

ORIGINAL ARTICLE

The Research on Herb and Its Allocation Form in Landscape

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Abstract

In order to provide a scientific foundation for herb application in landscape, the photographs were taken from the herb landscape in urban green space and sightseeing garden. The questionnaire-based survey was also applied to analyze the cognitive situation of herb. Most investigators love herb, but have a low level of herb; Interviewees' consideration of herb function lie in ornamental, healthcare and medical treatment; The bulk of the visitors think herb landscape is insufficient; Investigators' preferences for herb application forms are landscape edging and combining with stone. We also probe into the optimum allocation form combining herb with landscape elements. When we combine herb with landscape water or landscape architecture, artistic conception and reasonable plant allocation should be considered; When we combine herb with landscape path or garden ornament, reasonable plant disposition and appearance and practical collocation should be thought over; When we combine herb with flower-border, richly colored landscape and reasonable plant allocation should be deliberated on.

Key words : Herb, Cognitive, Allocation form

1. Introduction

Herb which refers to annual or perennial herbage and evergreen dwarf shrubs means some trivial names of fragrance material plant populations together (Huang, 2006). The booming diversification developments of "green, perfuming and coloring" have been in vogue due to the hosting of Beijing Olympic Games, Shanghai Expo and the rising of the city parks all over the country in recent years. Herb had a head start in Europe and the United States, and its products have penetrated into all aspects of daily life. Japan and Korea also grew herb as economic crops, and herb has been widely used in ornamental and courtyard greening a long time ago (Qi et al., 2010).

The concept of herb was first introduced in Mediterranean Coast and people have already grown herb in the Stone Age. In the 16th century, with the boom of herb culture, the application of herb was not limited to medicinal but to more fields. In 1964, the French doctor Kim created the aromatherapy, which was use of flower, fruits, roots and their leaves to extract natural oils in order to apply in human health care, beauty and alternative medicine (Feng, 2012). Xu (2008) put forward the herb application forms mainly including herb botanical garden, flower bed, flower-border, and champignon garden; Design methods were classified into regular style and Mediterranean style. Professor Zhao from China Agricultural University submitted that herb has

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filtered into everywhere of our lives (Qiao, 2004). But the theory research of herb is not enough in China and its application in landscape is also only just beginning. Herb regulates urban climate, beautifies and improves urban environment and enriches the landscape. What is more, as a great potential and environment friendly plant, herb fills the blank of "smell" landscape at present and plays an irreplaceable role in the garden perfuming.

According to the detailed investigation of the disposition form of combining herb with landscape elements (landform, landscape architecture, garden ornament, landscape plant, landscape path and square), we can explore the better landscape architecture combining herb with landscape elements, so as to provide a scientific foundation for herb garden application for the future.

2. Contents and Methods

2.1. The Time, Places and Respondents

The investigation was conducted in South Lake Park, East Lake Park and Tian Waicun Square in Tai'an during September 11~14, 2012. And the respondents were visitors and local residents of different ages, educations and professions.

South Lake Park which is located in South of Tai'an is the largest comprehensive park in the urban area. Covering an area of 170,000 square meters, it has an integration of ecological, cultural and recreational natures. The park is divided into six regions: the main entrance area, youngsters' activities area, entertainment district, children's activity area, wooded area and water sports area. The main scenic spots are the "prosperity and peace", "favorable weather", "twelve lotus bridge", "Wangyue pavilion", "Hu Xinfang" and so on.

Located in the east of old town center of Tai'an, East Lake Park having a total area of nearly 100,000 square meters, amalgamate with original East Lake Park and Five Horse Lake. The attractions in the park

mainly include "High Mountain and Flowing Water", "Spring Lake Warm", "Water Creek Bamboo Path", "Bloom Rhyme Flow" and so on.

Tian Waicun Square is seated at the foot of majestic Mount Tai, covering an area of 35,000 square meters. It's the beginning of the west mountain-climbing, the junction of mountain and city and the visitors distributing center. The main spots are "Heaven and Earth Square", "Feng Yuxiang Tomb" and so on.

