

## Ecological and Artistic Application of Garden Plants

Yongzhi Wang

Sanmenxia Polytechnic, Sanmenxia, Henan 472000, China

wyz-168@163.com

**Keywords:** Garden plants; Ecological; Artistic; Evaluation

**Abstract:** From the perspective of landscape plant landscape evaluation, a systematic summary of the plant landscape art from its thinking mode and research process, from the distribution of weights in the evaluation process, plant landscaping will be generated in the plant landscape attribute organization in different green spaces. Differences in importance and explore the reasons for this difference and discuss how to balance these differences in plant landscaping. The purpose of this research is to avoid the average force or isolated thinking of plant landscape attributes in plant landscaping, and to form a comprehensive, balanced and focused ecological and artistic model of garden plant applications.

### 1. Introduction

At present, with the emergence of global environmental issues, the problem of living environment has become the subject we have to face. In order to ensure that human beings and nature can live in harmony and make the society develop harmoniously and sustainably, it is necessary to develop a circular and benign garden landscape. Garden plants can not only improve the environment, purify the air, but also meet the aesthetic needs of people. This requires the attention to artistic and ecological aspects in the gardening, thus promoting the sustainable development of society.

The important role of garden plants in urban ecological environment is reflected in their ability to release oxygen, control temperature, absorb toxic and harmful gases, maintain water and soil, and conserve water sources; garden plants are also important materials for urban beautification [1-3], It enriches people's visual appreciation requirements and changes people's social aesthetics in a certain sense: garden plants themselves have certain economic value, and urban green space shaped by plant communities also enhances the value of surrounding land use [4-6]. Therefore, in today's historical environment, people's research on plants is no longer limited to the summary and prediction of natural community succession and development. Garden plant landscape and plant landscaping have also become the focus of research. In the design and application of modern gardens, society has higher and higher requirements for garden plant landscaping: not only to meet the urban green space construction indicators, but also to achieve harmony and unity of urban landscape through plant landscaping [7-9]; Not only does the planting need to meet the local ecological requirements, but also the improvement of the landscape level; not only the artistic value of the plant community, but also the cultural connotation of the plant, resource management, etc. These different societies need to put forward quite high requirements for landscape plant landscaping, and also encourage designers and researchers to continuously explore ways to improve the landscape and social benefits of landscape plants.

This paper is to grasp the background of the great development of this garden, to sort out the development history of garden and garden planting from the perspective of today's social needs; to summarize the methods and processes of garden plant landscape evaluation based on relevant theoretical research; Analyze and find the corresponding relationship with the research of plant landscaping system, and analyze the accurate expression of the ecological and artistic landscape of landscape plant landscape in the process of plant landscaping.

## 2. Artistic Use of Garden Plants

The artistic nature of garden plant configuration is related to the aesthetics of appreciation. It is necessary to consider the type of plant, the quantity, shape, line, contour, color, season, composition and interaction with other garden elements. Strive for people to be in it, there are scenic spots, intentions, and feelings. The use of artistic vision to guide the arrangement of garden plants allows us to more clearly illuminate the context of aesthetics in the landscape of landscaped plants, thereby creating a landscape that has a positive impact on the aesthetics and has a positive impact on the people in it.

### 2.1. Diversified and Unified, Primary and Secondary

Garden plants are planted, and the types of requirements are diversified; the configuration needs to have a certain depth of field, pay attention to the complementary space and size, to avoid an unobstructed view. The plant space should be rich and diverse and coordinated, and the backbone arbor species should cry, paying attention to the momentum and balance. Plant postures are regular, some are dynamic, and the configuration should consider the coordination between plants or between plants and other elements in the environment. Plants in a space should be divided according to the height, size, deciduous or evergreen of the tree, so that the primary and secondary are distinct and sparse; in order to avoid the landscape being too monotonous, it is better to use trees, shrubs, flowers and ground cover plants. Hierarchical planting; plants of different flowering periods and colors are planted in layers and layered to create a colorful plant landscape. Usually the background tree is higher than the foreground tree, the planting density should be large, the color tone should be deeper or have a larger color difference with the foreground tree to enhance the contrast effect.

### 2.2. Contrast Setting, Different at Four O'clock

The garden uses different morphological features of plants, such as the height, posture, flower shape, flower color, leaf shape and leaf color of the plant, which expresses certain artistic ideas and cries out the beauty of the plants. For example, when Joe and shrubs form a cluster of trees and trees, they must be deep and shallow, hidden and obvious, and sparse and dense; in general, there are places where scenery can be borrowed, trees should be planted sparsely, or trunks should be tall. Trees are with tall canopies, or low shrubs or flowers, to maintain a transparent perspective. The seasonal landscape of the plants in the garden is also particularly important. In different seasons, the plants will exhibit different forms, colors and charms. It is necessary to have a beautiful view in all seasons and a change in the scenery of the four seasons. The scenery is different, and the music is endless.

