Study on The Selection of Roof Greening Plants and Its Ecological Benefits

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Abstract: With the acceleration of urbanization, the scale of the city is becoming larger and larger, and there are more and more concrete buildings. With the decrease of green space, the phenomenon of "heat island effect" becomes more and more serious in many cities. With the awakening of people's awareness of environmental protection, more and more people begin to pay attention to the quality of living environment and try to find ways to solve this problem. With the awakening of people's awareness of environmental protection, more and more people begin to pay attention to the quality of living environment and try to find ways to solve this problem. China is a developing country with high population density. In the process of implementing the strategy of urban sustainable development, urban environmental problems are the key problems that need to be solved urgently. In recent years, global climate problems, greenhouse effect, shortage of fresh water resources, sharp reduction of forest resources, over exploitation of non renewable resources, serious environmental pollution and frequent bad weather have seriously affected human survival.In China's first-tier cities, the government and citizens are very concerned. The research and development work is in full swing in the country, setting off an upsurge of roof greening.In this paper, the community composition, growth status and landscape effect of plants in roof greening are observed and counted, and the commonly used plant types and configuration modes are summarized, which will contribute to the popularization of roof greening in various regions.

1. Introduction

As high-density human settlements in cities, human activities are particularly frequent and intense [1]. With the acceleration of urbanization, the scale of cities is getting bigger and bigger, and there are more and more concrete structures. The decrease of green space has caused the phenomenon of "heat island effect" in many cities to become more and more serious. The deterioration of the environment such as urban high temperature, desiccation, urban floods, and air pollution has become more and more serious [2]. Roof greening refers to the planting of trees and flowers such as various buildings, urban bridges, balconies or large rockery landscaping. With the awakening of people's awareness of environmental protection, more and more people are beginning to pay attention to the quality of the living environment and try to find a way to solve this problem. Nowadays, with the development of cities, urban environmental problems are becoming more and more serious, such as air pollution, water pollution, noise pollution, heat island effect, greenhouse effect, ozone layer destruction and excessive utilization of resources [3].With the awakening of people's awareness of environmental protection, more and more people begin to pay attention to the quality of living environment and try to find ways to solve this problem. Now we are facing a series of ecological problems, such as population explosion, reduction of fresh water resources, sharp reduction of energy resources such as coal and oil [4].

Nowadays, with the continuous progress of human science and technology, the productivity is getting stronger and stronger, the industry is developing rapidly, and a large amount of harmful gases are emitted in the production process, which destroys the natural environment on which human beings depend [5]. As a developing country with high population density, in the process of implementing the strategy of urban sustainable development, the urban environmental problem is an

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urgent key problem to be solved [6]. To achieve a high-quality, "healthy" urban living environment, it is not just one measure that can completely reverse the situation [7].In recent years, global climate problems, greenhouse effect, shortage of fresh water resources and sharp reduction of forest resources are no longer what we can see. Excessive exploitation and utilization of health resources, serious environmental pollution and frequent bad weather have seriously affected human survival [8].Therefore, roof greening is a kind of green infrastructure which can improve urban ecological self purification and alleviate urban heat island effect without land cost. In the first tier cities in China, the government and the public have paid close attention to it. The research and development work has been carried out in full swing in China, and the roof greening heat has been set off [9]. However, in the face of less and less land resources available for greening construction in cities, many cities are unable to achieve this index, and many cities begin to try to move the ground greening onto the roof in order to improve the urban ecological environment [10].

2. The basic concept of roof greening

2.1. Concept of green roof

Roof greening, also known as green roof or ecological roof, can be said that plants are planted in the roof area, not connected with the ground. So far, roof greening has made great progress. Due to the development and change of the city, the spatial form of the city is becoming more and more diversified. With the shortage of urban land resources, in addition to the above-ground buildings, the number of underground buildings is gradually increasing, and the number of bridges is also gradually increasing. This also belongs to the form of roof greening. Therefore, the concept and category of roof greening have been extended to a great extent. Including roofs, terraces, balconies, air corridors, bridges, walls, etc. of residential buildings, office buildings, underground buildings, hotels, factories, etc., is one of the important forms of the development of urban green space towards three-dimensional and spatial. Because of the particularity of roof greening, it has been paid more and more attention in the greening construction of major cities, and it has also caused many researchers at home and abroad to study it and its surrounding products. A heat wave of roof greening is rapidly sweeping every city around the world.

