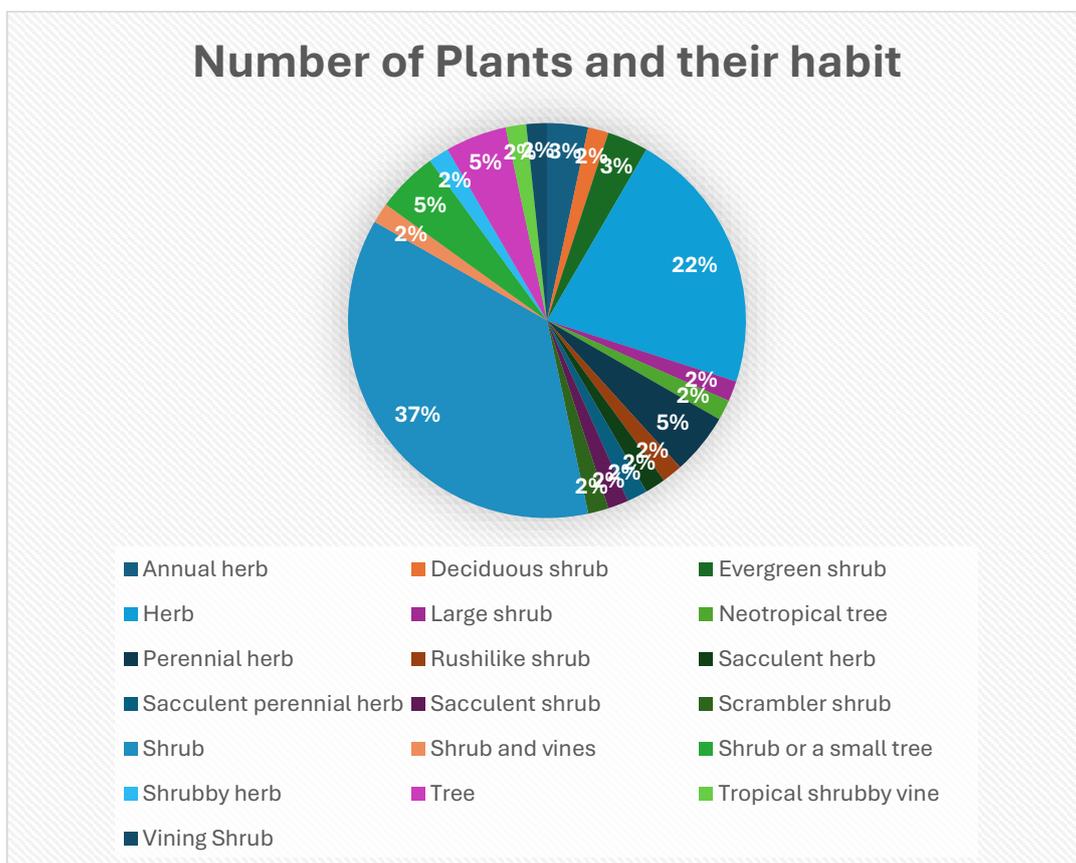
## Result Analysis:



The diversity of plant species shown in such way belong to 24 families, in which Asteraceae comprises of highest with 9 taxa and Apocynaceae with 8 taxa. Families Acanthaceae, and Bignoniaceae, with 5 taxa and Malvaceae and Fabaceae each with 4 taxa were distributed in various locations.



Among the sampling areas, most of the plant taxa were distributed at the premises of District collectorate, Mahabubnagar with 27 types of taxa out of 60 and the residential areas of Shah sahab Gutta, Bandameedipally and Christian pally with 10, 5 & 5 taxa respectively.





Based on the habit very diversified habits were observed viz, Annual herb, Deciduous shrub, Evergreen shrub, Herb, Large shrub, Neotropical tree, Perennial herb, Rushlike shrub, Succulent herb, Succulent perennial herb, Succulent shrub, Scrambler shrub, Shrub, Shrub and vines, Shrub or a small tree, Shrubby herb, Tree, Tropical shrubby vine, Vining Shrub, in which 22 were shrubs and 13 were herbs, trees were 3 out of 60.