Table 1 Level Table of Landscape Resource Evaluation Indicators

Comprehensive evaluation layer	Assignment	Project evaluation layer
Jingyuan value	70-80	(1) Appreciation value (2) Scientific value (3) Historical value (4) Health value (5) Recreation value
Environmental level	20-10	(1) Ecological characteristics (2) Environmental quality (3) Facility status (4) Guardianship management
Use condition	5	(1) Traffic communication (2) Accommodation and reception (3) source market (4) Operation management
Scale range	5	(1) Area (2) Volume (3) Space (4) Capacity

### **2.3. Ingenious and Profound**

Drawing on the essence and nutrients from Chinese traditional culture, and drawing on the artistic techniques of Chinese classical garden gardening, especially the experience and application of the ingenuity, artistic conception and aesthetics of Chinese classical poetry and painting. The creation of the artistic conception must have a profound cultural heritage as the background to make people feel profound and long-lasting. The times continue to develop, but the beauty can touch, touch, enlighten, and purify the human heart. People's love and persistent pursuit of beauty have never changed.

### **3. Ecological Evaluation of Garden Plants**

There are many methods for garden plant landscape evaluation, some use qualitative methods, and some need to establish mathematical models. The landscape of landscape plants is a complex representation, and the internal connections are relatively comprehensive. It is difficult to determine the general rules for their evaluation. Nowadays, the more common method is to comprehensively establish mathematical models based on the visual environment theory and the characteristics of garden plant landscape features. Among them, the analytic hierarchy process, fuzzy comprehensive evaluation method, principal component analysis method, regression analysis method, correlation coefficient test method .

Analytic Hierarchy Process (AHP) is a method of decomposing elements that are always related to decision-making into goals, criteria, and programs, and making decisions on more complex and vague problems. The method has the characteristics of qualitative and quantitative joint examination. It is a hierarchical weight decision analysis method proposed by applying network system theory and multi-objective comprehensive evaluation method. This method is characterized by the in-depth analysis of the nature, influencing factors and internal relations of complex decision problems, using less quantitative information to mathematicalize the thinking process of decision making, thus multi-objective and multi-criteria or complex decision problems with no structural characteristics provide a simple decision-making method. It is especially suitable for problems that are difficult to directly and accurately measure decision results.

In past evaluations, the weights between elements are often determined by expert questionnaires, and the weights of the elements are determined according to the selection rate. This method has flexibility and accuracy, but it also contains more Subjective interference factors; mathematical methods using analytic hierarchy can be used to offset the uncertainty of weights in mathematical formulas by the judgment matrix.

#### **3.1. Establish a Hierarchical Structure Model**

After fully understanding the system to be analyzed, we must first organize and layer the problem into a hierarchical structure model. In this model, complex problems are broken down into problems between the components of each element. These elements form a hierarchical relationship according to their attributes: the upper layer element serves as a criterion for the next layer of elements; the next layer element is the interpretation of all aspects of the previous layer element.

In order to avoid confusion in the evaluation factor relationship to avoid too many levels, the hierarchy is usually divided into three levels:

Top level: This level generally has only one factor, the evaluation target or research result. This level is also called the target layer.

Middle layer: This level contains the intermediate links involved in achieving the goal. It includes the criteria to be considered. This layer is also called the criteria layer.

The lowest level: This level includes various measures and solutions selected to achieve the goal, so it is called the indicator layer or the feature layer.

Generally, the number of elements in the next level should not exceed 9 in the next level, because too many elements will cause confusion for the comparison between the two.

### 3.2. Construction Judgment Matrix

Through analysis, we can know that the various elements that make up the landscape of landscape plants are not necessarily the same in proportion due to the geographical location and the type of green space. For example, we evaluate the landscape of a landscaped plant in terms of both the constituent elements and the ecological role.

At this time, if there are  $n$  factors  $X$  in the same layer, it is necessary to judge the influence of their influence on the  $Z$  target. You can take two factors each time to form a group and find the ratio of the influence of the two on  $Z$ . This ratio is described by  $a$ , all comparison results are represented by a matrix:

$$A = (a_{ij})_{n \times n} = \begin{bmatrix} a_{11}, a_{12}, \dots, a_{1n} \\ a_{21}, a_{22}, \dots, a_{2n} \\ \dots \\ a_{n1}, a_{n2}, \dots, a_{nn} \end{bmatrix} \quad (1)$$

The value of the ratio  $a$  is:

Table 2 importance scale

Importance scale	meaning
1	Expresses equal importance compared to two elements
3	Compared to the two elements, the former is slightly more important than the latter
5	Compared with the two elements, the former is obviously more important than the latter.
7	Compared with the two elements, the former is more important than the latter.
9	Compared with two elements, the former is more important than the latter
2.4.6.8	Indicates the intermediate value of the above adjacent judgment

Such  $n$  elements need to be  $n(n-1)/2$  times two-two judgment, so that more information is provided, and each two elements are judged, and a more accurate sorting situation can be proposed.

