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Application Analysis of Aromatic Plants of the Main Family Genera in Urban Greening in Henan Province

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Abstract

Through many places, in maintaining the urban overall urban texture and style at the same time, in the respect for the original order and humanities in the city on the basis of the aromatic plants clever into the urban greening, focus on the appropriate scale of urban green space, create an influential, sense of belonging and Henan regional characteristics of culture and spatial form. According to the ornamental characteristics, ecological value and health care of aromatic plants, we mainly analyze how to scientifically apply the above features in urban park greening, create the landscape effect of green and flowers in three seasons, and optimize the health configuration of influencing factors, providing scientific suggestions for the evaluation system of multi-sensory landscape design, so as to provide reference and reference for the application research and development of aromatic plants in our province.

Keywords

Aromatic Plants; Urban Greening; Selecting Planting Factors; Multisensory Experience.

1. Overview of Research-Related Definitions

1.1 Historical Distribution of Aromatic Plants

The use of aromatic plants in the world has a long history, and its functions and application forms are diverse, as shown in Table 1. The history of the development of foreign aromatic gardens began more than 2,500 years ago, when the world's first aromatic garden appeared in the enclosed courtyard of a Persian palace [1]. In the early 14th century, aromatic orchards were built mainly based on citrus, lemon and other fragrant fruit plants. Due to the ornamental characteristics of aromatic plants, Western countries use a large number of aromatic plants for garden ornamentation and courtyard greening in landscape design [2]. The Kobe Buyin Herb Garden in Japan is a landscape garden themed on aromatic plants, with 150 aromatic plants planted in the garden and 160 kinds of perfumes on display, creating an aroma garden with a very olfactory experience. The Great-garny's Garden in the Oslo Botanical Garden is not only a national project "Plant Heritage" coordinated by the Norwegian Genetic Resources Centre, but also the first aromatic garden for people with dementia in Norway [3].Most of the landscape composition of these aromatic gardens takes geometric figures as the main design elements. Through the combination and transformation of square and round gardens, it pays attention to the sense of order and perspective of space, and has its unique effect in reflecting the unified and complete space form.It is different from the changing spatial form of modern aromatic gardens in China, focusing on the harmonious unity of natural beauty and artificial beauty.

Aromatic plants are distributed in the five continents of the world, mainly in the Mediterranean coast countries , followed by in Central Asia, China, India, South America and other regions[4] .At present, there are various cultivation and growth of aromatic plants around the world, especially in tropical and subtropical regions, and some places have also formed the world-famous aromatic plant production areas, with a large scale, as shown in Table 2.

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Table 1. Regional distribution of ancient spices

Region	Plant categories	Function
Persia	*rose*	feast
Arab	*Boswellia, myrrh,jasmine,rose*	sacrifice,decoration,incense
ancient Greek	*rose ,Purple luo Orchid, Mentha haplocalyx, musk*	serve the gods and the dead,make food and wine
Cippus	*rose*	sacrifice,decoration,incense
East Asia, India,Kashmir	*benzoin,Pogostemon cablin , Cinnamomum cassia,nard,eaglewood,Pogostemon cablin, rose,tulip*	religious services, skin care

Table 2. World Key Aromatic Plant Production Areas

Region	Country	Plant categories
Europe	France	*lavender , Angelica sinensis,marjoram*
	Italy	*bergamot,citrus, lemon*
	Spain	*rosemary,sage,cypress,Foeniculum vulgare*
	Bulgaria	*lavender ,rose*
Africa		
	Egypt	*jasmine, geranium*
	Somalia	*myrrh,Boswellia carterii*
	Madagascar	*vetivertone,black pepper, Cananga odorata, Cinnamomum cassia*
Asia	India	*jasmine,sanders,Pogostemon cablin*
	China	eucalyptus,ginger,fruit of cubeb litsea tree
	Vietnam	citronella
America		
	America	*citronella,camomile,Perilla*
	Guatemala	cardamum
	Brazil	*eucalyptus,rosewood*
Aussie	Australia	*eucalyptus*

1.2 Aromatic Plant Landscape Design Positioning

Aromatic plants are a general term for cultivated and wild plants that have aromas and can be used to extract aromatic oils. It has medicinal value and profound meaning, and it is increasingly applied to our lives, often making essential oils and other uses.The use of aromatic plants with landscape design as an important part of the urban green space, through the qiao, shrubs, vines and herbs to divide the

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space, to create a landscape atmosphere.According to the growth habits and morphological structure of different plants, it shows the different group images of the four seasons, and can also bring visitors an olfactory experience in addition to visual appreciation.

