

Urban Street Plant Landscape Renewal Design Research - A Case Study of Ersha Island, Guangzhou City

Enna Xie¹, Jianfenng Yuan^{1*}

¹ South China Normal University Academy of Fine Arts, Guangzhou, China

Email Address

5499195888@qq.com (Enna Xie), 1275715800@qq.com (Jianfenng Yuan)

*Correspondence: 1275715800@qq.com

Received: 4 June 2023; Accepted: 30 June 2023; Published: 24 July 2023

Abstract:

With the acceleration of urbanization, the importance of urban public spaces has become increasingly prominent. Plant landscapes are an integral part of urban public spaces and have a positive impact on beautifying the urban environment, improving air quality, and enhancing the psychological well-being of residents. This paper aims to explore the renewal design of street plant landscapes based on urban public spaces, using Ersha Island in Guangzhou City as a case study. Therefore, this study first conducts field research on Ersha Island in Guangzhou City to analyze the existing problems in the street plant landscapes. Based on this analysis, design proposals for the renewal of street plant landscapes are put forward, aiming to promote sustainable development of the urban environment and the well-being of residents.

Keywords:

Street Landscape, Plant Landscape, Renewal Design, Ersha Island

1. Relevant Concepts

1.1. Concept of Street Landscape

Street landscape refers to the overall visual image and environmental characteristics of streets in urban or rural areas. It encompasses various aspects of street design, layout, buildings, greening, road facilities, sidewalks, road materials, etc., with the aim of creating aesthetically pleasing, pleasant, and functional street spaces. The concept of street landscape includes the following elements:

Street design and layout

The design of street width, length, curves, and topological structure has an impact on the street landscape. A well-planned street layout can provide smooth and convenient traffic flow while considering the reasonable division of sidewalks, bike lanes, and lanes to ensure the safety and comfort of pedestrians and vehicles.

Buildings and facade design

The exterior design of buildings along the street is crucial to the street landscape. The architectural style, proportions, height, facade materials, and decorations of buildings all influence the overall image of the street. Coordinated design of building facades can create a cohesive, orderly, and aesthetically pleasing street landscape.

Greening and landscape elements

Greening and landscape elements in street landscapes, such as trees, flower beds, lawns, and landscape sculptures, can enhance the beauty and comfort of streets, providing shaded areas and places for rest. Greenery also improves air quality, absorbs noise, and creates a pedestrian-friendly environment for walking and leisure.

Road facilities and street furniture

Road facilities include traffic lights, streetlights, road signs, garbage bins, etc., which play important functional and aesthetic roles in the street landscape. Street furniture refers to amenities such as benches, bicycle racks, public artworks, etc., providing convenience and comfort for pedestrians.

Road materials and textures

The choice and texture of road materials have an impact on the visual effect and pedestrian experience of the street landscape. For example, using high-quality sidewalk materials, road paving, and cobblestones can enhance the texture and overall quality of the street.

1.2. Plant Landscape

In street landscape design, plant landscape plays a vital role as an integral component. “Plants serve as a common means of greening and embellishing various types of clean spaces. As a soft landscape element, plants possess unique design techniques, rich content, and environmental ecology, bringing aesthetic appeal and vitality to urban streetscapes.” [11] Plant landscape refers to the creation and shaping of the visual environment of streets in urban public spaces through the selection, arrangement, and combination of plant elements. Its purpose is to utilize the natural beauty, ecological functions, and social values of plants to create a pleasant, sustainable, and human-centered urban environment.

1.2.1 Elements and Structure of Plant Landscape

Elements of Plant Landscape

Firstly, plant selection involves choosing plants that are suitable for the local climate and soil conditions, including trees, shrubs, flowers, and herbaceous plants. Consideration should be given to the color, form, texture, and growth habits of the plants to achieve a diverse and visually appealing effect. “Plants have forms that are inherent to them, providing rich content for plant landscape design, and can be shaped to some extent by human intervention, although many aspects are unchangeable. Through their natural and artificially modified forms, plants create different visual experiences for people: pointed or conical shapes convey a sense of seriousness, round or spherical shapes create a sense of grandeur, columnar shapes evoke tranquility, and drooping branches evoke elegance. In plant landscape design, the shape of plants can be fully utilized to create the desired atmosphere for people.” (Table 1) [3]

Table 1. *Plant Form Styles.*

Plant Form/Shape	Form Style
Spindle Shape	Narrow and elongated, tapering towards the top, directing the upward gaze.
Cylindrical Shape	Tree crown is round, similar in shape to the spindle shape.
Spherical Shape	Clearly defined as a circular or spherical shape.
Pyramidal Shape	Gradually widening from the top and tapering downwards, forming a pointed top.