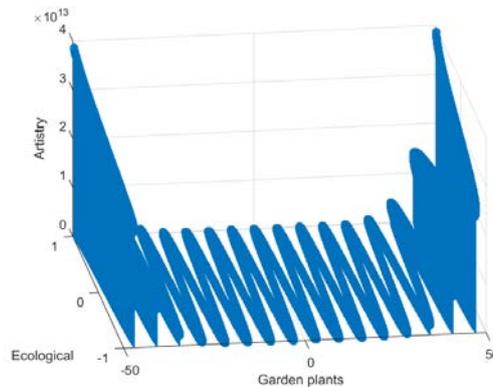


Figure 1 Ecological and artistic verification of garden plant applications

As shown in Figure 1, the space under the forest can be divided into two types: one is an inaccessible viewing space, and the other is an accessible recreational space. In the plant landscaping of the under-forest space, the observation points are outside the flora, and the purpose of appreciation is the external form of the flora, the shrub under the forest, the posture of the ground, the mottled tree shadow under the forest, and the deep feeling of the space under the forest. . The use of the understory space for recreational use determines the multiple possibilities for carrying out activities under the forest. Whether this part of the space continues to penetrate at the edge of the flora or is cut off by the edge is an important task for edge space processing.

From the perspective of research and analysis, plant space also has a strong sense of dimension, which has a consistent understanding with other spatial forms, such as architectural space. Under the multi-dimensional control of the top surface, horizontal plane and façade of the plant space, the

combination of elements such as dotted lines and the like, with these generalizations, the plant landscaping can meticulously push the space down, and the design can also be conveniently controlled. Due to the randomness of the plant's organic and plant morphological changes, coupled with the variability of the observation angle, the best spatial effect is also perceived by the visitors after the completion. The design level provides only the speculation and hypothesis of the designer. There are more variables. Therefore, there is only a suitable plant space, and there is no space design for full marks.

#### 4. Conclusion

In summary, the garden is a comprehensive discipline that involves both natural sciences, social sciences, economics, and art and aesthetics. Therefore, garden design must not only have scientific development ideas as a guide, but also have the nutrients of art and aesthetics to nourish. It is necessary to have an in-depth understanding of the laws governing the formation of local natural plant communities, to conduct investigations and studies in a planned manner, and to carry out introduction and domestication work, to expand and enrich the varieties of garden plants, so as to improve the level of plant resource allocation. At the same time, the plant collocation design in the garden landscape should seek inspiration and enlightenment from nature to enrich the ideas and methods of plant configuration; it must have a global vision and attention to detail. Combining ecological theory with art and aesthetic theory, applying it to the practice of garden plant configuration, and constantly exploring, and strive to create a modern garden landscape with ecological coordination and stability and beautiful artistic conception.

#### References

- [1] Traveset A, Navarro L. Plant reproductive ecology and evolution in the Mediterranean islands: state of the art[J]. *Plant Biology*, 2018, 20 (1):1-63.
- [2] Richards P J, Williams, Nicholas S.G, Fletcher, Tim D, et al. Can raingardens produce food and retain stormwater? Effects of substrates and stormwater application method on plant water use, stormwater retention and yield[J]. *Ecological Engineering*, 2017, 100(e):165-174.
- [3] Miles M, Strecker, Zoe. Eco-aesthetic dimensions: Herbert Marcuse, ecology and art[J]. *Cogent Arts & Humanities*, 2016, 3(1):116-126.
- [4] Kruse J, Pautasso M, Aas G. A test of the enemy release hypothesis for plants in the Ecological-Botanical Gardens, Bayreuth, using data on plant parasitic microfungi[J]. *Nova Hedwigia*, 2016, 103(1):239-249.
- [5] Grossart H P, Wurzbacher C, James T Y, et al. Discovery of dark matter fungi in aquatic ecosystems demands a reappraisal of the phylogeny and ecology of zoosporic fungi[J]. *Fungal Ecology*, 2015, 19:28-38.
- [6] Stanford B, Rogers S M. R(NA)-tistic expression: The art of matching unknown mRNA and proteins to environmental response in ecological genomics.[J]. *Molecular Ecology*, 2018, 27(4):827-830.
- [7] Frenken T, Alacid, Elisabet, Berger, Stella A, et al. Integrating chytrid fungal parasites into plankton ecology. Research gaps and needs[J]. *Environmental Microbiology*, 2017, 19(10):3802-3822.
- [8] Flores W. Ecological Crisis and Cultural Representation in Latin America: Ecocritical Perspectives on Art, Film and Literature ed. by Mark Anderson and Zélia M. Bora[J]. *Hispania*, 2018, 101(1):143-144.
- [9] Landy J A, Travis, Joseph. Shape variation in the least killifish: ecological associations of phenotypic variation and the effects of a common garden[J]. *Ecology & Evolution*, 2016, 5(23):5616-5631.