1.3 Overview of Urban Park Green Space

As an important place for outdoor activities and communication among residents, the urban park green space has a relatively concentrated and large-scale land, providing a variety of functional space, and is known as the urban "oasis" [5].It plays a positive role in beautifying the urban environment, balancing the urban ecological environment and regulating the urban climate. It not only has the functions of cultural display, leisure activities, disaster prevention and shelter, but also provides the media for people to perceive the society, understand nature and experience modern scientific and technological achievements.

1.4 Urban Park Greening Development Requirements

With the rapid development of science and technology, people's requirements for the characteristics of the living environment are getting higher and higher, and in addition to intense work, they hope to relax in the natural environment and hope to have more characteristic experiences integrated into it. In the past, the simple plant stacking and a large pattern of artificial plant environment not only increased the construction and maintenance costs, but also the lack of native landscape effect, can not form the difference, so that people can not feel the natural effect.Aromatic plants play a role in beautifying, fragrant, purifying the air, improving human emotions and other roles in the greening of the park [6], and more and more designs have begun to advocate the implementation of multi-sensory ecological concepts in plant design planning, which has become a new idea of urban greening design.

2. Research Areas and Analysis

2.1 Resource Condition Analysis in Various Regions of Henan Province

Table 3. Analysis of resource conditions in various regions of Henan Province

Region		Ecological condition					Economic level
		Temperature	Illumination	Soil	Terrain	Hydrology	
Central of Henan	Zhengzhou City, Luohe City, Xuchang City, Pingdingshan City	Average annual air temperature of 12-16℃, rich in heat resources.	The annual average sunshine hours are 2000h-2200h	Tide soil, brown soil and brown soil have a wide area.	Plains, hills	The average annual precipitation is about 500-900 mL Yellow River system	High
Western of Henan	Sanmenxia City, Luoyang City	Heat resources are slightly insufficient	The annual average sunshine hours are 2000h-2200h	The brown soil has the largest distribution area	Hilly	The average annual precipitation is about 500-700 mL	Higher
North of Henan	Anyang, Puyang, Hebi, Xinxiang, Jiaozuo, Jiyuan City	Heat resources are slightly insufficient	The annual average sunshine hours were 2200h-2373h	Tide soil and brown soil are the largest distributed area	Plains,hills	The average annual precipitation is about 500-700 mL	Medium height
East of Henan	Shangqiu City, Kaifeng City, Zhoukou City	Rich in heat resources		Tide soil, salt soil, new accumulated soil	Plain	Huaihe river system	Middle
Southeast of Henan	Xinyang City, Zhumadian City	Rich in heat resources	The annual average sunshine hours are 1837h-2000h	Rice soil, brown loess	Plain	The average annual precipitation is about 900–1100 ml	Medium height
Southwest to Henan	Nanyang City	Rich in heat resources		Yellow brown soil, brown soil, tidal soil	Mountains,hills	Changjiang River system	Middle

Henan Province (located between 110°21′~116°39′E, 31°23′~36°22′N) is located in central China, in the middle and lower reaches of the Yellow River, with an area of more than 160,000 square

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kilometers, accounting for about 1.74% of the total area of the country[7]. In order to facilitate the unified study of various regions in the province, the sub-regions are divided according to the ecological and environmental conditions, social development conditions, geographical location, topographic conditions and regional differences in land use in Henan Province[8], as shown in Table 3. The terrain can be summarized as "three mountains, two basins and one plain", the west is the mountainous hilly area on the east side of the Loess Plateau, and the east is the Huang-Huai-Hai Plain formed by the siltation of the Yellow River and the Huai River. There are many types of soils and different forms, and at the same time, they span the four major river systems of Haihe, Yellow River, Huaihe River and Yangtze River, and more than 1500 rivers in the territory are crisscrossed. The rich and diverse environment provides powerful conditions for the growth of aromatic plants.

