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GREENWAY PLANT LANDSCAPE PREFERENCES AMONG WORKERS IN URBAN BUSINESS DISTRICTS

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Abstract:

Rapid high-density development of central business districts has intensified environmental stressors for urban workers. Research confirms that individuals experience stress-reducing effects when immersed in their preferred natural settings. However, surveys on the preferences of urban business district workers for the greenway plant landscapes in their working areas are still relatively rare. This study selected Zhengzhou's North Longhu Financial Island as its research site, conducting a questionnaire survey among working populations. By October 2025, 582 valid responses were collected. Findings indicate that at the landscape design level, users generally favour greenway environments characterised by colour diversity, diverse plant species, clearly layered planting arrangements, and an emphasis on practicality and comfort. These findings provide a reference for the selection of plant varieties and planting methods in the subsequent design of greenways in urban business districts.

Keyword:

Greenway Plant Landscapes, Visual Preferences, Urban Business District Workers

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Introduction

Central Business District (CBD) office buildings are densely populated with commercial establishments and concentrated workforces. The high-intensity work pace subjects those employed within them to prolonged exposure to a high-stress microenvironment (Atchison et al., 2024). Research confirms that exposure to preferred natural environments yields stress-reducing effects (Chen & Li, 2024). However, CBD green spaces are limited in total area, with greenways often serving multiple functions—recreation, commuting, social interaction, and image projection—thus becoming coupled carriers of green space provision and psychological stress recovery. Over the past four decades, environmental psychology has demonstrated that preference for nature significantly enhances cognitive performance and emotional stability through attention restoration and stress buffer pathways (Kaplan & Kaplan, 1989; Ulrich et al., 1991). Yet, these classic studies predominantly relied on green-rich settings like suburbs or campuses. Whether their conclusions hold true within CBD greenways—characterised by extremely high land values and intense spatial heterogeneity—remains systematically unvalidated.

Environmental psychology theories, including Attention Restoration Theory (ART) (Kaplan & Kaplan, 1989) and Stress Reduction Theory (SRT) (Ulrich, 1981; Ulrich et al., 1991), suggest that green landscapes aid recovery from mental fatigue, stress, and negative emotions. ART posits that green landscapes can restore our attention and recover from mental fatigue. Regarding spatial layout, Kaplan and Kaplan (1989) indicate that individuals favour landscapes they can comprehend (i.e., those facilitating cognitive mapping) and integrate into (i.e., captivating environments with rich potential for further exploration). Human responses to landscapes are naturally expressed, and studying preferences for diverse landscapes can reveal certain types of perceptual understanding. Preference serves as a potent tool for understanding diverse landscape perceptions (Gao et al., 2019). Recent landscape preference research has increasingly focused on human responses to vegetation. Studies indicate that micro-scale characteristics such as tree canopy spread, floral colour diversity, and planting patterns exert significant main effects on perceived restrictiveness (Jiang et al., 2024).

Perceptual assessments of landscape preferences typically employ choices, rankings, or ratings provided by a sample of human observers (often represented by photographs) (Daniel & Meitner, 2001; Kalivoda et al., 2014). Landscape preferences are primarily influenced by landscape elements, landscape attributes, and the characteristics of survey respondents (Kalivoda et al., 2014). Related studies have found that plant landscape elements (e.g., trees, flowers, shrubs, grasses) (Wu, 2020) and plant landscape attributes (plant patterns, density, colour combinations) (Song et al., 2023; Turgut et al., 2012) exert significant main effects on perceived restrictiveness (Jiang et al., 2024). Some studies have revealed that factors such

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as gender (Sun et al., 2025), educational background (Kalivoda et al., 2014), age (Zakharova et al., 2025), and occupation (Svobodova et al., 2012) influence people's preferences for green spaces. Therefore, it is urgent to systematically investigate the plant landscape preferences of workers in the highly developed CBD core area, in order to provide a basis for the refined and universal design of stress-reducing landscapes for greenways under the condition of scarce land resources.

Methodology

Trees, shrubs, grasses, and flowers constitute the fundamental elements of plant landscapes (Wu, 2020). Factors that influenced the visual impact of greenway landscapes include plant colouration (Song et al., 2023), species selection, plant combinations, density, and plant methods (Turgut et al., 2012).

Through field investigations of Zhengzhou's greenways, researchers selected photographs of locally prevalent greenway plants. By categories and compiling these images across four holistic elements—flowers, trees, shrubs, and grasses—and considering colour, species, plant methods, planting combinations, and density, 28 high-quality landscape photographs were chosen. Each photograph was coded according to different elements: A1–A5, B1–B3, C1–C3, D1–D3, E1–E3, F1–F4, G1–G4, and H1–H3. A total of 28 landscape photographs were thus finalised as the sample set. Through organizing and analyzing photographs of common greenway plants in Zhengzhou, this study explores visual preferences for greenway landscape design among workers of different professions, focusing on users of the North Longhu Financial Island Greenway.

