



Journal of Applied Sciences

ISSN 1812-5654

science
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The Application and Exploration of Plant Landscape in University Campus

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Abstract: The plant landscape is “the second class” in the university campus. It is an important carrier for the material civilization and spiritual civilization of campus. This paper analyzes the effect of plant landscape in ecological functions, metal regulation, landscape creating, etc. Besides, it summarizes the plant landscape should adopt three patterns (i.e., point, line and surface) of layout and it should map out ecological diversity plant landscape community according to the geographic feature. Moreover, it takes full advantage of the implied meaning of the plant with the purpose of creating landscape, bears the great task of the environment to impart knowledge and educate people and brings the symbolic feature of the plant landscape into full play with the purpose of enhance the characteristics.

Key words: Landscape, plant, university, campus, exploration

INTRODUCTION

Louis Isadore Kahn, a famous American architect, believes that the beginning of the school is to have equal conversation between the teacher and students under a tree (Clouston, 1984). It states that the friendly and natural environment formed by the plant landscape in the campus accelerates the students’ academic exchange and meditation. It is not only “the second class” in the campus, but also the significant carrier of the material civilization and spiritual civilization of the campus. Clouston, a famous British landscape architect, holds that, “The selection and design of the plant material is the fundamental of the landscape architecture and also the basic environment for bringing other landscape architecture elements into the full play, with the purpose of improving the ecological environment of the human being.” The quality of the plant landscape has direct impact on the whole landscape quality of the university campus (Laneaster, 2000). Therefore, the research on the application of plant landscape in the university campus is to the benefit of creating better campus environment and realizing the purpose of imparting knowledge and educating people.

EFFECT OF PLANT LANDSCAPE IN THE UNIVERSITY CAMPUS

Ecological function: The effect of greenbelt plants on the city has been clarified in the book *Our Common Future*:

the negative effect of urban transportation only can be comprehensively alleviated through the effect of the greenbelt.

The vegetation on the greenbelt is the most vigorous natural factor and the guarantee of human survival. Its most basic function is to maintain the function of the ecological balance. The greenbelt renders favorable ecological effect to the environment, such as adjusting the balance of the carbon dioxide and the oxygen, purifying the air and changing the partial microclimate. What’s more, some special plants can absorb noxious gas and dust remaining in the air. For the sake of guaranteeing the normal class, rest and association of the students, the quiet environment is the most basic condition. The green plant with relatively large planting area can isolate the noise and weaken 5-8db noise (Zhou, 1998). The dense trees and greenbelt adopted between the campus road and architecture and also adopted in the boundary of the school and the city, are also capable of isolating the noise. The school association and some necessary activities in the tropical or temperate area require certain sunshade and sunscreen. High plants adopted in the surrounding areas for campus activities, rest and walking can improve the outdoor behavior.

Mental regulation: The color of the plants can absorb hard light and harmful ultraviolet rays in the environment, so that the nervous system, brain and eyes will be comfortable. In addition, it can reduce the learning fatigue and enables people to have peaceful and comfortable

mood. According to the psychological study, it shows that when the green in the visual field can reach 75%, people feel comfortable and the activities of all aspects (e.g. psychology, etc.) can be at the best status. It is thus clear that the quality of the plant landscape in the campus has direct or indirect impact on the students' learning status and also it plays a significant role in the education purpose and the integrity of the university functions.

Landscape creation: The plant not only presents improvement effect on the environment, human psychology and physiology, but also increases natural color and pattern for the vision of the campus landscape. It is a kind of vision rendering of the man-made landscape gardening. The lawn on the greenbelt is tranquil, open and natural. The great lawn on the axis space of the campus (e.g., University of Virginia, Tsinghua University, etc.) not only is the main landscape, but also is the public activity place of the campus. The different plants have different color, form, texture and culture. They provide colorful and changeable appreciation characteristics for the campus. The peach tree bears fruit with 3 years, the plum tree with 4 years and the pear tree with 5 years. The spring is full of flowers; the summer is full of green shade; the autumn is a season for fruits; the winter. Different season presents different landscape, which meets the vision change of appreciation. The landscape of the plants generates different landscape appreciation as the time goes by. The spectacular landscape in the university campus appeals to a great majority of people. Wuhan University has numerous cherry blossoms. Stanford University has palm alameda in the entrance area. According to the appreciation feature of the plants, the evergreen plants can be allocated in the special landscape of fallen-leaf plants through the form, color, seasonal aspect and reasonable combination, which can constitute the landscape of the comparison between "dynamic" and "static" situation. The combination of the plant landscape in the campus renders beautiful picture and sight for the school and also provides nice places for the teachers and students.