2.2. Contents of the Research

In order to focus on garden disposition form of combining herb and landscape elements, the questionnaire-based survey and interviews were applied to make preliminary analysis about the visitors' basic information and the cognitive situation of herb in city parks and squares.

2.3. Materials and Methods

2.3.1. Pictures for Research

Plenty of studies point to use pictures as a medium to evaluate the landscape quality having no obvious differences between field investigations (Shuttleworth, 1980). In 2010-2012, photographs were taken from the existing herb landscape in urban parks, green streets, sightseeing gardens and special class gardens to provide for questionnaire. 25 pictures were divided into five categories of garden dispositions including the combination of different herbs with landscape water, landscape path, landscape architecture, garden ornament, and flower-border (Fig. 1).

2.3.2. Methods of the Research

In order to gain more information, this research used questionnaire-based survey and interviews. This investigation sent out the questionnaire 300 cents (half for weekdays and half for weekends) in September 2012, took back the valid questionnaire 285 cents (the effective rate was 95%). Photos were taken as a medium of herb scenic beauty evaluation, and the



Fig. 1. Pictures for Research.

visitors chose the best and worst one from combining herb with landscape water, landscape path, landscape architecture, garden ornament, and flower-border. And then they selected an appropriate reason from the five options including “colorful landscape, graceful conception, reasonable plant disposition, beautiful and practical landscape and others”. Finally, the questionnaires were taken back immediately after the completion. We used EXCEL and DPS to handle the survey data statistics to acquire the affecting factors

and best viewing patterns of the disposition form of combining herb and landscape elements.

3. Results and Discussions

3.1. Basic Information of the Respondents

The questionnaire adopted four indicators of gender, age, profession and education to reflect the basic information of the participants. The more detail information is shown in Table 1.

Table1. Basic information of the respondents

Gender		Age							
Male	Female	<18	19-30	30-39	40-49	>50			
48.2%	51.8%	9.6%	34%	26.2%	16.7%	13.5%			
Profession				Education					
Student	Enterprises and employees	Civil service	Private owner	Retired	Others	Junior high school or lower	Senior high school or vocational school	College and university	Master degree or above
28.4%	24.1%	5.7%	15.2%	11.7%	14.9%	12.4%	35.8%	48.9%	2.9%

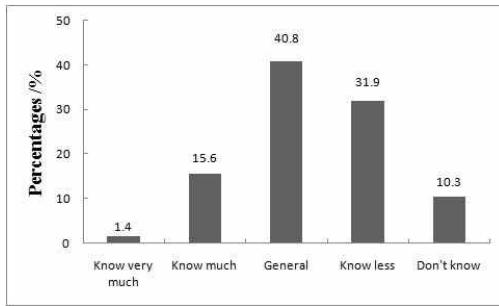


Fig. 2. The understanding levels of herb.

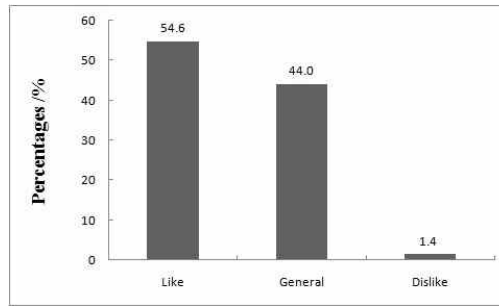


Fig. 3. The degree of love for herb.

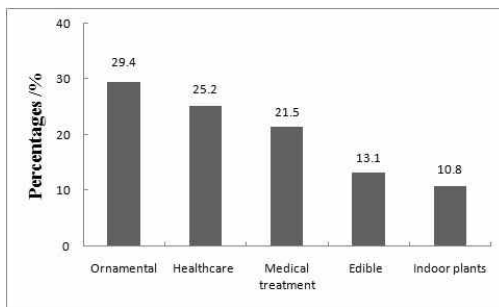


Fig. 4. The cognitive situation of herb's functions.

