Design and Application of Garden Flowers in Urban Greening Landscapes

Peizi Xu

Anhui Province Urban Construction Design & Research Institute Co., Ltd., Hefei, Anhui, 230000, China.

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Abstract: With the advancement of China's economic development, people are paying increasing attention to the quality of life. Urban greening exhibits diverse forms, with garden flowers being a crucial component. How to leverage these characteristics to enhance urban greening standards is a topic of widespread concern. This paper elaborates in detail on the strategies and principles for the design and application of garden flowers in urban greening landscapes, aiming to improve the scientific nature of urban greening landscape design and create comfortable living environments for people.

1. Introduction

Against the backdrop of accelerated urbanization, urban spaces are filled with steel and concrete, and people's longing for natural ecosystems is growing stronger. Urban greening landscapes serve as a vital link between humans and nature. Garden flowers, as dynamic elements within them, bring vitality to the cold urban environment with their diverse forms and vibrant colors. They not only improve the ecology but also shape urban characteristics and meet residents' spiritual needs. Based on this, researching the design and application principles of garden flowers in urban greening landscapes and analyzing design and application strategies that align with ecological laws and citizens' demands hold profound significance.

2. Design and Application Principles of Garden Flowers in Urban Greening Landscapes

2.1 Aesthetic Principle

The aesthetic principle requires that in the design of urban greening landscapes using garden flowers, enhancing landscape quality should be the central focus, with visual harmony and emotional resonance as the guiding principles. This is manifested in the following aspects:Color coordination: Pursue a unified main tone with contrasting highlights. Use one or two colors as the dominant hues and then incorporate a small amount of contrasting colors to create focal points. For example, in road greenbelts, yellow coreopsis can be used as the main color, with red salvia interspersed among holly hedges to create a visually appealing effect.

Form design: Create a multi-level structure with varying heights. Arrange plants according to the pattern of a high background, a rich middle layer, and a low foreground. For instance, black-eyed Susan can serve as the background to block walls, medium-sized roses can be the main (this word seems out of place here, maybe "feature"?) elements, and low-growing petunias can fill in the ground gaps. The combination of different textures enhances the visual tension and prevents a flat landscape.

Atmosphere creation: Select appropriate flower species for different scenes. Use bright, thornless petunias in children's areas to create a playful atmosphere. In cultural districts, choose flowers that reflect local characteristics to make them carriers of emotions and culture.

2.2 Suitability Principle

In the design of urban greening using garden flowers, the suitability principle is the foundation for maintaining long-term landscape effectiveness and is reflected in four dimensions:

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Soil and climate suitability: Select flower species that are adapted to local soil and climate conditions. In cold and arid regions in the north, choose cold- and drought-resistant varieties such as Hylotelephium erythrostictum, and avoid planting Bougainvillea, which prefers warm and humid conditions. In the rainy south, plant water-tolerant species like Nymphaea and improve clay soils to prevent root rot. Spatial functionality suitability: Plant wind-resistant petunias at traffic nodes such as overpasses and intersections to avoid obstructing views. In park resting areas, grow low-growing, odorless white clover. On rooftops, plant Sedum lineare for its greening function and to reduce building loads. Ecological synergy suitability: Prioritize native flower species to reduce the risk of invasive alien species. Plant Pyracantha fortuneana and other ornamental fruit flowers to provide food for birds and build small ecological chains. Cultural context suitability:[1] Use peonies to enhance the ancient charm of historical cities like Xi'an. In ethnic minority regions such as Kunming, incorporate Yunnan's tea mountains to make flowers important symbols of urban culture.

2.3 Economic Principle

In urban greening landscape construction, the design and application of garden flowers should focus on cost control and follow the economic principle to ensure the sustainable progress of greening projects. This principle requires designers to maximize resource utilization through scientific planning, minimize comprehensive costs while meeting aesthetic and ecological needs, and avoid resource waste. When selecting flower species in the early stages, prioritize native flowers that are adapted to local soil, climate, and other conditions. These flowers do not require additional shading or insulation facilities, which improves their survival rate and reduces the need for replanting. In terms of configuration methods, focus on long-term effectiveness and multifunctionality, adopting a configuration model that primarily features perennial flowers supplemented by seasonal flowers. Additionally, use intensive configuration techniques such as flower clusters to reduce the management costs associated with scattered monoculture and improve maintenance levels.