2.2 Analysis of Aromatic Plant Resources in Henan Province

China's aromatic plant resources are very rich, a total of 153 families, 620 genera, more than 1300 species, distributed throughout the country [9]. In terms of the family distribution of aromatic plant species, as shown in Figure 1, it is mainly concentrated in five families, namely Asteraceae, Labiaceae, Ruelia family, Magnolia family and Lauraceae, accounting for 35.03% of domestic aromatic plants, and concentrated in Zhejiang, Fujian, Xinjiang, Jiangxi, Guangxi and other places. Henan Province is located in the northern subtropical and warm temperate transition area, the climatic conditions are suitable for plant growth in the north and south, and the aromatic plant data is relatively rich. According to incomplete statistics, Henan Province has more than 130 kinds of aromatic plants, belonging to more than 20 families. As shown in Figure 2, it is mainly concentrated in the family Lipaceae, Lauraceae, and Rue family, accounting for a total of 34.62% of aromatic plants in Henan, mainly distributed in several mountainous areas such as Dabie Mountain, Tongbai Mountain, and Funiu Mountain[10], especially south of the Huai River, which is more abundant, and is almost consistent with the distribution of major aromatic plants in China.

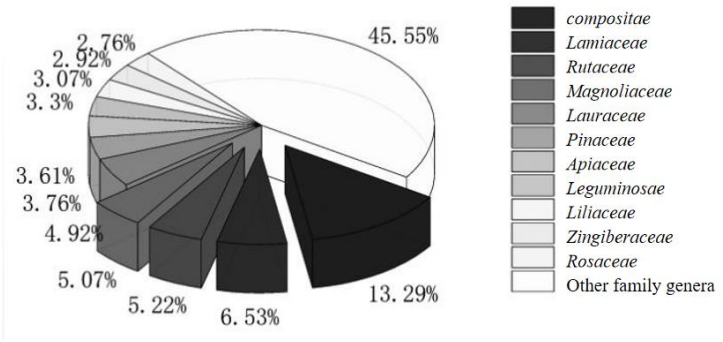

Figure 1. Proportion of aromatic plant species in China

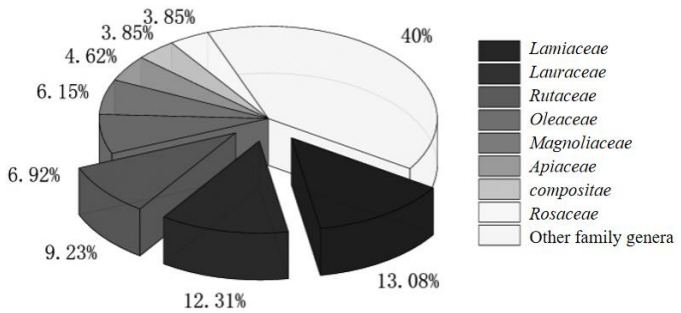

Figure 2. Proportion of major aromatic plant species in Henan Province

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The main species of aromatic plants in Henan Province are shown in Table 4, the fragrant flowers and vanilla plants with high ornamental properties are mainly concentrated in Labiaceae Family and the Rosaceae family, which are planted all over Henan, with high adaptability and wide range, and are used for urban green space configuration and development.Trees and shrubs are concentrated in Lauraceae, Trichoderma, Magnoliaceae, is the best choice of street trees, landscape trees, protective trees. In addition, there are some edible fruit and vegetable aromatic plants, the planting range is wider, but mainly to eat, do less ornamental planting, in the urban greening has limitations, can be appropriately selected for planting.

Table 4. Aromatic plant species of major families in Henan Province

Category	Section	Plant categories	Regional distribution
Fragrant flowers vanilla plants	*Lamiaceae*	*Scutellaria scutellaria, chamomile,sage,oregano, thyme, lemon balm, perilla, basil,mint,spearmint*	Distribution throughout Henan, mainly Funiu, Taihang, Dabie Mountains.
	Rosaceae	*Wood fragrance,perfume moon season,rose,yellow thorn rose,rose,Japanese evening cherry*	It is planted all over Henan
	compositae	*Chrysanthemum,Mugwort, Artemisia arvensis, Artemisia annua*	
Incense tree plant	*Camposta*	*Purple Nan,sassafras,yellow dan wood ginger,incense leaves, black medicine, green leaves,fragrant leaf tree,fishing camphor, mountain pepper*	Mainly distributed in Henan Dabie Mountain, Funiu Mountain south and Tongbai Mountain area.
	Oleaceae	*Osmanthus,hairy leaf cloves,leaf lilacs northern fragrant vines,jasmine flowers, forsythia*	It is planted all over Henan
	Magnoliaceae	*Tiannu flower, Magnolia,Wangchun flower,Mulan Magnolia,Yellow Heart Nocturnal,Red Fennel,Narrow Leaf Schisandra*	
Spices Fruit (Edible)	*Rutaceae*	*Wild peppercorns, peppercorns, Sichuan-Shaanxi peppercornsPeppercorns, bamboo peppers, peppercorns, spiny peppercorns,Quercus leaf peppercorns, prickly pepper trees, loquat trees,white fresh,citrus aurantium*	Mainly distributed in Henan Taihang, Funiu, Dawei and Tongbai Mountain.
	Apiaceae	*Coriander, heterophylla,white parsley Fennel, big-toothed angelica,wild carrots*	It is planted all over Henan