Furthermore, plant layout considers the height, size, and growth rate of plants, arranging them in an organized manner within the space. Different levels and zones can be used to divide different functional areas, such as tree groves, flower beds, green belts, etc. Additionally, selecting plant combinations that are compatible and complementary allows for color coordination, contrasting forms, and seasonal variation effects. The interaction and mutual influence between plants also need to be considered to avoid competition or shading. “In plant landscape design, the spatial arrangement of different plants can have a significant impact on people's emotions and visual experience. Through the varied spatial composition, different feelings and experiences can be created within the design.”(Table 2.) [8]

Table 2. *Different Enclosure Effects of Plants with Varying Heights (Illustrated by the author)*

Plant Height	Function	Plant Species
Low Hedge <0.5m	ground-level boundary	Crepe Myrtle、Forsythia, Golden Euonymus, etc.
Medium Hedge 0.5~1.2m	enclosure and space division	Osmanthus, Camellia, Red Spider Lily, etc.
Tall Hedge 1.2~1.8m	space partitioning and visual screening	Hibiscus, Round Cypress, Golden Mimosa, etc.

In addition, “plants possess colors, and plant landscapes can utilize the colors of different plant flowers, leaves, and fruits to create a vibrant landscape effect.”[13]One can choose a theme color or a combination of complementary colors and adjust the plant color combinations based on seasonal changes.

“Lastly, plants have textures. The leaves, flowers, bark, and other parts of plants are composed of smooth, rough, soft, prickly, and other textures.” [9] By selecting plants with different textures, plants not only have their own tactile qualities but also form different textural effects under the influence of light. “Strong light tends to make plants appear rough, while soft light makes plants appear delicate. Different textures evoke different psychological perceptions, where roughness can evoke a wild feeling and delicacy can create a solemn effect, thereby enhancing the visual and tactile effects of the landscape.” [3]

The Structure of Plant Landscapes

Plant landscapes not only have their own distinct features but also possess the ability to integrate with the surrounding space. Based on the relationship between the height of plants and human sightlines, the combined structure of plants can be categorized into five types: sequential structure, point-line-plane structure, spatial structure, horizontal structure, and vertical structure.

a. Vertical structure: Refers to the three-dimensional layering created by plants of different heights in the space. Typically, it includes tall trees as the dominant layer,

medium-sized shrubs as the intermediate layer, and low-growing flowers or groundcover plants as the ground layer.

b. Horizontal structure: Formed by the layout and combination of plants to create a sense of horizontal hierarchy. Different functional areas can be defined through planned pathways, flower beds, or horticultural decorations, using plants of different types and heights to establish boundaries and transitions.

c. Spatial structure: Pertains to the sense of space and scale formed in plant landscapes. It can be defined and divided by the shadows of trees, the borders of flower beds, or the installation of fences, walls, or hedges. The arrangement and combination of plants can also create open spaces, enclosed courtyards, or intimate corners to meet various usage needs.

d. Sequential structure: Creates a series of coherent landscape elements through the design of plant continuity and variation. This can be achieved by gradually changing the height, color, and form of plants, or by incorporating pathways, landscape decorations, and water features to guide the flow of people through the landscape, creating visual continuity and surprises.

e. Point-line-plane structure: Formed by the layout and combination of plants, creating different shapes and scales of points, lines, and planes. Points can be prominent trees, flower beds, or landscape decorations, lines can be pathways, borders, or screens, and planes can be lawns, gardens, or courtyards. These structural elements interact with each other, resulting in rich landscape effects and a sense of space.

The elements and structures of plant landscapes are interconnected, together forming the overall landscape design. Through careful plant selection, layout, and combination, combined with different structural elements, unique and beautiful plant landscapes can be created, providing people with places to appreciate, relax, and connect with nature.