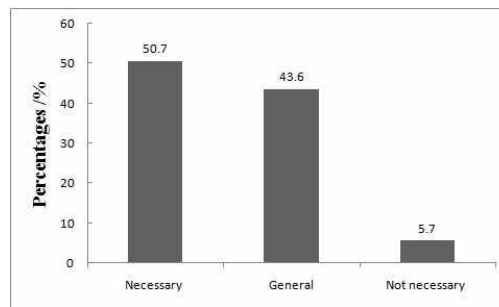


Fig. 5. The necessary to increase the herb landscaping.

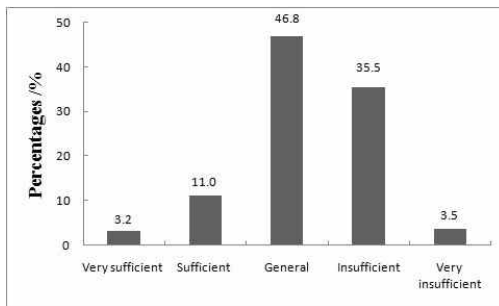


Fig. 6. Landscape sufficiency of herb at present.

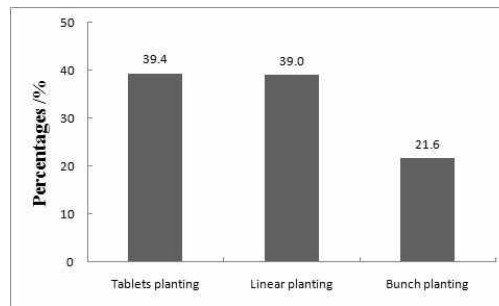


Fig. 7. Likeability of herb cultivation.

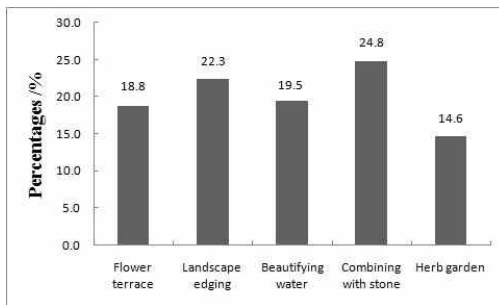


Fig. 8. Likeability of herb application form.

3.2. Visitors' Cognitions of Herb

According to the questionnaire, most respondents' understanding of herb is general or less (72.7%), and only 1.4% tourists know herb very much (Fig. 2). The investigators have a low level about herb (only understand some of the common herb species, such as *Lavandula angustifolia* Mill, *Mentha canadensis* L., *Rosmarinus officinalis* L., *Thymus mongolicus* Ronn., *Rosa damascena* & *Rosa centifolia*, etc.) But most of the respondents like herb ("like" 54.6%, "general" 44%, "dislike" only 1.4%) as shown in Fig. 3.

Regarding the cognitive situation of herb, 29.4% participants think herb is used for ornamental; 25.2% tourists consider herb for healthcare (making scented oils and incense, etc.); 21.5% participants believe herb for medical treatment (aromatherapy); 13.1% tourists take herb for edible (herb ice cream); 10.8% visitors think herb for indoor plants. It shows that the most visitors' cognition of herb have still stayed in ornamental, healthcare and medical treatment. For other aspects, such as edible and indoor plants, they know little comparatively (Fig. 4).

Herb can be called year-round "natural perfume bottle", because its leaves expire fragrance all the time. Herb also can soothe nervous and relax the mind to achieve the effect of treatment. 50.7% respondents believe the herb application should be strengthened in landscape plant, 43.6% participants consider "ambiguous" and only 5.7% visitors say it not necessary. That also illustrates the herb landscaping attracting people's attention increasingly (Fig. 5).