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3. Application Forms and Function of Aromatic Plants in the Greening Design of Urban Parks

3.1 Application Principles of Aromatic Plants in Urban Greening Design

3.1.1 Use Garden Plants to Show the Regional Characteristics of the Landscape

The plant landscape is an intersection of natural and human factors, which is a very important link in the display of local culture, carrying more and more historical and cultural information[11]. The differences in local plant communities due to climate and garden ecology make plants present regional landscapes. Palms and coconuts create a tropical scenery in the south, with lush pines and tall deciduous trees showing rugged northern scenery.In the design, we should actively use garden plant materials with regional characteristics to create a plant landscape, carry forward local culture, and cultivate people's sentiments.

3.1.2 Use Garden Plants to Create Landscape Space Artistic Conception

Use garden plants to create artistic conception for the space.Such as pine trees are planted at the entrance of the memorial hall, which looks solemn;the water's edge is planted with Metasequoia and so on, and it is cute and quiet.In order to create a plant landscape with distinctive cultural characteristics and stable cultural environment, in addition to understanding the competition and symbiosis of plant populations, we should also master the human spiritual attributes caused by plants—the beauty of garden artistic conception.

3.1.3 Use of Garden Plants to Form Spatial Changes

Plant is a three-dimensional object, which is the main component of the spatial structure in the landscape construction.Like other buildings and landscapes, plants also have the function that constitutes space, separates space and guides spatial change[12] .We can use the traditional garden of borrowing scenery, barrier scenery and other garden building techniques to produce the effect of"changing scenery step by step".

3.1.4 Use the Garden Landscape to Show the Timing of the Nature

According to the seasonal changes of plants, plants with different flowering periods are planted together, so that the same place produces different landscapes at different times, giving people a novel feeling.

3.1.5 Combination of Garden Plants and Other Landscape Elements

Garden plants not only have independent landscape appearance, but also complement the landscape architecture, mountains and waters, roads, sculptures and fountains and other landscape pieces, and should be harmonious and unified with other landscape elements.

3.1.6 Use Toxic Aromatic Garden Plants with Caution

In special places, avoid using toxic, prickly and easy to cause allergic plants[13], so as not to hurt visitors.Common toxic garden plants are oleander, poisonous arrow tree, ivy and so on.

3.2 The Use of Fragrance in Urban Greening

3.2.1 The Collocation of Fragrance

The use of aromatic plants should be primary and secondary, that is, considering the proportion of odors, generally with 1 to 2 kinds of odors as the main body, and others as auxiliaries to avoid the mixing of aromas. It is necessary to consider the interaction between different plant odors, whether they promote each other or suppress each other, and more importantly, whether the type of odor is in harmony with the surrounding environment.For example: the smell of fragrant or exciting roses, lilies, and wisteria is suitable for lively public venues[14], while the smell of camellia, mast, magnolia, plum and other plants can calm people [15], suitable for relatively quiet residential communities, hospitals and other environments.

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3.2.2 Flow of Fragrance

The configuration of outdoor aromatic plants should consider the crown density of the environment and the role of wind direction[16]. The concentration of the aroma required for open and closed spaces varies greatly, which can be adjusted by the density and position of the aromatic plant configuration and the direction of the wind.

3.2.3 Continuation of the Fragrance

The use of plant scents should also take into account the continuation and variation of the four seasons and be combined with the visual landscape. The plant configuration in spring can be considered to use scent to complement the visual landscape of hundreds of flowers blooming, and in winter, we should give full play to the advantages of aromatic plants and use evergreen plants to create garden landscape.

3.3 Application Type

3.3.1 Aromatic Plant Garden

With fragrant plants as the theme of the park landscape design, with a beautiful artistic conception, to provide tourists with an olfactory feast.