1.3. The Role of Plant Landscapes in Street Landscape Design

Plant landscapes play a vital role in street landscape design. “Plants are a common means of greening different types of clean spaces. As a soft landscape element, plants bring aesthetic enhancement and vitality to urban streetscapes, with unique design techniques, rich content, and environmental ecology.” [11] Plant landscapes refer to the creation and shaping of the visual environment of streets in urban public spaces through the selection, arrangement, and combination of plant elements. They aim to utilize the natural beauty, ecological functions, and social value of plants to create pleasant, sustainable, and humanistic urban environments. Plant landscapes have several functions in the design of streets in urban public spaces:

Aesthetic value

Plant landscapes can provide a natural beauty and artistic appeal to urban streets by selecting appropriate plant species, forms, and colors, creating a diverse range of landscape effects. The lushness of plants, the blooming of flowers, and the changing foliage add vitality and colors to the streets, enhancing people's quality of life and the city's image.

Ecological functions

“Plant landscapes play an important ecological function in urban environments. Plants absorb carbon dioxide and harmful substances in the air, release oxygen, and

improve air quality.” [5] Moreover, plants provide ecosystem services such as habitat provision, water cycle regulation, and mitigation of urban heat island effects. They can absorb pollutants from the air, purify the air, lower temperatures, and absorb and reduce stormwater runoff. Plants also provide shade and alleviate heat island effects, improving the microclimate of the city, absorbing noise, and enhancing people's comfort on urban streets.

Social spaces

Plant landscapes can create urban public spaces with social functions. The plant landscapes on streets provide places for relaxation, communication, and interaction, attracting people to stop, gather, and participate in community activities. They offer a space for people to interact with nature and socialize, promoting community cohesion and social connections.

Health and well-being

Plant landscapes have a positive impact on people's physical and mental health and well-being. Contact with nature and the enjoyment of plant scenery have been proven to reduce stress, improve mood and concentration, and promote relaxation. Introducing plant landscapes into streets in urban public spaces can provide residents with psychological and emotional satisfaction, enhancing their quality of life.

In summary, street plant landscape design is an important means of optimizing urban public spaces. Through the careful selection and arrangement of plants, it can increase the green atmosphere of streets, improve air quality, provide comfortable pedestrian environments, and enhance the city's image and residents' lives. [14][15]

2. Analysis of Plant Landscapes in Ersha Island Street, Guangzhou

2.1. Overview of Ersha Island Street, Guangzhou

“Ersha Island, also known as Ersha Head Island, is located on the Pearl River in the urban area of Guangzhou. It is surrounded by the river on all sides, with the main navigation channel of the Pearl River to the south, a secondary navigation channel to the north, Dongshanhu Park to the west, and Zhudao Hotel and Wuyang New Town to the north. Dashe Tou Wharf is located to the west.” [4] Ersha Island covers an area of 1.26 million acres. It is a sandbank in the middle of the Pearl River, standing by the river, with the Pearl River flowing around it. It is only a ten-minute drive from the Pearl River's new CBD. It is a feng shui treasure land and the most modern area in Guangzhou. The Star Sea Concert Hall, Guangdong Museum of Art, a large area of high-quality residential areas, and fitness centers are covered with lush greenery. Various art sculptures are scattered around, creating a rich cultural and artistic atmosphere. [2][7]

The east-west roads on Ersha Island include Qinglan Road, Datong Road, Yanyu Road, Yuetai Road, and Qingbo Road. The north-south roads include Dizhu Street, Yunying Street, Chunxiao Street, Xiaowu Street, Qilin Street, Yuyu Street, Tan Yue Street, Haishan Street, Yuchang Street, Juhu Street, Pujian Street, Songtao Street, Pazhou Street, and Lingzhou Street. With the rapid development of Guangzhou City, Ersha Island has also become one of the hotspots for urban development. In recent years, a series of urban renewal and transformation projects have been carried out on the island, including street renovations, landscape design, and infrastructure construction, to enhance the island's image and functionality. “The plant landscape

planning in street design has created a city street dominated by large trees, shrubs, flowers, and lawns, forming a public leisure green belt in the city center. It creates a landscape effect of sparse woods and shady trees.” [1] (Figure 1)



Figure 1. Aerial View of Ersha Island Street, Guangzhou.

Source: <https://image.baidu.com/>

2.2. Analysis of the Current Situation of Plant Landscape in Ersha Island Street, Guangzhou

2.2.1. Effects of Plant Landscape

The street design of Ersha Island includes single-lane traffic, pedestrian walkways, and non-motorized vehicle lanes. To mitigate the negative effects of heavy traffic flow and vehicle noise on pedestrian experience, tall deciduous trees are planted along the streets with shrubs forming a barrier underneath. The use of partially open shrubs and flower lawns as common spatial designs helps create a natural transition from the protective green belt to the road, effectively blocking vehicle noise and unwanted sights, and reducing the impact of unfavorable views on the overall visual experience of the sidewalk (Figure 2).

