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Comprehensive Evaluation and Application Research on Street Tree Resources in Yangzhou City Based on AHP Method

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Abstract: *By constructing a multi-dimensional indicator system covering ecological landscape value and other dimensions, the Analytic Hierarchy Process (AHP) effectively addresses the complexity of multi-objective decision-making in tree species evaluation, and greatly improves the specificity and objectivity of weight determination. Based on field investigations and literature research, this paper selects 20 major street tree species in Yangzhou as research objects and establishes a comprehensive evaluation system via the Analytic Hierarchy Process (AHP). Quantitative analysis is conducted on 14 specific indicators from three dimensions, namely ornamental characteristics, adaptability and environmental improvement capacity. According to the comprehensive evaluation results, the tested tree species are classified into three recommended grades: Grade I (10 species) with excellent comprehensive performance, which are recommended for priority promotion; Grade II (6 species) with good performance for supplementary application; Grade III (4 species) with average performance, whose planting scale is suggested to be controlled. The research findings can provide theoretical basis and practical reference for the scientific selection and optimal allocation of street trees in Yangzhou and other similar regions.*

Keywords: *Analytic Hierarchy Process; Street Trees; Greening Allocation*

1. Introduction

Urban streets constitute an essential component of urban greening. Their construction emphasizes the integration of ecology, aesthetics and functions to form unique urban landscapes, which play a pivotal role in improving the urban ecological environment, enhancing residents' quality of life and advancing sustainable development[1].The selection and collocation of tree species for urban streets significantly affect urban environmental aesthetics and ecological benefits, and are closely linked to the health and well-being of pedestrians, residents and merchants[2].

With the acceleration of global urbanization and the growing pressure on the ecological environment, scientific and rational tree species selection has become a key link in enhancing urban ecological resilience, optimizing landscape quality and achieving sustainable development. Faced with complex habitat conditions and diversified functional demands, the traditional tree species selection mode relying on empirical judgment can hardly meet the requirements of refined and scientific management, and it is urgent to introduce systematic quantitative evaluation methods to support decision-making.

The Analytic Hierarchy Process (AHP) exhibits prominent application value in the fields of forestry resource assessment and landscape planning by virtue of its advantages in decomposing complex problems into multi-level indicator systems and effectively integrating expert experience with qualitative and quantitative data. However, there remain extensive discussions and controversies regarding the dimensional construction of indicator systems, the subjective-objective integration strategy for weight determination, and the applicability differences of AHP in heterogeneous regional habitats across different regions.

Scholars have conducted targeted evaluations in various regions. For instance, Sun Yangchao et al. used the AHP Method to evaluate tree species for urban greening in Yan'an City. They found that the

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weight for Stress Tolerance was significantly higher than that for ornamental value, indicating that under special topographic and climatic conditions, the survival capability of tree species is the primary consideration for configuration models [3]. Focusing on the specific mountain landscape of Yichong Mountain in Datian County, Chen Guangwei constructed an evaluation indicator system that included Stress Tolerance, ornamental value, and plasticity. By integrating the AHP Method and the entropy weight method to calculate comprehensive weights, suitable species such as “Koelreuteria bipinnata” var. “integrifoliola” were screened and categorized into four grades, providing a quantitative basis for tree species selection in mountain landscapes [6]. Subsequently, building upon this foundation, Gao Yin et al. focused on the urban streets of Chongqing. Their research on street tree configuration patterns emphasized the importance of adaptation to the urban landscape and overall greening effectiveness. The AHP evaluation system they established provides a methodological reference for street greening configuration in areas with complex topography [7].