3.3.2 Aromatic Health Park

The garden design takes the environment as the medium to improve the health status of the human body through the absorption of aroma components and rehabilitation activities[17].In order to better meet the needs of the relevant therapy, the corresponding organization and design, and control the construction cost while meeting the effect, the whole garden with plants as the core, supplemented by outdoor furniture.According to the current area and shape of the garden, the main activity area is arranged in the middle of the site. By setting up outdoor furniture and soft barriers, the moving area is stretched to ensure effective walking and other activities.At the same time, the functions of each location are clear, and the needs of activities such as rest and gardening are met.

3.3.3 Fragrant Night Garden

At night, as the function of people's visual organs weakens, other senses gradually become sensitive.Night garden can make people "smell the scenery" when they cannot "view the scenery". In the night tour garden, we should choose white or yellow plants with large brightness, Such as evening primrose,tuberose, osmanthus, Gardenia et al, consider to create a suitable habitat environment for some insects[18], such as crickets, fireflies and so on.It is important to note that this kind of garden had better not have too strong lighting layout, in order to make the bright aromatic plant itself and insects such as fireflies create a blurry, dreamy visual effect, coupled with the aromatic experience of the sense of smell and the aural enjoyment brought by insects such as crickets,to the residents living in the dense areas of the town with the feeling of outdoor paradise.

3.4 Aromatic Plant Action

3.4.1 Have Ornamental Value and Enrich the Urban Landscape

At present, the introduction of aromatic plants in the park greening of the city has the function of beautification, and most of the aromatic plants have beautiful flower shapes, bright colors and excellent appearance. For example, China's top ten aromatic plants and various plants of medical value.

3.4.2 Improve the Air Quality and Beautify the Urban Environment

The tall plant communities in the city park use their dense foliage to effectively absorb and isolate all kinds of noise. Studies have proved that plants can absorb Soluble matter in water, reduce the number of bacteria in water, and their roots can absorb harmful substances in the soil, which plays a role in purifying the soil [19]. Plants are climate modifiers of urban ecological gardens. According to the physiological role of plants, it not only has the effect of regulating air, but also has a good impact on the local climate.According to the data, in the urban environment with more green amount, the chance

of heatstroke in summer is greatly reduced, and the plants in the urban green space can effectively reduce the "urban heat island" effect in most cities in China.

3.4.3 Have the Effect of Medical Care and Promote the Healthy Life of Residents

For these aromatic plants, not only have ornamental effect, some plants have a relatively strong medical effect. For example; geranium fragrance has calm mind, eliminate fatigue, promote sleep effect, jasmine has the effect of treating colds, and lilac aroma contains eugenol oil, sterilization ability is very strong.Some aromatic plants can also improve people's immunity, improve people's physiological function and spiritual outlook[20].

3.4.4 Secondary Processing of Medicinal Herbs, Spices and Foods

When the medicinal ingredients in the aroma are absorbed by the human body, they have a special therapeutic effect. The smell of white chrysanthemum, mugwort leaves and honeysuckle has a significant anti-hypertensive effect; the ozone released by pine trees has the effect of inhibiting tuberculosis bacillus; geranium has a sedative effect, can improve sleep, treat neurasthenia, etc.It can also extract a variety of fragrances of natural high-grade flavors, widely used in food, cigarettes, textiles, building materials, leather, alcohol, candy, toothpaste, cosmetics and other industries, its economic benefits are significant,it can also be used for processing health care fragrant teas, sachets, incense pillows, etc.

4. Summary

Based on the current situation, this paper conducts research on the introduction of aromatic plants in Henan regional urban parks, and expounds the relevant concepts of aromatic plants, aromatic gardens and aromatherapy by analyzing the development of aromatic gardens in foreign countries and abroad. Analyze how the development of urban park landscape in Henan region can scientifically and efficiently combine aromatic plants to form new landscape types, and put forward relevant theoretical support and scientific basis.It is also interpreted in detail from the functional zoning of urban parks, artistic treatment techniques, and selection of aromatic plant materials to enrich the landscape design of the city. Aiming at the ornamental characteristics, ecological value, health care and other special functions of aromatic plants, it mainly analyzes how to scientifically apply the above characteristics to the greening of urban parks, and creates a landscape effect of green in four seasons, flowers in three seasons, and different scenery in steps; Fully consider the characteristics and efficacy of aromatic plants, pay attention to the regularity and layering of plants, conduct research on the application of aromatic plants in urban parks and propose corresponding upgrading design schemes, achieve the effect of combining landscape and function, and better explore the significance of the value of aromatic plants, in order to provide valuable reference for the landscape design of urban parks in Henan.

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