The plant configuration in Ersha Island Street is mostly evergreen throughout the year, providing satisfactory flower viewing and foliage appreciation. The design of plant landscape on Ersha Island Street also emphasizes the use of local plants, which are adaptable and selected according to different locations. The diverse plant configuration showcases the differences in form, proportion, ornamental characteristics, and colors of various plants, creating a cohesive and rich plant landscape. The plant species used in the landscape design include mango trees, kapok trees, camphor trees, phoenix trees, egg-flower trees from the family of magnoliaceae; red-flowered jade vine, asparagus vine, rose chestnut, and others for shrubs; and hundred-day grass, cockscomb, and thousand-day red for herbaceous plants, creating a multi-level integrated landscape effect.

Ersha Island Street has a wide variety of plant species with colorful flowers, but most flowering plants bloom in spring, summer, and autumn. There are fewer plants that bloom in winter, resulting in a monotonous color and shape during that season. The current plant landscape on Ersha Island Street mainly focuses on flower and foliage plants, appearing visually repetitive, lacking sustainable ornamental value. This situation limits the street's aesthetics to a predominantly green effect rather than enhancing the viewing experience (Figure 3). Therefore, it is necessary to consider planting some winter-flowering and visually appealing plants, such as red flowering silver fern, poinciana, roses, and Chinese fringe trees, which exhibit high ornamental value during their blooming period and showcase distinctive Lingnan characteristics. The selection of plant combinations should also consider color diversity to enrich the

plant landscape and avoid monotony, enhancing the ornamental value and improving the viewing experience. In some areas of the street, the lack of sunlight results in the inability of grass to grow under the trees and the lack of pruning, leading to a messy appearance (Figure 4).

2.2.2. Plant Selection

The core of plant configuration on Ersha Island in Guangzhou is the use of local plants combined with Lingnan cultural elements. The main tree species planted are Kapok trees, which are the city flower of Guangzhou. They have large flowers, elegant and towering tree structure. They are used for greening the motor vehicle lanes, non-motorized vehicle lanes, and pedestrian streets individually and separately. The main shrub layer consists of red-flowered jade vine. Red-flowered jade vine is known for its strong adaptability, drought resistance, and long flowering period. It can be pruned into a spherical shape artificially or grow naturally in clusters. In the road landscape, it is planted individually or in groups around the lawn to increase the vertical and horizontal hierarchy of road vegetation, creating a strong visual contrast between road vegetation and green spaces. The overall plant selection for the street considers the unity of ecology and culture. However, due to multiple construction and design phases of the street landscape, there is a lack of continuity in plant selection and arrangement, resulting in a chaotic plant landscape. The trees are relatively young, and although there is a variety of plant species, they are not well-scaled (Figure 5).



Figure 2. Roadway and Sidewalk.



Figure 3. Yanyu Road Section on Ersha Island .



Figure 4. Partially Disordered Shrubs.



Figure 5. Plant Landscape on Ersha Island.

2.3. Issues in the Landscape Design of Ersha Island Street

The landscape design of Ersha Island street has many aspects to learn from and reference in terms of ecological planning and plant landscape configuration. It has formed a certain landscape through multiple construction plans by the Guangzhou Municipal Government. However, the matching plant landscaping has not been fully developed and requires further enhancement in terms of quantity and scale. The main issues in the design of the Ersha Island street landscape in Guangzhou are as follows:

a. Overemphasis on visual effects of the landscape while neglecting the interactive and experiential aspects between pedestrians and the streetscape, as well as community communication.

b. Limited variety of plant species and vegetation types, resulting in insufficient biodiversity in urban green spaces.

c. Selection of diverse flowering plants to ensure different changes in the landscape throughout the year.

d. The overall selection of plant species considers the unity of ecology and culture, but the street landscape has undergone multiple construction designs, resulting in a lack of continuity in plant planting and arrangement, leading to a chaotic plant landscape.

e. Some street plants are aging, poorly grown, or lack maintenance, which affects the aesthetics and functionality of the landscape.

It is worth focusing on how to improve and address these issues through the creation of plant landscapes.

2.4. Updating Strategies

It is worth focusing on how to improve and address these issues through the creation of plant landscapes.