#### Key Observations:

- The Asteraceae and Apocynaceae families contributed to the highest number of species, indicating their popularity in ornamental gardening.
- The Fabaceae and Bignoniaceae families had multiple representatives, highlighting their flowering and vine-based ornamental significance.
- Lamiaceae, Euphorbiaceae, and Nyctaginaceae had a moderate presence, showcasing diversity in leaf texture, shrub formation, and vine growth.

#### Discussion

The ornamental plants documented exhibit a diverse composition in terms of type and family distribution. The dominance of shrubs and herbaceous plants indicates a preference for easily maintainable and aesthetically pleasing greenery. The prevalence of flowering shrubs and vines signifies an inclination toward vibrant landscaping elements. [13]

The family-wise distribution underscores the significance of Asteraceae and Apocynaceae in ornamental horticulture, known for their bright, long-lasting flowers and adaptive growth forms. Families such as Fabaceae and Bignoniaceae, known for their fast-growing and climber species, enhance the vertical aesthetics of landscapes. [12,15,25]

#### Ecological Role:

Urban ornamentals such as *Ixora chinensis*, *Hibiscus rosa-sinensis*, and *Tagetes erecta* support pollinators, while *Tabebuia rosea* and *Bougainvillea spectabilis* provide shade, microclimate regulation, and carbon sequestration. Species like *Pyrostegia venusta* and *Portulaca grandiflora* aid soil stabilization, enhance biodiversity, and strengthen ecological resilience in urban landscapes. [12,21]

Overall, the analysis highlights a well-rounded collection of ornamental plants, suitable for diverse landscaping needs while supporting biodiversity and ecosystem sustainability.

#### 5. Summary

The project titled "Enhancing Urban Greenery: Ornamental Flowering Plants in Mahabubnagar" aimed to explore the role of ornamental plants in improving urban landscapes, with a specific focus on Mahabubnagar. The study identified a diverse range of ornamental species that thrive in the region's climatic conditions. Through detailed field surveys and observations, the research documented the



distribution, characteristics, and ecological benefits of these plants in various urban settings such as parks, roadsides, and residential areas.

The study highlighted the significance of ornamental flowering plants in enhancing aesthetic appeal, promoting environmental sustainability, and contributing to urban biodiversity. Species such as *Bougainvillea*, Marigold, Hibiscus, and *Rosa* were identified as popular choices due to their adaptability, vibrant blooms, and low maintenance requirements. The research also emphasized the role of GIS mapping in analyzing the spatial distribution of greenery in Mahabubnagar. This mapping helped assess gaps in vegetation coverage and identified priority areas for introducing new plant species to improve urban greenery.

In addition to environmental benefits, the project underscored the social and economic impacts of ornamental plants. These species were found to promote mental well-being, reduce noise pollution, and enhance local business aesthetics. The study also explored community participation initiatives for promoting greenery, recommending collaboration with schools, local authorities, and environmental groups.

To ensure long-term sustainability, the project proposed strategies such as promoting drought-tolerant species, establishing green corridors, and implementing awareness campaigns about the benefits of ornamental plants. Furthermore, maintenance practices, including pruning schedules, soil enrichment methods, and irrigation strategies, were discussed to ensure healthy plant growth.

## 6. Conclusion

The study on "Enhancing Urban Greenery: Ornamental Flowering Plants in Mahabubnagar" concludes that ornamental plants play a crucial role in transforming urban spaces. The findings confirm that these plants significantly contribute to aesthetic enhancement, ecological balance, and social well-being. By strategically integrating ornamental species in public parks, residential areas, and along roadways, Mahabubnagar can establish a sustainable and vibrant green landscape.

The research highlights the importance of plant selection based on regional climate conditions. Species like *Bougainvillea*, Jasmine, and Chrysanthemum demonstrated resilience to local environmental stressors, making them ideal for urban landscaping. Additionally, the use of GIS mapping proved effective in identifying underutilized green spaces, enabling targeted planting efforts that optimize resource utilization.

The project recommends a multi-pronged approach to maintain and expand ornamental greenery. Key strategies include promoting drought-tolerant species, ensuring regular maintenance through pruning and soil enrichment, and engaging local communities in greening initiatives. Collaboration with educational institutions and municipal authorities is vital to fostering environmental awareness and securing long-term greenery goals.



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