3. Design and Application Strategies of Garden Flowers in Urban Greening Landscapes

3.1 Preliminary Planning: Precisely Adapting to Urban Conditions

Preliminary planning is the foundation for improving the quality of urban greening with garden flowers. It requires a deep integration of flowers and urban conditions using multiple methods to prevent blind planting. Comprehensive regional research: Natural conditions determine flower survival rates. Collect climate data from the past decade. For example, in Harbin in the north, where extreme low temperatures can reach -30°C, choose cold-resistant species like Hylotelephium erythrostictum. In Guangzhou in the south, which is hot and humid, select heat- and humidity-tolerant species such as Nelumbo nucifera. For areas with insufficient sunlight due to high-rise buildings, choose shade-tolerant flowers like Ophiopogon japonicus. In terms of soil, sample different regions. In old urban areas with saline-alkali soil, choose Tamarix chinensis, while in newly developed areas with poor soil fertility, use Medicago sativa for nitrogen fixation. Scientific functional matching: Plan according to regional functions. For traffic-related areas, use petunias in road dividers to prevent obstructing views. Plant shade-tolerant and shallow-rooted Ophiopogon japonicus under elevated bridges. For residential activity areas, prioritize safety and comfort. Choose Portulaca grandiflora for children's areas and Jasminum sambac and Osmanthus fragrans for elderly areas. Effective cost prediction: Balance effects and investments by calculating planting and maintenance costs in advance. Native flowers are generally cheaper than imported ones, and perennial flowers are more cost-effective than annual flowers in the long run, making them suitable for large-scale planting. In terms of facilities, install drip irrigation systems in water-scarce areas.[2] For example, using drip irrigation in greenbelts in arid northern cities is more cost-effective than manual watering. In summary, preliminary planning is a systematic task that should clarify what can be planted, what should be planted, and how to plant it at this stage, laying

the foundation for subsequent urban greening, improving resource utilization quality, and maintaining landscape aesthetics.

3.2 Planting and Combination: Creating Diverse Landscape Layers

Planting and combination are core methods for enhancing the texture of urban greening landscapes. They require breaking through flat layouts by constructing three-dimensional structures, coordinating colors and seasons, and adapting to different scenes to achieve the desired landscape effects. Constructing three-dimensional structures: Establish a "tree-shrub-flower-grass" spatial framework and create multi-level landscapes based on vertical height to avoid visual monotony. Use ornamental flowering trees in the upper layer to set the tone. For example, plant Crape myrtle and Prunus serrulata along roadsides to form flower tree corridors, and Malus spectabilis in community parks for their fragrance and ornamental value. Use shrub flowers in the middle layer. Plant Camellia japonica and Rosa chinensis in road greenbelts to create compact flower belts, and Nerium indicum in waterfront areas for visual enrichment and wind protection. Use herbaceous flowers and ground covers in the lower layer. Grow Hosta ventricosa under trees and Trifolium repens on bare soil to create a three-dimensional structure with "flowering trees above, flowering shrubs in the middle, and flowers and grasses below." Coordinating colors and seasons: Achieve "scenery in all seasons and harmonious colors" by reasonably coordinating colors and staggering flowering periods to enhance landscape sustainability. Follow the principle of a unified main tone with contrasting highlights in color coordination. In spring, use warm yellow as the main color, such as planting Hyacinthus orientalis and Tulipa gesneriana on park lawns. In summer, use cool colors as the dominant hues, planting Nymphaea and Iris tectorum in waterfront areas to relieve visual fatigue caused by high temperatures. In autumn, use red as the main color, planting Kochia scoparia along roadsides to create a seasonal atmosphere. In winter, retain Chimonanthus praecox and pair it with evergreen shrubs to prevent a monotonous landscape. Adapting to scenes: Adjust flower combination logic according to regional needs. Plant petunias, Roses, and Crape myrtle with a height of no more than 1.5 meters in greenbelts along traffic arteries to avoid obstructing traffic. Plant Camellia japonica, Malus spectabilis, and Viola tricolor in pocket parks and leave sufficient walking space for residents to rest and enjoy the scenery. Plant Salix babylonica, Nelumbo nucifera, and Iris tectorum along waterfront corridors to create a suitable waterfront environment and a poetic landscape.[3] In summary, planting and combination should take into account multiple dimensions such as space, time, and scenes, and enhance the layering and practicality of urban greening by combining three-dimensional structures, color and seasonal coordination, and scene adaptation.

3.3 Ecological Synergy: Building a Sustainable Greening System

Ecological synergy is a key link in promoting the sustainable development of urban flower greening. It requires enhancing the ornamental value and urban ecological functions of flowers by selecting ecological flower species, applying green planting technologies, and building biological chains.

Selecting ecological flower species: Lay the ecological foundation by prioritizing flower species with both ornamental and ecological functions and reducing the risk of invasive alien species. Focus on native wildflowers, such as Nelumbo nucifera in Shanghai's waterfront areas, which are adapted to local climate and soil conditions and do not require excessive labor, avoiding the displacement of native plants by alien species. Additionally, select flower species with special ecological functions, such as Lavandula angustifolia, which provides food for bees and increases the number of pollinating insects in cities.

Applying green planting technologies: Reduce ecological burdens by promoting low-carbon and environmentally friendly planting and maintenance technologies. Use sprinkler irrigation systems for water conservation. Install rainwater collection devices in road greenbelts in arid northern cities and use the collected rainwater for irrigation. Improve soil structure and prevent groundwater pollution by using organic fertilizers instead of chemical fertilizers. Control pests and diseases primarily through biological methods, such as releasing ladybugs to control aphids and using

biopesticides like matrine instead of chemical pesticides to minimize harm to birds and insects.