Ersha Island Street in Guangzhou is an important urban street, and “plant landscape design plays a significant role in urban public space greening. On one hand, it is a rare form of visual art, and on the other hand, it promotes the development of modern environmentally-friendly cities”[10]. Therefore, this paper aims to study the design of plant landscape renewal in urban public spaces, taking Ersha Island Street in Guangzhou as an example, and propose optimization strategies to enhance the city's charm and soft power, effectively activating its intrinsic vitality and creating a favorable environment for better construction of a modern city.

Plant Selection Strategy:

a. Priority for local species: Choose local plants that are adapted to local climate conditions and have good growth conditions to enhance the adaptability and ecological stability of the landscape. Consider using characteristic local plants in Guangzhou, such as Pearl River flowers and Camphor trees, to enhance the local characteristics and cultural significance of the landscape.

b. Diverse plant arrangement: Emphasize the introduction of diverse species in plant selection to enhance ecosystem functionality and increase the ornamental value of the landscape. Ensure that there are different scenery and blooming flowers throughout the year, providing a continuous sense of beauty and landscape variation. Introduce a variety of plants, including trees, flowers, and shrubs, to enrich the sense of landscape hierarchy and color variation while increasing the diversity of the ecosystem.

c. Introduction of adaptive varieties: Introduce non-local species with strong adaptability to increase the variety and richness of plants, improving the diversity and abundance of the landscape. [12]

Landscape Design Strategy

Clearly hierarchical green layout: Divide the green layout into different levels based on the street's functions and usage requirements, such as main roads, pedestrian streets, and community green spaces, to achieve effective separation of functions and spaces.

a. Integration of plant landscape with pedestrian environment: Incorporate suitable green elements into street design, such as green isolation belts, vertical green walls, and green canopies, to provide a comfortable walking environment and visual enjoyment.

c. Seasonal landscape variation design: Achieve seasonal landscape changes by selecting plants with different flowering periods and colors, providing a rich visual experience and dynamic sensation.

d. Diverse tree species and planting methods: Emphasize the selection of plants, including local species and seasonal flowers, to increase plant biodiversity. Consider introducing suitable herbaceous plants and ground cover plants to enhance the plant hierarchy and ecological functions.

e. Enhancing the continuity of street landscape: Pay attention to the coherence of street landscape design by using consistent plant cultivation and matching schemes, ensuring a unified style and overall sense in different areas. Design considerations should take into account the growth and development characteristics of plants to maintain landscape stability and continuity.

Maintenance Management Strategy

a. Reasonable maintenance plan: Develop a comprehensive plant maintenance plan, including watering, pruning, fertilization, etc., to ensure the healthy growth of plants and long-term maintenance of the landscape. Strengthen plant maintenance and care, focusing on the health and maintenance of street plants. Regularly inspect and maintain plants, promptly replacing aging or poorly growing plants to ensure the aesthetics and functionality of the landscape. Additionally, establish an effective maintenance management mechanism to ensure regular care and maintenance of the plants.

b. Community participation and education: Encourage residents to participate in landscape maintenance, organize relevant training and promotional activities to enhance residents' sense of ownership of public spaces.

c. Environmentally-friendly maintenance methods: Adopt environmentally-friendly maintenance methods, reduce the use of chemical agents, and emphasize the application of organic fertilizers and natural control methods to promote ecological balance and environmental friendliness.

In conclusion, by focusing on pedestrian experience, increasing biodiversity, selecting plants with diverse flowering periods, emphasizing continuity, and strengthening maintenance and care, the design strategies for updating Ersha Island Street in Guangzhou can be enhanced, thereby improving the quality and functionality of the street landscape. By enhancing the scientific and rational allocation of plants, optimizing the design of plant landscape in urban public spaces, diverse needs of urban residents can be met.

3. Conclusions

In this study, the street plant landscape of Ersha Island Street in Guangzhou City was taken as a case to conduct a research on the updated design of urban public

spaces. By analyzing and reflecting on the problems of the existing design methods, a series of updated design strategies were proposed with the aim of improving the quality and functionality of the street plant landscape.

Firstly, the importance of the interaction experience between people and the street scenery, as well as the communication and exchange within the neighborhood, was emphasized. By introducing elements such as resting areas, outdoor seating, and interactive installations, people are encouraged to stay, communicate, and participate in the street scenery, making the street a place that promotes social interaction and engagement.

Secondly, the issue of biodiversity loss in urban green spaces was addressed. By adopting diverse tree species and planting methods, including local species and seasonal flowers, the aim is to increase the biodiversity of plants. In addition, the consideration of introducing suitable herbaceous plants and ground cover plants helps to increase the plant layers and ecological functionality, achieving the ecological sustainability of the street plant landscape.