Furthermore, building upon this foundation, Yang Xiaojun et al. focused on the Jinan area. Through a comprehensive survey of the application status of backbone tree species in northern cities and specifically in Jinan, they established a comprehensive AHP evaluation model integrating qualitative and quantitative methods. Tree species were classified into three grades, ultimately recommending 13 species suitable as backbone trees for the Jinan area, including Chinese juniper, lacebark pine, goldenrain tree, and trident maple, thereby providing direct evidence for the planning of the local greening system [4]. The research by Huang Yuni et al. focuses explicitly on the comprehensive evaluation of new and superior native street tree species in the South Subtropical region. Employing the Analytic Hierarchy Process (AHP), the study constructed an evaluation model consisting of 5 criterion layers and 16 indicator layers to systematically assess 46 native tree species. The results show that seven species, including “Cinnamomum porrectum”, “Sinopimelodendron kwangsiense”, and “Terminalia myriocarpa”, exhibited excellent comprehensive performance. Another 21 species, such as “Laurocerasus zippeliana” and “Machilus chinensis”, demonstrated good performance. All of these are suitable as preferred street tree selections for South Subtropical cities in central-southern Guangdong, central-southern Guangxi, central Yunnan, and similar areas. The study specifically identified and recommended 12 new and superior native tree species[5]. Furthermore, Zhao Li et al., taking the street tree species in the main urban area of Zhanjiang City as a specific case, also employed the Analytic Hierarchy Process to construct a comprehensive evaluation system encompassing three criterion layers (landscape effect, ecological adaptability, and ecological service function) and 15 indicator layers. Through field surveys and expert consultation on 80 arbor species, they identified drought tolerance, shading and cooling effect, and stress tolerance as the key indicators with the highest weights. Based on the comprehensive evaluation index, the tree species were classified into four grades, with 35 species categorized as Grade I, possessing both excellent landscape effects and ecological adaptability. The study recommends that for the construction of shaded streets in Zhanjiang City, priority should be given to wind-resistant and highly adaptable tree species [6]. Taking Funing Qicai Agricultural Park as a case study, Sun Yaxuan and Liu Ruosha constructed an evaluation indicator system comprising three criterion layers—ecological function, aesthetic function, and service function—and 16 specific factors. They calculated the weights using the AHP Method and conducted a fuzzy comprehensive evaluation .

Yangzhou City has been successively recognized as a National Ecological City, a National Water Ecological Civilization City, a National Forest City, China's Most Ecologically Competitive City, and a Global Model City for Ecological Restoration. However, there is currently no specific evaluation indicator system for street tree species selection tailored to the Yangzhou region. This study employs the AHP Method to evaluate the major street tree species in Yangzhou City, aiming to provide a basis for promoting and applying superior street tree species.

2. Materials and Methods

2.1 Investigation Time and Location

The survey was conducted from April to December 2024 in Yangzhou City, Jiangsu Province.

2.2 Current Situation Investigation of Street Trees in Yangzhou City

Taking the street trees along the main streets of the central urban area of Yangzhou City as the research subject, multiple field surveys were conducted to identify the most frequently planted street tree species (see Table 1).

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Table 1 Major Street Tree Species in Yangzhou City

No.	Tree Species	Family	Genus	Life Form	Scientific Name (Latin)
1	Osmanthus	Oleaceae	Osmanthus	Evergreen Tree or Shrub	*Osmanthus fragrans*
2	Triadica sebifera	Euphorbiaceae	Sapium	Deciduous Tree	*Triadica sebifera*
3	Camphor Tree	Lauraceae	Cinnamomum	Evergreen Large Tree	*Cinnamomum camphora*
4	Red Tip Photinia	Rosaceae	Photinia	Evergreen Shrub or Small Tree	*Photinia × fraseri*
5	Crape Myrtle	Lythraceae	Lagerstroemia	Deciduous Shrub or Small Tree	*Lagerstroemia indica*
6	Sasanqua Camellia	Theaceae	Camellia	Evergreen Shrub or Small Tree	*Camellia sasanqua*
7	Japanese Spindle Tree	Celastraceae	Genus Euonymus	Evergreen Shrub or Small Tree	*Euonymus japonicus*
8	Red maple	Aceraceae	Genus Acer	Deciduous small tree	*Acer palmatum "Atropurpureum"*
9	Loropetalum chinense var. rubrum	Hamamelidaceae	Genus Loropetalum	Evergreen Shrub or Small Tree	*Loropetalum chinense var. rubrum*
10	Celtis sinensis	Ulmaceae	Genus Celtis	Deciduous Tree	*Celtis sinensis*
11	Ginkgo	Ginkgoaceae	Genus Ginkgo	Deciduous large tree	*Ginkgo biloba*
12	Cherry blossom	Rosaceae	Genus Prunus	Deciduous Tree	*Prunus serrulata*
13	Chinese Redbud	Fabaceae	Cercis genus	Deciduous Shrub or Small Tree	*Cercis chinensis*
14	Japanese Aralia	Araliaceae	Fatsia genus	Evergreen shrub	*Fatsia japonica*
15	Weeping Crabapple	Rosaceae	Malus genus	Deciduous small tree	*Malus halliana*
16	Glossy Privet	Oleaceae	Ligustrum genus	Evergreen tree	*Ligustrum compactum*
17	Southern Magnolia	Magnoliaceae	Magnolia genus	Evergreen Large Tree	*Magnolia grandiflora*