According to this investigation of the adequacy of herb landscape application at present in landscape plants, we can find that 3.5% visitors believe very insufficient, 35.5% participants consider insufficient, 46.8% tourist think generally, 11% visitors say sufficient and only 3.2% participants think very sufficient. That clearly shows most visitors hope herb can be applied in landscape. Therefore, herb landscape application has a great potential and prospect (Fig. 6).

The herb cultivation is an important factor to constitute architectural landscape. The percentage of visitors' preferences for herb cultivation are "tablets planting" (39.4%), "linear planting" (39%) and "bunch planting" (21.6%). And from the interview we found that participants prefer bunch planting for a small area of the green space, but visitors tend to tablets planting for a large area of green space. Therefore, the tourists' preferences for cultivation are not isolated (Fig. 7).

The optimal herb application forms are landscape edging and combining with stone. The better ones are flower terrace and beautifying water and only 14.6% tourists are fond of herb garden (Fig. 8). Tourists' preferences for herb landscape application form are mainly related to age, occupation and level of education. For example, the young participants adore large and endless herb garden, however, the old are keen on combining herb with rocks which is full of cultural connotations. What is more, the old are fond of Tai Ji, Qigong and so on, and breathing exercises in the face of certain plant have health care function. Therefore, we should not only consider the needs of young people but also pay more attention to what the old really want in the herb landscape construction.

3.3. Allocation Form and Selective Basis of Combination Herb with Landscape Elements

In the landscape satisfaction evaluation of configuration, combining herb with landscape elements, shows that 67.7% participants are satisfied, 22.4% participants think it general, and only 9.9% participants feel unhappy. As can be seen, the majority of visitors are very satisfied with the landscape configuration of combining herb and landscape elements.

3.3.1. Allocation Form of Combining Herb with Landscape Elements (Fig. 9)

(1) Allocation form of combining herb with landscape water

Mountains have not lived without rivers since

ancient times. From the natural relationship of mountains and rivers, mountains become more active with rivers and rivers are more charming with mountains. So the scenery relies on each other to achieve co-prosperity. The optimal disposition form of combining herb and landscape water is “mountain+water+different species of *Lavandula angustifolia* Mill” (Scenic beauty of S1 is 42.9%). And the better one is “trees + potting of *Pelargonium graveolens* L’Her + *Rosmarinus officinalis* L. + *Typha orientalis* Presl. + *Monochoria vaginalis* (Burm.F.)” (Scenic beauty of S3 is 34.6%) which also fully embodies the preference.

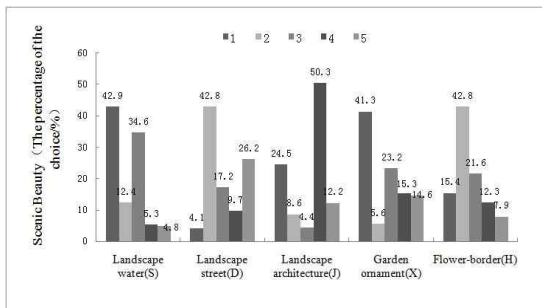


Fig. 9. Landscape evaluation of herb combining with landscape elements.

The tourists are in favor of the beauty with harmony, graceful conception, and reasonable plants. Big chunks of different colors and kinds of *Lavandula angustifolia* Mill bend before the wind, which becomes into the beautiful ocean of flowers with the fragrance in air. However, *Matricaria recutita* L. and *Cymbopogon citrates* Stapf. planted by the water seem single and messy. So too much rigid pavement or lack of graceful conception is also out of favor, such as S5 (Scenic beauty is 4.8%).