Furthermore, the importance of selecting plants with diverse flowering periods was emphasized. By selecting plants with different flowering periods, the diversity of views throughout the year can be achieved, providing pedestrians with a continuous sense of beauty and landscape variation.

Moreover, the continuity of the street landscape and the maintenance of plants were highlighted. In the design, emphasis is placed on the coherence of the street landscape, ensuring a consistent style and overall sense in different areas through unified plant planting and matching schemes. At the same time, the maintenance and care of plants are emphasized, with regular inspections and maintenance, timely replacement of aging or poorly growing plants, to ensure the aesthetics and functionality of the landscape.

Finally, this study provides a series of reference strategies for the updated design of street plant landscapes based on urban public spaces. By improving visual effects, enhancing pedestrian experiences, promoting community interaction, increasing biodiversity, and strengthening maintenance and care, a more beautiful, pleasant, and sustainable urban street environment can be created. It is hoped that this study can provide useful references for future design and transformation of urban public spaces, and create a better living environment for urban residents.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

This work was supported by the Guangdong Education Science Project (Higher Education Special Project) (2021GXJK200), and the Guangzhou Philosophy and Social Science 14th Five-Year Plan Project (2021GZGJ274).

References

- [1] Yan, J. Problems and Improvement Measures of the Lawn in Ersha Island Park, Guangzhou. *Green Technology*, 2021, 23(13), 65-67+71.

- [2] Zhou, L. Urban Marathon and Urban Image Marketing in the Media Context (Master's thesis, South China University of Technology). Available online: <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201701&filename=1016737519.nh> (accessed on 5 May 2023).
- [3] Yan, P. Rational Design of Plant Landscapes in Urban Public Spaces. *Journal of Chifeng University (Natural Science Edition)*, 2016, 32(06), 139-140.
- [4] Dong, Y. Research on the Development of Residential Buildings in the Central Urban Area of Contemporary Guangzhou (Doctoral dissertation, South China University of Technology). Available online: <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFD1214&filename=1014153501.nh> (accessed on 5 May 2023).
- [5] Chen, Y. Analysis of the Application of Classical Chinese Garden Architecture. *Modern Horticulture*, 2015, 23, 90-91.
- [6] Zhou, C. Analysis of Plant Configuration in Urban Ecological Landscapes. *Special Economic Animals and Plants*, 2021, 24(09), 97-98.
- [7] Xiao, Y. Poetry Dwelling in Guangzhou. *Pearl River Shipping*, 2011, Z3, 88-90.
- [8] Liu, Y. Optimization Design of Plant Landscapes in Urban Public Spaces in Central China. *Modern Horticulture*, 2020, 43(22), 80-81.
- [9] Wang, X. Research on the Texture of Plants in Landscape Design. *Journal of Jilin Radio and TV University*, 2012, 06, 94-95.
- [10] Zhou, Y. Research on the Design of Plant Landscapes in Urban Public Spaces (Master's thesis, Huazhong University of Science and Technology). Available online: <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD0506&filename=2006039345.nh> (accessed on 5 May 2023).
- [11] Xie, W.; Dong, L.; Hao, P.; Tang, L.; Li, S.; Zhang, Y.; Tan, L. Street Plant Landscape in Urban Public Spaces. *Landscape Design*, 2021, 06, 118-121.
- [12] Liu, H. Vegetation Characteristics of the Ningyuan River Basin and Construction of Artificial Plant Communities in Sanya City (Master's thesis, Central South University of Forestry and Technology). Available online: <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201302&filename=1013214157.nh> (accessed on 5 May 2023).
- [13] Kong, D. Research on the Application of Plant Color in Urban Gardens (Master's thesis, Northwest A&F University). Available online: <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD2012&filename=1012305288.nh> (accessed on 5 May 2023).
- [14] Hidalgo, A.K. Mental health in winter cities: The effect of vegetation on streets. *Urban Forestry & Urban Greening*, 2021, 63, 127226.
- [15] Chaudron, C.; Perronne, R.; Bonthoux, S.; Di Pietro, F. A stronger influence of past rather than present landscape structure on present plant species richness of road-field boundaries. *Acta Oecologica*, 2021, 92, 85-94.



© 2023 by the author(s); licensee International Technology and Science Publications (ITS), this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (<http://creativecommons.org/licenses/by/4.0/>)