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18	Japanese Pittosporum	Pittosporaceae	Pittosporum genus	Evergreen shrub	*Pittosporum tobira*
19	Japanese Maple	Aceraceae	Genus Acer	Deciduous small tree	*Acer palmatum*
20	Cedar	Pinaceae	Cedrus	Evergreen Large Tree	*Cedrus deodara*

2.3 Establishment of Evaluation System

2.3.1 Determination of the Street Tree Evaluation Indicator System for Yangzhou City

This study primarily utilized the expert consultation method and theoretical analysis to determine the evaluation indicator system. Questionnaires were administered to 10 horticultural plant experts, 10 landscape planning and design professionals, 10 landscape construction personnel, and 10 landscape greening management personnel (totaling 40 individuals). Additionally, 10 visitors were randomly interviewed in public gardens. This process was combined with a review of relevant literature, incorporating scholarly research findings and the latest requirements from Yangzhou City's Urban Green Space System Plan to formulate the Street Tree Evaluation Indicator System for Yangzhou City (see Figure 1).

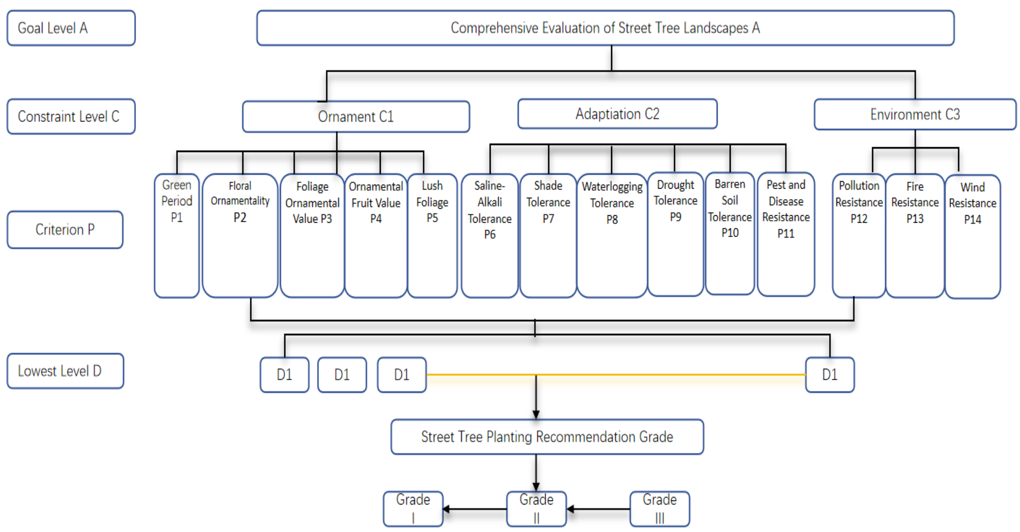

Figure 1: Evaluation Index System for Street Trees in Yangzhou City

2.3.2 Weight of Evaluation Indicators

(1) Construct pairwise comparison Judgment Matrices (Table 1). Based on the affiliation relationships within the evaluation system, this study employed the 1-9 ratio scale method to quantify the evaluation indicators. Nine sets of Judgment Matrices were created (see Formula 1) to perform pairwise comparisons and judgments among the evaluation items, calculating the relative importance coefficients (i.e., Weights) for each item.

To ensure the judgment matrix has complete consistency, a consistency check must be performed on the established matrix. The method calculates the judgment matrix's maximum eigenvalue λ max (see Formula 2) and constructs the judgment matrix:

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$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & \cdots & a_{2n} \\ \cdots & \cdots & a_{ij} & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{n1} & a_{n2} & \cdots & \cdots & a_{nn} \end{bmatrix} \tag{1}$$

In the matrix, a_{ij} represents A_i the relative A_j importance level. If the former is more important, then a_{ij} >1; if both are equally important, then a_{ij} =1.

$$\mathrm{CI} = \frac{\lambda_{\max} - n}{n - 1} \tag{2}$$

the CI value can be calculated, followed by CR= CI/RI. If CR<0.10, the matrix is considered to have satisfactory consistency. This shows that all 9 matrices exhibit satisfactory consistency.