Space constitution: The lawn on the green belt restricts the ground and highlights the shape of the hard ground. The crown of the plants has the effect of architecture "top" and forms definite shading space. The natural group planting and reshaping plant can enclose the space and strengthen the spatial feature. If it is difficult to adopt the external space with relatively great architecture division area, it is feasible to utilize the collocation of trees and shrubs to make separation and secondary limitation,

which not only can completely separate the space, but also can present the interpenetrative effect of adjacent landscape. Moreover, it corrects the spatial proportion and increases the spatial level, which makes the space more abundant and far-reaching. Furthermore, it is feasible to guide pedestrian flow through the plantation of banded plants, which makes contribution to the increasing of spatial orientation effect.

CONSTITUTION OF PLANT LANDSCAPE IN THE UNIVERSITY CAMPUS

Starting from the landscape and function effect, the large-scale campus plant greening is composed of the layout of point, belt and surface. The combining application and mutual alternation of these three approaches contribute to colorful plant landscape.

Point landscape: The isolated plants and combining plants on the vast lawn or the pavement belong to point landscape. Therefore, compared with the surface, the single plant or combining plants with relatively small range belong to point plant landscape. It has the contractile attraction. Besides, it is the active factor and finishing touch within the regional greening area. Due to the pruning-resistance feature of the suffruticosa plants, in the entrance of the campus, the plants are pruned into letter forms, which is adopted both in domestic and foreign schools. Some schools directly prune the plants into the name of the school and some prune them into the school motto.

Liner landscape: The line-shaped landscape refers that a series of trees and pruned shrubs are arranged and connected according to certain direction and it is formed through the plants with the same size and shape. The forms, such as straight line, broken line and natural curve, generate different aesthetic effect. The belt landscape plays a role in guiding and enclosing the space.

The greenbelt that presents line shape is named linear greenbelt. In the campus, it is divided into road greenbelt, boundary greenbelt and separation greenbelt (Liu, 2000). The road greenbelt is divided into roadside greenbelt and shade tree greenbelt. The shade tree greenbelt is generally in the form of planting bed, mainly adopting the beautiful gesture of the plants and seasonal landscape to form characteristic campus landscape road. Some campus roads are directly named by adopting the name of the shade tree, which can reflect the direct impression of the space. The roadside greenbelt is handled by selecting different landscape according to its

background environment. If the roadside is with walls or campus auxiliary facilities, the sheltering is adopted, while if the roadside is with water or unique building, view borrowing is adopted to be brought into the road landscape. The boundary greenbelt includes the greenbelt at the boundary between the campus and the city and the greenbelt in the demarcated space. The greenbelt that is set among the different function areas of the campus is regarded as the separated greenbelt.

Surface landscape-botanic garden: The botanic garden is an indispensable functional component for a comprehensive university. Besides, it plays a significant role in educating and leisure and it is a great place for the teachers and students to appreciate the great natural landscape. The rudiment of the botanic garden first appeared in the medieval campus courtyard. The closed-type courtyard greenbelt enclosed with geometrical quick-set hedge and building walls is usually divided into four equivalent parts. It is highly featured with water channel, well or fountain set in the center of the courtyard. Initially, it was featured with irrigation and water drinking in the courtyard. Then, due to the religious belief, it was used by the people for purifying the body, or planting medicinal materials, flowers, roses and dungarunga. The shading plants form greenways. The vegetable, fruit trees and decorative plants are mixed and planted in the courtyard. The aromatic plants with beautiful leaves are attached great importance to. As the time goes by, in the universities, the places exclusively for collecting plants have been established which serves the doctors and pharmacists. The botanic garden of Oxford university founded in 1621 is the most ancient and classic one in British. The plants are planted regularly and classified based on the country of region, kind and economic value (Li, 2003), including 7 division areas, such as the palm house of tropical economic plants, insectivorous plant, cactus and other xerophytes, alpine vegetation, pteridophyte, water lily, royal water lily and other aquatic plants. In Germany, there are botanic gardens in Berlin University and other urban universities. University of Munster is the third largest university in Germany. There is a botanic garden behind the main building of the ancient Barockschloss. Harvard University has Arnold Arboretum. In 1993, Wuhan University cleared a space of 21 hectares in the eastern part of the campus. Professor Ye Yaoge raised fund and established a botanic garden. It is used for the education, scientific and research field for the teachers and students of the agricultural college. At present, the universities, especially about medicine, living beings, agriculture and forestry, has certain areas of botanic gardens or arboretum.