Building biological interaction chains: Enhance ecological diversity by forming a symbiotic system of flowers, animals, and plants and improving urban micro-ecological chains. Attract insects and birds to communities and parks by planting Lavandula angustifolia, Pyracantha fortuneana, and Ilex chinensis, creating an ecological system that integrates flowers, insects, and birds. Build a complete ecosystem in waterfront areas by planting Nymphaea to provide shelter for fish, which eat floating organisms in the water and reduce algal blooms. Waterfowl then feed on the fish, achieving water ecological balance. In summary, by synergizing flower species, technologies, and biological interactions, greening landscapes can be transformed from purely ornamental to ecologically functional, contributing to the construction of a sustainable urban ecological environment.

3.4 Cultural Integration: Highlighting the Unique Cultural Heritage of the City

Cultural integration serves as the soul of urban floral greening. It is essential to make flowers carriers of a city's distinct characteristics through the following approaches:

Firstly, accurately extract urban cultural symbols and select cultural spokespersons. This involves identifying cultural elements by considering the city's spiritual essence, ethnicity, and history, and then matching them with appropriate flower varieties [5]. For historical and cultural cities, priority should be given to flowers associated with the city's culture. For instance, Xi'an, with its Tang Dynasty culture, can plant peonies and begonias along the ancient city walls to vividly and directly showcase the poetic charm hidden in the "flowers of Chang'an." Suzhou, renowned for its Jiangnan garden culture, can plant lotuses and camellias around Pingjiang Road to resonate with the city's water-based charm. Modern cities, on the other hand, should select flowers based on their urban spirit. For example, Shenzhen, characterized by innovation and vitality, can plant jacarandas to create streetscapes.

Secondly, design for different scenarios and use floral landscapes to "tell stories." Cultural elements should be integrated into flower arrangements based on various urban spatial settings. City squares, as key areas for cultural display, can feature themed floral landscapes. For example, Luoyang's Wangcheng Square takes "peony culture" as its theme, planting a large number of peonies during the Spring Festival and pairing them with peony-shaped flower borders to highlight the city's reputation as "the best peonies in Luoyang." Meanwhile, local folk culture can be incorporated into communities and campuses. For instance, planting apricot trees and pairing them with chrysanthemums around campuses in Qufu echoes the city's identity as the birthplace of Confucian culture.

Thirdly, integrate cultural activities to enhance cultural memory. The cultural perception of tourists and residents can be strengthened by combining flowers with cultural events [6]. Kaifeng, for example, uses chrysanthemums to build ancient city gate shapes in Longting Park during its "Chrysanthemum Culture Festival," visually showcasing the city's historical heritage as a "capital of seven dynasties."

In summary, the application of cultural integration strategies makes flowers carriers of urban culture, enhancing the aesthetic appeal of urban landscapes and showcasing the city's unique characteristics through flower selection, scene arrangement, and event organization.

3.5 Post-Maintenance: Ensuring Long-Term Landscape Sustainability

Post-maintenance work is crucial for maintaining the quality of urban floral greening landscapes and requires scientific care and dynamic monitoring to ensure long-term stability. In daily meticulous maintenance, regularly prune unruly branches and withered flowers. For example, promptly cut off the withered branches of roses to facilitate better blooming next time. Water should be applied reasonably according to the flower varieties and characteristics. For instance, keep the soil moist for moisture-loving irises using drip irrigation, while reducing irrigation frequency for drought-tolerant sedum spectabile. Additionally, apply thin fertilizers frequently. Nitrogen fertilizer should be applied in spring to promote flower growth, and phosphorus and potassium fertilizers should be supplemented before flowering to increase the number of blooms. Organic fertilizers are

preferred to minimize soil pollution [7].

In seasonal-specific management, comprehensive plans should be formulated to address risks associated with different seasons. For example, set up sunshades for water lilies and other flowers during hot summer days, and water them in the morning and evening to lower temperatures. In severe winter cold, wrap the trunks of camellias and other flowers to prevent frostbite. During the rainy season, promptly inspect the drainage system and thoroughly clear accumulated water in flower beds to prevent root rot in lotuses and other flowers.

In dynamic monitoring and renewal, establish a landscape monitoring mechanism to regularly inspect the growth dynamics of flowers. When diseased or pest-infested plants are detected, replace and replant them within 24 hours. For example, promptly replant the same variety of flower seedlings when the dwarf morning glories in road greenbelts wither to prevent gaps in the flower beds.

In conclusion, post-maintenance should adhere to the principles of refinement and dynamism. Through daily care and seasonal responses, urban floral landscapes can continuously play a role in beautifying the city.

4. Conclusion

The ultimate goal of the design and application of garden flowers in urban greening landscapes is to create a suitable urban environment and shape a positive city image. In practical design and application, designers should adhere to the principles of aesthetics, suitability, and economy. By conducting thorough preliminary planning and achieving ecological synergy, they can create a comfortable living environment for urban residents and contribute to the sustainable development of the city.

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