This survey employed a combination of printed questionnaires distributed on-site and web-based questionnaires accessible via a provided link. A random sampling method was used to survey the work population within the North Longhu Financial Island. The questionnaire primarily consists of three sections. The first section requires respondents to provide background information such as gender, age, educational attainment, and occupation. The second part asked respondents to evaluate their preference for each of 28 landscape sample photos individually. Using a Likert scale, five preference levels were established: Strongly Dislike, Dislike, Neutral, Like, and Strongly Like, assigned scores from 1 to 5, respectively. A total of 582 valid questionnaires were collected for this survey. Respondents were primarily working individuals from the Financial Island area of North Longhu Lake in Zhengzhou, representing occupations that include financial professionals, horticultural workers, delivery personnel, and service industry employees.

To validate the questionnaire's scientific rigour, a reliability analysis was first conducted. Results indicated a Cronbach's alpha coefficient of 0.967 for this dataset, confirming high reliability. Subsequently, Excel was employed to statistically analyse the number of respondents, percentage distribution, and mean values for each response option.

Analysis and Findings

The respondents in this urban greenway landscape preference survey were predominantly male (57.9%). Educational backgrounds were primarily bachelor's degree holders (54.12%) and college graduates (36.77%), while the occupational distribution showed the highest proportion in the professionals' category (66.49%). This demographic aligns with the survey

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area's status as an urban financial hub, exhibiting overall characteristics of youthfulness and high educational attainment.

Based on the table data, the public ratings for greenway plant landscape elements are as follows: Among floral displays, pink (A5) scored highest (3.89 points), followed by purple (A3, 3.84 points) and white (A4, 3.65 points), while red (A1, 3.30 points) and yellow (A2, 3.27 points) scored lower. For colour combinations, three or more colours (B3, 3.76 points) scored higher than two to three colours (B2, 3.60 points) and single colours (B1, 3.14 points). Regarding trees, double-sided planting (C3) received the highest score (3.98 points), significantly higher than no trees (C1, 2.69 points) and single-sided planting (C2, 3.27 points); multi-species combinations (D3, 3.78 points) scored higher than two or three species (D2, 3.56 points) and single species (D1, 3.33 points). Regarding density, density (E1, 3.65 points) and medium-dense (E2, 3.62 points) were similar, while sparse (E3, 3.12 points) scored lowest. Among tree species, Ginkgo (F4) scored highest (4.03 points), followed by Plane Tree (F3, 3.73 points) and Chinese Scholartree (F2, 3.73 points), while Goldenrain Tree (F1, 3.51 points) scored lower.

Among shrubs, golden privet (G4) scored highest (3.72 points), followed by boxwood (G3, 3.62 points) and pittosporum (G2, 3.56 points), while red osmanthus (G1) scored lowest (3.18 points). Among turfgrass species, daylilies (H3) scored highest (3.71 points), followed by oxalis (H2, 3.62 points), while liriope (H1, 3.44 points) scored lowest. Overall, Ginkgo (F4, 4.03 points) was the only category exceeding 4 points across all projects, followed by double-sided tree planting (C3, 3.98 points) and pink flowers (A5, 3.89 points).

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Table 1: Statistics on the Number of Respondents Selecting Each Score, Percentage of Total Respondents, and Average Score

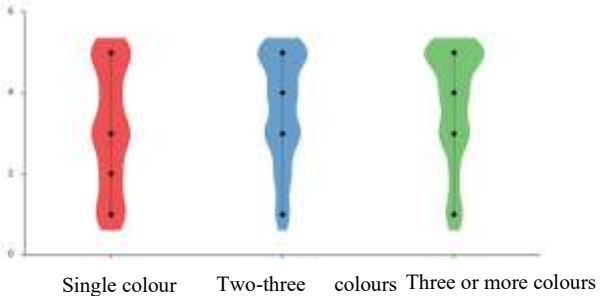
Image category / Score		Sample image	1	2	3	4	5	Average mark	Score Distribution Chart
Greenway Floral Display	A1 Red		108(18.56%)	54(9.28%)	145(24.91%)	105(18.04%)	170(29.21%)	3.3	
	A2 Yellow		93(15.98%)	75(12.89%)	154(26.46%)	104(17.87%)	156(26.8%)	3.27	
	A3 Purple		58(9.97%)	27(4.64%)	119(20.45%)	126(21.65%)	252(43.3%)	3.84	
	A4 White		65(11.17%)	49(8.42%)	136(23.37%)	109(18.73%)	223(38.32%)	3.65	
	A5 Pink		55(9.45%)	24(4.12%)	114(19.59%)	124(21.31%)	265(45.53%)	3.89	
	B1 Single colour		116(19.93%)	81(13.92%)	151(25.95%)	73(12.54%)	161(27.66%)	3.14	
	B2 Two-three colours		54(9.28%)	66(11.34%)	143(24.57%)	115(19.76%)	204(35.05%)	3.6	
	B3 Three or more colours		65(11.17%)	35(6.01%)	122(20.96%)	112(19.24%)	248(42.61%)	3.76	