(2) Allocation form of combining herb with landscape path

The allocation disposition form of combining herb and landscape path is “evergreen shrub + bunch planting

of *Lavandula angustifolia* Mill + *Allium cepiforme* G. Don + *Plectranthus coieoides* and *Cymbopogon citrates* Stapf. + *Mentha canadensis* L.” (Scenic beauty of D2 is 42.8%). The better one is “*Populus tomentosa* Carr + tablets planting of *Lavandula angustifolia* Mill + *Buxus megistophylla* Lévl + stakes and pebble path” (Scenic beauty of D5 is 26.2%). And the worse one is “*Monarda didyma* + *Rosmarinus officinalis* L.” (Scenic beauty of D4 is 9.7%). The worst one is “*Rosa damascena* & *Rosa centifolia* in tablets planting + *Heliotropium arborescens* and *Lavandula pinna*” (Scenic beauty of D1 is 4.1%). Herb uses its cool color and elegant spike to relieve people’s irritability and anxiety emotions in the hot summer. Simultaneously, we should be careful to the changes of landscape plants in the plane when we combine herb with landscape path. More attentions should be paid to the rich level changes in the facade to form strewn at random which includes rich colored herb, evergreen shrubs and small trees also.

(3) Allocation form of combining herb with landscape architecture

Among the photos of combining herb and landscape architecture, the optimal disposition form is “*Populus tomentosa* Carr + small trees in tablets planting + *Lavandula angustifolia* Mill + *Salvia japonica* Thumb.” (Scenic beauty of J4 is 50.3%). The better one is “church + linear planting *Lavandula angustifolia* Mill” (Scenic beauty of J1 is 24.5%). The worst one is “*Sophora japonica* L. + formal style of *Buxus megistophylla* Lévl + *Rosa damascena* & *Rosa centifolia*, *Lavandula angustifolia* Mill + *Gladiolus gandavensis* in bunch planting” (Scenic beauty of J3 is 4.4%). Therefore, people are in favor of the allocation which is made of graceful conception, rich hierarchies and integrated with buildings when we combine herb with landscape architecture. Large green coverage and refreshing scenery also gain people’s partialities out of question. And messy

planting mode and rigid lines are not popular, such as J3 (planting density is too high and the effect is very poor).

(4) Allocation form of combining herb with garden ornament

The optimal configuration form of combining herb with garden ornament is “trees + *Lavandula angustifolia* Mill at a roadside + *Hyssopus officinalis* and *Rosmarinus officinalis* L.”(Scenic beauty of X1 is 41.3%). The better one is “wooden chair + *Pelargonium graveolens* L’Her and *Tanacetum vulgare* + *Anthurium andraeanum* + *Ocimum basilicum* L. in potting” (Scenic beauty of X3 is 23.2%). The worse one is “*Ocimum basilicum* L. in tablets planting and *Pelargonium hortorum* + *Thymus mongolicus* Ronn. and climbing plants + *Lilium longiflorum* Thunb.” (Scenic beauty of X2 is 5.6%). From this research we can find that simple, natural, reasonable, beautiful and practical herb landscape architecture combined with garden ornament is more popular, but growing too densely does not attract tourists also.

(5) Allocation form of combining herb with flower-border

The best disposition form of combining herb with flower-border is “*Bombax malabaricum* DC. + *Lagerstroemia indica* + different species and colors of *Tulipa gesneriana* L.” (Scenic beauty of H2 is 42.8%). The worst one is “animal sculpture made by *Buxus megistophylla* Lévl + *Trollius chinensis* Bunge + *Viola odorata* L. + *Mentha haplocalyx* Briq.” (Scenic beauty of H5 is 7.9%). So colorful, reasonable and creative configuration form of combining herb and flower-border gains more people’s praise naturally. Inversely, drab colors and lacking of changes in herb gardens gain low opinions.

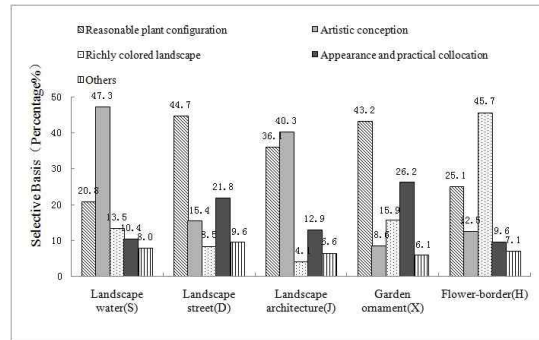


Fig. 10. Selective basis of the optimal allocation form of herb combining with landscape elements.