(2) The relative importance ranking of all factors within the same level toward the highest level is termed the Hierarchy Total Sorting. After calculating the weight values of each specific P-level evaluation indicator relative to its corresponding C-level constraint layer, these are synthesized through weighting with the A-level criterion's weight value. This process ultimately calculates each C-level evaluation indicator factor's weight value relative to the Comprehensive Evaluation value, yielding the Hierarchy Total Sorting (see table 2-5).

Table 2: Judgment Matrix and Consistency Check

Comprehensive Evaluation of Street Tree Planting (A)	Ornamental Characteristics (C1)	Adaptive Traits (C2)	Environmental Improvement Capacity (C3)	Weight
Ornamental Characteristics (C1)	1.0000	1.1623	1.5368	0.3973
Adaptive Traits (C2)	0.8604	1.0000	1.4269	0.3506
Environmental Improvement Capacity (C3)	0.6507	0.7008	1.0000	0.2520
λmax=3.0006, CR=0.0006<0.1. Test result: Consistent.				

Ornamental Characteristics (C1)	Green Period (P1)	Floral Ornamentality (P2)	Foliage Ornamental Value (P3)	Ornamental Fruit Value (P4)	Lush Foliage (P5)	Weight
Green Period (P1)	1.0000	3.8367	2.2826	4.9091	0.5260	0.3052
Floral Ornamentality (P2)	0.2606	1.0000	0.5640	2.0939	0.2936	0.1011
Foliage Ornamental Value (P3)	0.4381	1.7731	1.0000	3.0304	0.3202	0.1546
Ornamental Fruit Value (P4)	0.2037	0.4776	0.3300	1.0000	0.3259	0.0657
Lush Foliage (P5)	1.9012	3.4060	3.1228	3.0688	1.0000	0.3734
λmax=5.1854, CR=0.0413<0.1. Test result: Consistent.						

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Adaptive Traits (C2)	Saline-Alkali Tolerance (P6)	Shade Tolerance (P7)	Waterlogging Tolerance (P8)	Drought Tolerance (P9)	Barren Soil Tolerance (P10)	Pest and Disease Resistance (P11)	Weight
Saline-Alkali Tolerance (P6)	1.0000	2.4584	2.6126	0.4004	0.8798	0.2335	0.1222
Shade Tolerance (P7)	0.4068	1.0000	1.4240	0.3413	0.5086	0.2135	0.0717
Waterlogging Tolerance (P8)	0.3828	0.7022	1.0000	0.3605	0.5644	0.3160	0.0691
Drought Tolerance (P9)	2.4977	2.9302	2.7742	1.0000	2.0237	0.3978	0.2166
Barren Soil Tolerance (P10)	1.1367	1.9663	1.7717	0.4941	1.0000	0.2453	0.1203
Pest and Disease Resistance (P11)	4.2824	4.6839	3.1649	2.5139	4.0774	1.0000	0.4002
λmax=6.2005, CR=0.0318<0.1. Test result: Consistent.							

Environmental Improvement Capacity (C3)	Fire Resistance (P12)	Pollution Resistance (P13)	Wind Resistance (P14)	Weight
Fire Resistance (P12)	1.0000	1.1367	1.6299	0.3925
Pollution Resistance (P13)	0.8798	1.0000	2.2179	0.3993
Wind Resistance (P14)	0.6135	0.4509	1.0000	0.2082
λmax=3.0212, CR=0.0204<0.1. Test result: consistent.				