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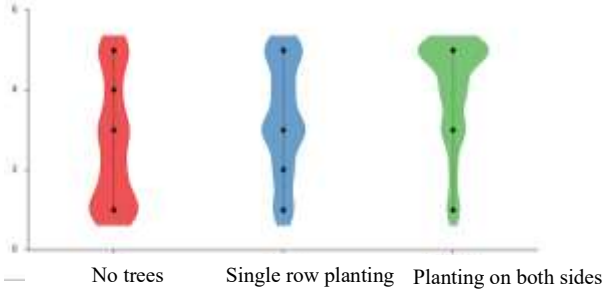
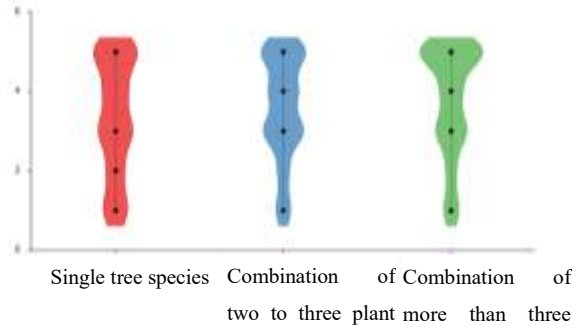
Image category / Score		Sample image	1	2	3	4	5	Average mark	Score Distribution Chart
Greenway trees	C1 No trees		199(34.19%)	85(14.6%)	121(20.79%)	54(9.28%)	123(21.13%)	2.69	
	C2 Single row planting		82(14.09%)	80(13.75%)	177(30.41%)	87(14.95%)	156(26.8%)	3.27	
	C3 Planting on both sides		50(8.59%)	30(5.15%)	97(16.67%)	107(18.38%)	298(51.2%)	3.98	
	D1 Single tree species		101(17.35%)	66(11.34%)	139(23.88%)	93(15.98%)	183(31.44%)	3.33	
	D2 Combination of two to three plant varieties		61(10.48%)	45(7.73%)	168(28.87%)	121(20.79%)	187(32.13%)	3.56	
	D3 Combination of more than three plant varieties		63(10.82%)	38(6.53%)	129(22.16%)	84(14.43%)	268(46.05%)	3.78	

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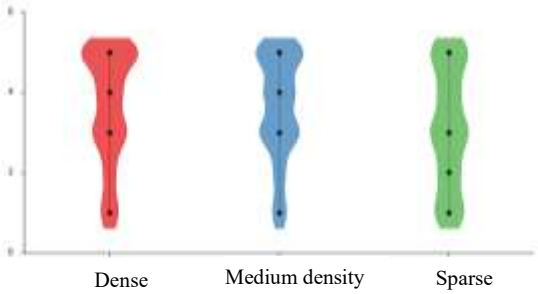
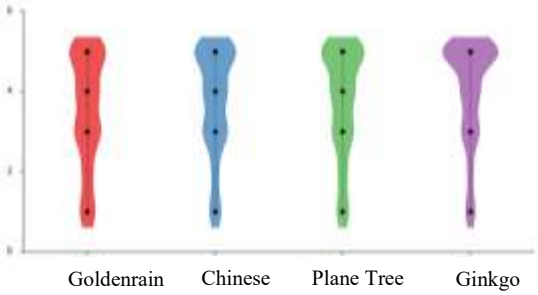
Image category / Score		Sample image	1	2	3	4	5	Average mark	Score Distribution Chart
Greenway trees	E1 Dense		70(12.03 %)	44(7.56%)	138(23.71 %)	95(16.32 %)	235(40.38 %)	3.65	
	E2 Medium density		56(9.62%)	44(7.56%)	163(28.01 %)	123(21.13 %)	196(33.68 %)	3.62	
	E3 Sparse		117(20.1 %)	81(13.92 %)	151(25.95 %)	82(14.09 %)	151(25.95 %)	3.12	
	F1 Goldenrain Tree		80(13.75 %)	51(8.76%)	139(23.88 %)	116(19.93 %)	196(33.68 %)	3.51	
	F2 Chinese Scholartree		61(10.48 %)	35(6.01%)	134(23.02 %)	124(21.31 %)	228(39.18 %)	3.73	
	F3 Plane Tree		63(10.82 %)	44(7.56%)	114(19.59 %)	125(21.48 %)	236(40.55 %)	3.73	
	F4 Ginkgo		49(8.42%)	26(4.47%)	96(16.49%)	100(17.18 %)	311(53.44 %)	4.03	