The landscape of the botanic garden is the product of the science and art (Meng, 2004). It has so many kinds of plants. The scientific allocation means are adopted to form beautiful places with plant landscape, which appeals to many people. The area with great geomorphic feature in the campus is the first factor considered during the location selection of botanic gardens. It is necessary to reduce the transformation of the original ecological conditions as possible and place various gardens, functional zones and communities according to the feature of the natural environment. Besides, the relation among each function is so close. The partition can be done according to the season, plant color, application and different site conditions (Keen, 1997; Zhong *et al.*, 2009; Wang, 2003). It breaks through the single function centered on teaching. It enables to take both botanic garden that is centered on the teaching and the biodiversity protection, ecological environment improvement and agriculture forestry science and technology demonstration into account and presents a new campus with the integration of science and technology, biodiversity protection, so as to integrate the campus environment with the natural environment.

DEVELOPMENT OF PLANT LANDSCAPE IN THE UNIVERSITY CAMPUS

Plant landscape ecological diversity: Nowadays, the university campus regards structuring the ecological campus as one of the construction planning targets. Integrate the natural geographic feature with the overall planning of the campus, have in-depth investigation on the top original community under the natural status and confirm the planning of reasonable matrix, plaque and gallery. The small scope is based on the feature of plaque and gallery of the partition with different functions, so that the multi-level and diversified allocation is adopted to meet the ecological balance of the partial ecological niche. The development of the greenbelt ecological benefits in the ecological campus is based on the abundant kinds of plants and reasonable distribution and the plant application is different from the traditional plantation combination (Xia *et al.*, 2007). The plant allocation uses the community succession and structure law for reference and adopts the ecological relation between the plants for reasonable combination. What's more, it constitutes plant ecological community with complementary advantages and habit compatibility through the reasonable allocation of diversified plants and liana. Besides, it brings the comprehensive ecological effect of the campus greenbelt into full play. Cyfair College of Huston in the area of Katie Grasslands not only brings advanced education to this

region, but also undertakes the mission of the landscape to restore the natural feature of the grasslands. The design and construction process of the campus should run through the following target: make artistic interpretation towards the ecological system of the grasslands, create the environment focused on water and suitable for the gathering place of the students, accelerate the outdoor to be the potential learning environment and become the new landmark of the local. The campus of Cyfair College is a typical case for restoring the sensitive ecological environment and attaching importance to the environment development.

Plant landscape educational meaning: Imparting knowledge and educating people is the most important task undertaken by the school. Educating people through environment plays a significant role. It is necessary to take full advantage of the implied meaning of the plants. The teachers and students cultivate the mind and body within influential character by environment, experience the vigor of the great nature in the campus and comprehend the non-separation of the human and the nature. From the vicissitude and change of the plants and the life course through the young to the old, they can comprehend the flowing of the time and the natural law of the historical succession. Fukuoka Prefectural University accurately painted the shadow of the trees which were planted as built on the ground. The trees grow as the time goes by. And their shadow greatly differs from the original carved one. Through the comparison between the shadow of the grown trees and the carved one, the students will be able to perceive the importance of time, so that it plays an important role of educating people to treasure the time (Zhang, 2006). The plant possesses multiple culture connotations. For instance, the bamboo stands for modesty and noble character; the deodar stands for fortitude; the plum stands for toughness. The plants with cultural connotation in the campus can encourage the students. Besides, the plant plays a role in participating in the course teaching. In the agricultural and forestry universities, the plant is regarded as the natural teaching material. Hanging tags with the information of the plants is convenient for the student to study. At present, with regard to the teaching of plants involved, Xiamen University has specially established the course of climbing trees, which is to the benefit of training the physical agility and survival experience (Liu and Huang, 2011).