The table above shows that weights calculated via the Analytic Hierarchy Process clearly demonstrate the importance gradient of each criterion layer indicator in the street tree planting comprehensive evaluation system. The overall weight distribution reveals a structured evaluation framework with Ornamental Characteristics as the core driver, Adaptive Traits as the key support, and environmental improvement capability as a significant supplement. The weight for Ornamental Characteristics (C1) is 0.3973, the highest among the three criteria. Under this study's evaluation framework, landscape ornamental value constitutes the most central and prioritized factor in street tree comprehensive evaluation, directly determining visual landscape effects and urban greening aesthetic value. The weight of Adaptive Traits (C2) is 0.3506, second only to Ornamental Characteristics, indicating their comparable importance. A tree species' ability to adapt to growing environments (e.g., salt-alkali resistance, drought resistance, pest and disease resistance) forms the critical foundation for ensuring long-term stable growth of Street Trees and sustaining landscape effects, underscoring its fundamental supporting role in Comprehensive Evaluation; The weight of Environmental Improvement Capacity (C3) is 0.2520, the lowest proportion within the Criteria Layer. This reflects that while environmental improvement functions remain an important value attribute of Street Trees, their significance in this Comprehensive Evaluation system is slightly lower than the ornamental and adaptive dimensions, serving primarily as a supplementary consideration for overall Street Tree value.

Table 3 Weight Values of Evaluation Indicators

Target Level	Primary Indicator	Relative Weight	Secondary Indicator	Relative Weight	Comprehensive Weight
Comprehensive Evaluation of Street Tree Planting (A)	Ornamental Characteristics (C1)	0.3973	Green Period (P1)	0.3052	0.1213
			Floral Ornamentality (P2)	0.1011	0.0402

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			Foliage Ornamental Value (P3)	0.1546	0.0614
			Ornamental Fruit Value (P4)	0.0657	0.0261
			Lush Foliage (P5)	0.3734	0.1484
	Adaptive Traits (C2)	0.3506	Saline-Alkali Tolerance (P6)	0.1222	0.0428
			Shade Tolerance (P7)	0.0717	0.0251
			Waterlogging Tolerance (P8)	0.0691	0.0242
			Drought Tolerance (P9)	0.2166	0.0759
			Barren Soil Tolerance (P10)	0.1203	0.0422
			Pest and Disease Resistance (P11)	0.4002	0.1403
	Environmental Improvement Capacity (C3)	0.2520	Fire Resistance (P12)	0.3925	0.0989
			Pollution Resistance (P13)	0.3993	0.1006
			Wind Resistance (P14)	0.2082	0.0525

Table 3 shows the weights for indicators at all levels in the comprehensive Street Tree planting evaluation system, calculated using the Analytic Hierarchy Process. These weights reveal differences in the importance of each dimension for species screening and comprehensive assessment. The hierarchical weight structure features distinct levels and clear priorities, systemically reflecting the comprehensive value of Street Trees across three core functions: Ornamental Characteristics, adaptability, and environmental improvement. At the primary indicator level, Ornamental Characteristics (C1) has a relative weight of 0.3973, ranking first as the most critical factor influencing Street Tree comprehensive evaluation; The relative weight of Adaptive Traits (C2) is 0.3506, ranking second and demonstrating importance comparable to Ornamental Characteristics, collectively forming the dual core of the evaluation system. Environmental Improvement Capacity (C3) holds a relative weight of 0.2520, ranking third and serving as a crucial functional dimension that provides foundational support. Overall, this evaluation system prioritizes landscape value, emphasizes adaptive capability as the key component, and incorporates ecological functions as supplementary elements, balancing ornamental, adaptive, and ecological considerations—aligning with urban street side greening's practical needs and planning objectives.

Regarding the comprehensive weights of secondary indicators, specific metrics vary significantly in their contribution to the final evaluation results. Indicators including Lush Foliage (P5, 0.1484), Pest and Disease Resistance (P11, 0.1403), Pollution Resistance (P13, 0.1006), Fire Resistance (P12, 0.0989), Green Period (P1, 0.1213), and Drought Tolerance (P9, 0.0759) hold the highest comprehensive weights. These are key variables determining Street Tree Comprehensive Evaluation outcomes, collectively demonstrating the fundamental importance of landscape canopy coverage, sustained green periods, pest resistance, drought adaptation, pollution purification, and fire safety in Street Tree selection and application. Indicators including Wind Resistance (P14), Saline-Alkali Tolerance (P6), Barren Soil Tolerance (P10), and Foliage Ornamental Value (P3) demonstrate moderate contribution and play a crucial supporting role in the Comprehensive Evaluation. Indicators including Shade Tolerance (P7),

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Waterlogging Tolerance (P8), Floral Ornamentality (P2), and Ornamental Fruit Value (P4) have relatively lower comprehensive weights and exert weaker influence within the overall system; they primarily serve as supplementary and differentiated evaluation metrics.