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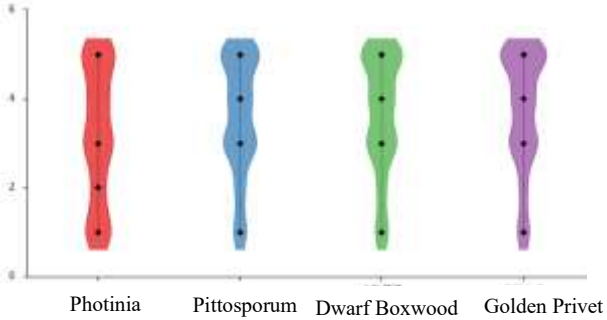
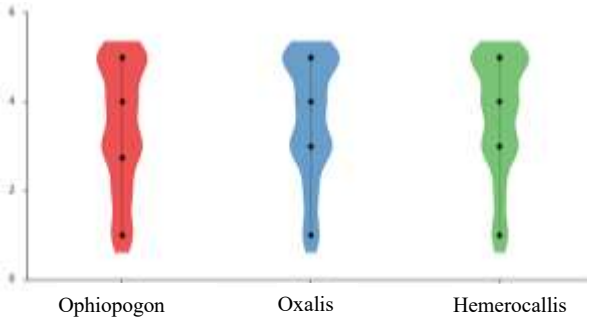
Image category / Score		Sample image	1	2	3	4	5	Average mark	Score Distribution Chart
Greenway shrubs	G1 Photinia		125(21.48%)	61(10.48%)	140(24.05%)	94(16.15%)	162(27.84%)	3.18	
	G2 Pittosporum		63(10.82%)	48(8.25%)	164(28.18%)	115(19.76%)	192(32.99%)	3.56	
	G3 Dwarf Boxwood		64(11%)	43(7.39%)	149(25.6%)	120(20.62%)	206(35.4%)	3.62	
	G4 Golden Privet		60(10.31%)	37(6.36%)	140(24.05%)	112(19.24%)	233(40.03%)	3.72	
Greenway Lawn	H1 Ophiopogon		76(13.06%)	69(11.86%)	145(24.91%)	106(18.21%)	186(31.96%)	3.44	
	H2 Oxalis		59(10.14%)	50(8.59%)	155(26.63%)	105(18.04%)	213(36.6%)	3.62	
	H3 Hemerocallis		58(9.97%)	40(6.87%)	134(23.02%)	132(22.68%)	218(37.46%)	3.71	

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Conclusion

Overall, this survey indicates that the working population of North Longhu Financial Island primarily uses greenways for commuting, fitness, and leisure activities. Regarding plant landscape preferences, flowers in soft hues such as pink and purple are significantly favoured over those in vibrant colours like red and yellow, with mixed-colour flower beds featuring three or more shades proving most popular. For roadside trees, planting arrangements with higher canopy closure—dense or medium-density configurations—were favoured. Regarding plant selection, Ginkgo biloba, golden privet, and daylilies emerged as the optimal choices for roadside trees, shrubs, and groundcover plants, respectively. In summary, greenway landscape design within urban financial districts should adopt multi-layered, multi-coloured configurations. Moderately high to high canopy closure creates a sense of enclosure along both sides, while prioritising ornamental plant species with pronounced seasonal variation meets the aesthetic demands of the financial sector workforce.

Contribution And Practical Implications

The contributions and significance of this study manifest at both theoretical and practical levels: ① Theoretically, by focusing on the specialised functional zone of urban financial centres, it systematically reveals the greenway landscape preferences of highly educated professional groups. This enriches research within environmental behavioural science concerning the spatial demands of specific socio-economic demographics, providing precise empirical data to underpin theories of urban green space preference. ② Practically, the findings can be applied to optimise greenway design within urban financial core districts. Quantitative data establishes a configuration paradigm characterised by multicoloured blending, densely shaded dual-sided layouts, and preferred distinctive tree species. This enhances the human-centred quality and usage efficiency of public spaces.

These findings provide a reference for the selection of plant varieties and planting methods in the subsequent design of greenways in urban business districts. They offer practical guidance for advancing the precise provision and sustainable development of urban public spaces.

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Ethics Statement: This study was conducted in accordance with ethical research standards. All procedures involving human participants were reviewed and approved by the Research Ethics Compliance Assessment Committee (JKPE-FSE) of the Faculty of Architecture and Economics at University Malaysia Kelantan, approval number UMK/FSE/JKPE/PG/001/2025. Informed consent was obtained from all participants prior to data collection. Participation was voluntary, and respondents were assured of confidentiality and anonymity. The data collected were used solely for academic purposes.

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