Plant landscape symbol: The medieval campus plants have symbols, such as the courtyards with intense religious symbol, the garden for the death of the loyal people, etc. The shape of each plant was so fascinating.

Once people see it, they would long for eating the fruits. There was a kind of fruit tree every month throughout the year. Their leaves can cure the wound. Later, due to the function of greening and beautifying the environment, as well as the beautiful gesture, they have been usually regarded as the symbol of the student and the class. Some classes plant the plants that stand for themselves during the school life. The plants accompany them in their life and study. After graduation, they become the link between the students and the school. Wellesley College compares the students to various trees of the campus, with respective gloss and characteristics. The tradition of the school is that the students of each period plant the trees that can stand for their grade in the second year. The year is carved on the stone under the tree. The class tree grows with them. After they graduate from the school, the trees accompany the school and continue to grow up. They become the important link between the students and the school. Nowadays, Xiamen University plants *Delonix regia* as the shade trees and utilizes the characteristic of the seasonal blossoming to enhance the symbol of the school. In the early summer, the *Delonix regia* blossoms when the students graduate from the school and walk into the society with great confidence. In the late summer, it blossoms again when the freshmen enter into the school with great enthusiasm. After all, it is really so meaningful (Liu and Huang, 2011).

DISCUSSION AND CONCLUSION

Corbusier, a great modern architect, compared the university campus to a microcosmic metropolis, with the special feature of integrating the education, learning, life, science and research. It differs from the general urban green land. The beautiful plant landscape of the university campus should create environment with special feature, which should have the function of unconsciously cultivating students' esthetical behavior, language and sentiment. Therefore, on the basis of different regional environment, design and feature of the universities, it is important to adopt the landscape construction from the viewpoint of point, surface and line and integrate the ecological diversity, educational meaning and humanity symbolic feature to form campus landscape with sustainable development.

ACKNOWLEDGMENTS

This study is supported by the "Twelve and Five" Provincial Key Disciplines of Jiangsu Province (0833 Urban and Rural Planning); PhD Initial Gold in Jinling Institute of Technology (JIT-6-201312).

REFERENCES

- Clouston, B., 1984. Landscape Design with Plants. Van Nostrand Reinhold, USA., ISBN: 9780442215811, Pages: 456.
- Keen, M., 1997. Gardening with Color. Random House, NewYork.
- Laneaster, M., 2000. Color, buildings and landscape. Landscape Des., 2: 21-25.
- Li, P., 2003. University of Oxford botanic garden. Garden, 11: 4-5.
- Liu, J.J. and J.Q. Huang, 2011. Plant landscape in xiamen. Univ. Garden, 5: 14-17.
- Liu, L.H., 2000. Landscape Design on Campus. China Forestry Press, Beijing, China.
- Meng, X.M., 2004. The development situation of world botanical garden and the illumination to the development of chinese botanical garden. World Forest. Res., 17: 4-8.
- Wang, H., 2003. Ecological Gardens and Green Space System Planning on the City. China Forestry Press, Beijing, China.
- Xia, X., Q. Yang and Y.R. Xu, 2007. Planting arrangement in constructing ecological campus. J. Huazhong Agric. Univ., 26: 107-111.
- Zhang, H.X., 2006. Research on colleges and university campus plants landscape in nanjing. Nanjing Forestry University, China.
- Zhong, T.L., B.L. Shi, G.Y. Li, H.X. Jin and X.Y. Ye, 2009. The theory and practice exploration of the eco-botany campus garden of zhejiang forestry college. Guangdong Landscape, 31: 39-44.
- Zhou, H.J., 1998. Chinese landscape. Architecture, 13: 21-24.