In summary, the weight allocation in this evaluation system closely aligns with the practical principles of 'landscape priority, suitability to site and species, safety and stability, and ecological soundness' for urban street trees. It balances visual effects, growth resistance, maintenance costs, and ecological benefits. With solid justification, it provides a quantitative basis for selecting superior street tree species, evaluating planting schemes, and making decisions on greening projects.

2.3.3 Scoring Criteria for Street Tree Evaluation Indicators

Comprehensively considering the landscape characteristics of Street Trees and based on expert opinions and literature [2-12], the scoring criteria for Street Tree ornamental value indicators were determined, adopting a 5-point system (using a scale of 1~5 to denote the relative importance scoring criteria for each indicator). This resulted in the scoring criteria for the P-layer criterion layer indicators (see Table 4).

Table 4: Evaluation Index System and Scoring Criteria for Street Tree Planting in the Central Urban Area of Yangzhou City

Target Layer (A)	Constraint Layer (C)	Criterion Layer (P)	Scoring Definition (1-5 points)
Comprehensive Evaluation of Street Tree Planting (A)	Ornamental Characteristics (C1)	Green Period (P1)	1 point: <120 days; 2 points: 120-180 days; 3 points: 181-240 days; 4 points: 241-300 days; 5 points: >300 days or evergreen
		Floral Ornamentality (P2)	1 point: No flowers; 2 points: Small, sparse flowers; 3 points: Moderate flowers; 4 points: Large, dense flowers; 5 points: Abundant flowers with long blooming period
		Foliage Ornamental Value (P3)	1 point: Ordinary leaves; 2 points: Slight color change; 3 points: Noticeable color change; 4 points: Seasonal colored foliage; 5 points: Year-round multicolored leaves or artistic form
		Ornamental Fruit Value (P4)	1 point: Fruit with no Ornamental Value; 2 points: Visible fruit; 3 points: Noticeable fruit; 4 points: Brightly colored fruit; 5 points: Distinctive shape and persistent fruit
		Lush Foliage (P5)	1 point: Coverage <30%; 2 points: 30%~50%; 3 points: 50%~70%; 4 points: 70%~90%; 5 points: >90%
	Adaptive Traits (C2)	Saline-Alkali Tolerance (P6)	1 point: Extremely low Salt-Alkali Resistance, prone to death in saline-alkali environments; 2 points: Low Salt-Alkali Resistance, stunted growth; 3 points: Moderate Salt-Alkali Resistance, can grow in mild saline-alkali conditions; 4 points: Salt-Alkali Resistance, can grow in moderate saline-alkali conditions; 5 points: Extremely high Salt-Alkali Resistance, grows normally in severe saline-alkali conditions
		Shade Tolerance (P7)	1 point: Extremely low shade tolerance, dies rapidly in shade; 2 points: Low shade tolerance, weak growth; 3 points: Moderate shade tolerance, can grow in partial shade; 4 points: Shade tolerance, grows well in shade; 5 points: Extremely high shade tolerance, thrives under dense canopy

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		Waterlogging Tolerance (P8)	1 point: Extremely intolerant to waterlogging, dies easily in standing water; 2 points: Intolerant to waterlogging, damaged by short-term flooding; 3 points: Moderately waterlogging tolerant, withstands short-term flooding; 4 points: Waterlogging tolerant, grows normally under prolonged moist conditions; 5 points: Highly waterlogging tolerant, withstands long-term standing water
		Drought Tolerance (P9)	1 point: Requires continuous irrigation; 2 points: Requires regular supplemental watering; 3 points: Drought tolerant for 1~2 months; 4 points: Drought tolerant for 3~6 months; 5 points: Drought tolerant >6 months
		Barren Soil Tolerance (P10)	1 point: Requires fertile soil; 2 point: Requires soil improvement; 3 points: Tolerates average soil; 4 points: Tolerates sandy/rocky soil; 5 points: Survives in rock crevices
		Pest and Disease Resistance (P11)	1 point: Highly disease-susceptible; 2 points: Requires frequent control measures; 3 points: Occurs occasionally; 4 points: Rarely diseased; 5 points: Naturally immune
	Environmental Improvement Capacity (C3)	Fire Resistance (P12)	1 point: Extremely flammable, complete mortality in fires; 2 points: Flammable, severe damage; 3 points: Moderately fire-resistant, recovers from light burns; 4 points: Strong fire resistance, low flammability; 5 points: Extremely fire-resistant, difficult to ignite, rapid post-fire recovery
		Pollution Resistance (P13)	1 point: Dies under pollution; 2 points: Foliar damage; 3 points: Reduced growth rate; 4 points: High tolerance; 5 points: Capable of pollutant absorption
		Wind Resistance (P14)	1 point: Highly wind-sensitive, prone to lodging; 2 points: Low wind resistance, breaks in strong winds; 3 points: Moderate wind resistance, withstands typical strong winds; 4 points: High wind resistance; 5 points: Exceptional wind resistance, deep-rooted with strong lodging resistance