3.3.2. Selective Basis of the Optimal Allocation Form of Herb

The analysis results of selective basis are shown in Fig. 10 about the optimal disposition form of combining herb with landscape elements. Selective basis of the best configuration form of combining herb with landscape water mainly includes artistic conception and reasonable plant configuration; Combining herb and landscape path largely depends on reasonable plant configuration, appearance and practical collocation; Combining herb with landscape architecture is greatly based on artistic conception and reasonable plant configuration; Combining herb with garden ornament chiefly involves reasonable plant configuration, appearance and practical collocation; Combining herb with flower-border mostly consists of richly colored landscape and reasonable plant configuration. The findings further demonstrate that the major influencing factor of disposition is consistent with what the photos show about combining herb with landscape elements.

4. Conclusions and Prospects

4.1. Conclusions

According to the questionnaire, the great majority of investigators have a low level about herb, but most of the tourists show their fondness; Interviewees’

cognition of herb have still stayed in ornamental, healthcare and medical treatment. For other aspects, such as edible and indoor plants, they know very little comparatively; Most visitors hope that herb can be applied in a large scale in landscape architecture; Investigators' preferences for cultivation are not isolated, which depends on the real situation; The optimal herb application forms are landscape edging and combining with stone. Responders also enjoy flower terrace and beautifying water. The fewest tourists are fond of herb garden mainly related with age, occupation and level of education.

Combining herb with landscape elements, disposition form has different tendencies on the basis of the analysis above. In the course, we should think over artistic conception and reasonable plant allocation when we combine herb with landscape water, consider reasonable plant configuration and appearance and practical collocation when we combine herb with landscape path, think of artistic conception and reasonable plant disposition when we combine herb with landscape architecture, think about reasonable plant allocation and appearance and practical collocation when we combine herb with garden ornament, deliberate on richly colored landscape and reasonable plant allocation when we combine herb with flower-border. This study is expected to be of guiding significance for the reasonable and scientific configuration of herb.

4.2. Prospects

According to incomplete statistics, there are more than 3000 species of herb in the whole world. However, only 400 kinds have been developed and utilized effectively. Although herb resources are very

rich in China, about more than 600 species, herb is seldom used in landscape application now. Most responders are not familiar with herb and some of them even do not know herb. At present, the "greening" is the theme of the development in landscape, and the main plants used in landscape architecture are woody plants while herb is rarely used. The tourist attractions such as "herb gardens" and "plant health greenbelt" are far fewer (Wang et al., 2012). With the high-quality of life today, herb is becoming so popular because of its ornamental, health care, medical and other functions. So herb has a great development potential, and the landscape application research of herb is facing a good opportunity and development prospect as well.

References

- Feng, S., 2012, Labiatae aromatic plant resources and its application, *Journal of Anhui Agriculture Science*, 19, 10024-10026. (in Chinese).
- Huang, D. J., 2006, The development and utilization of herb, *Northern Horticulture*, 3, 113-114. (in Chinese).
- Qiao, D. H., 2004, Aromatherapy: lifting the veil, *China Flowers & Horticulture*, 21, 34-35. (in Chinese).
- Qi, X. P., Shi B., Chen Y. X., 2010, A discussion of herb application in landscaping, *Garden of Science and Technology*, 1, 13-16. (in Chinese).
- Shuttleworth, S., 1980, The use of photographs as an environment perception medium in landscape studies, *Environ Manage*, 11, 61-76.
- Wang, M. J., Xiang, J., Wang, R. X., et al., 2012, Advances in studies of aromatic herb, *Northern Horticulture*, 15, 188-193. (in Chinese).
- Xu, Z. Y., 2008, Researches on the method of herbs landscaping, *Jiangxi Science*, 4, 631-634. (in Chinese).