3. Results and Analysis

Based on the scoring criteria in Table 4 and expert evaluations, Table 5 presents the comprehensive scores, rankings, and recommendation levels for the street trees.

Table 5: Comprehensive Score, Ranking, and Recommendation Grade of Street Trees

Tree Species	Comprehensive Score	Ranking	Recommendation Grade	Tree Species	Comprehensive Score	Ranking	Recommendation Grade
Camphor Tree	3.8419	1	I	Osmanthus	3.5026	11	II
Triadica sebifera	3.7763	2	I	Cherry blossom	3.4775	12	II
Ginkgo	3.7517	3	I	Chinese	3.4053	13	II

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				Redbud			
Celtis sinensis	3.68	4	I	Weeping Crabapple	3.3901	14	II
Glossy Privet	3.6021	5	I	Sasanqua Camellia	3.3837	15	II
Southern Magnolia	3.5996	6	I	Japanese Spindle Tree	3.3599	16	II
Cedar	3.5593	7	I	Loropetalum chinense var. rubrum	3.3407	17	III
Red Tip Photinia	3.5399	8	I	Japanese Aralia	3.3339	18	III
Red maple	3.538	9	I	Japanese Pittosporum	3.3338	19	III
Crape Myrtle	3.5177	10	I	Japanese Maple	3.176	20	III

Yangzhou City's Recommendation Grade I for street trees includes 10 species(see table 5). These species demonstrate excellent overall performance with strong ornamental value and distinct seasonal characteristics; they possess favorable cultivation traits, require relatively easy maintenance, and exhibit high planting survival rates; they show strong environmental adaptability with outstanding cold resistance, drought tolerance, and ability to thrive in poor soils; It also offers significant ecological benefits, demonstrating strong adsorption capacity for toxic gases and smoke dust, effectively purifying the air and improving the ecological environment. Its vigorous promotion and application in urban street greening projects within Yangzhou City are recommended.

Grade II recommended Street Trees comprise six species(see table 5). These tree species exhibit good performance in Ornamental Value, ecological function, and adaptability, though they are slightly inferior to Grade I species in some respects. They can be planted in controlled areas as an important supplement to Grade I species, enhancing the diversity and layering of the urban streetscape.

Level III Recommended Street Trees include four species (see table 5). They are unsuitable for widespread promotion as mainstream street trees and are recommended only for limited planting in specific areas to enhance green plant diversity and landscape layering richness.

4. Conclusions and Discussion

This study systematically investigates key issues concerning the health status, species composition rationality, and ecological adaptability of street trees in Yangzhou City's Central Urban Area. By introducing the Analytic Hierarchy Process (AHP), a Comprehensive Evaluation system for Street Trees suitable for the Yangzhou region was established to conduct quantitative assessments of the main Street Tree species in the Central Urban Area.

In developing road greening systems, the principle of controlling tree species ratios must be strictly followed, prioritizing native species adapted to local climate and soil conditions to effectively enhance plant community biodiversity. Simultaneously, symbiotic relationships between plant species must be fully considered, scientifically avoiding incompatible combinations to establish a stable and harmonious plant ecosystem . For tree species selection, priority should be given to varieties with strong Stress Tolerance and low maintenance requirements to control long-term management costs at the source. Meanwhile, introducing Geographic Information System (GIS) technology to establish comprehensive electronic archives for road greening is recommended. This facilitates digital management of plant growth status, maintenance records, and related data, providing technical support for the intelligent management and maintenance of road greening.

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