2.2. Types of roof greening

Roof greening refers to all kinds of buildings, structures, city fences, bridges, overpasses, etc. on the top of the terrace, balcony or large artificial rockery for gardening, planting trees and flowers. Lawn and ground cover plants are usually used for roof construction, covering and greening. Irrigation systems are often unnecessary, and natural rainfall alone can meet their physiological needs and reduce maintenance costs. Modern roof greening involves a wide range and complex types. This paper discusses the common classification methods of roof greening. Figure 1 shows the green plant roof.

Figure 1 Green plant roof

Generally, the roof greening is classified from the use, greening form, building height, roof type,

building function, building type, roof load and later management. However, due to the difference of regional climate and different requirements of roof planting, the structure of green roof also has slight adjustment. Roof greening is completely based on the building ground, which is the basis that all kinds of greening plants must be planted in artificial culture medium. For the sake of roof safety, artificial cultivation substrate requires small soil thickness, and the supply of roof water is limited. This affects the normal growth of roof greening plants, and even affects their survival. Through the diversity design of buildings, various roofs with different sizes, heights and shapes are formed. In addition, the novel and changeable layout design and the use of various plant materials and ancillary facilities have formed various types of roof greening forms.

3. Evaluation of Ecological Benefits of Green Roofs and Implementation Strategies

3.1. Overview of the ecological benefits of green roofs

Although green roof is not a panacea to solve all problems, its effect is not small. Green roof has a positive impact on people's life and environment, just like other environmental measures taken inside and outside buildings. Simple roof greening plant configuration, mainly to plant ground cover plants, low shrubs, lawn based simple greening. Considering the load-bearing limitation of roof and the living environment of plants, there are differences, such as light, temperature, humidity and other important factors, so it is necessary to simulate the natural ecological environment as much as possible to make it grow healthily and achieve the expected greening effect. In the long-term storage process, evaporation will be carried out properly to improve the air humidity. The additional storage pool on the roof can further irrigate the roof greening and flush the roof pavement. The underground reservoir is provided with a pump house, through which rainwater collected by the reservoir can be reused. Figure 2 shows the overall design schematic of rainwater reuse on green roof.

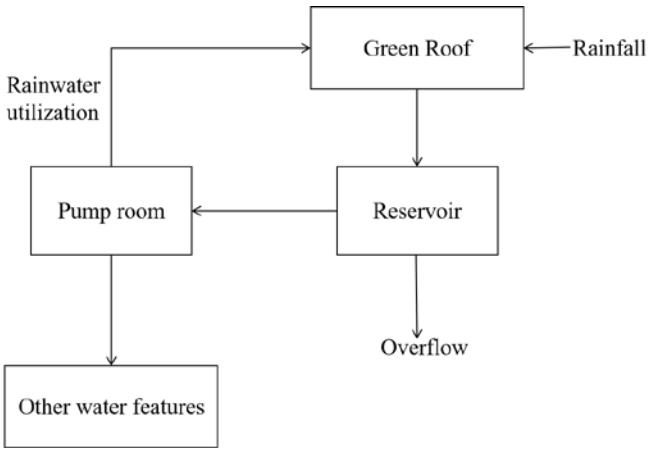

Figure 2 Schematic of the overall design of rainwater reuse on the green roof

Trees, shrubs, herbs, bamboo and vines grow well on the roof. Other species are not suitable for roof habitats. In addition, some ground greening plants can be selectively used in roof greening because they can not only adapt to extreme environment, but also have good ecological benefits and landscape value. Therefore, It is necessary to screen more roof greening plant species suitable for thin growth substrate, and try to enrich the roof greening landscape with small shrubs when the bearing capacity is allowed, so as to maximize the ecological, economic, social and ornamental value of roof greening

3.2. Lower the regional temperature and improve the evaluation and realization of the benefits of the heat island effect

In cities with rapid economic development, all kinds of high-rise buildings rise from the ground, and the cement pavement spreads out in a large area, which changes the original natural habitat of the city, and leads to the decrease of water permeability and water retention of urban soil. In

addition, the temperature values at each time point of the green space under the arbor-shrub configuration mode are lower than those of the control points, and the occurrence time of the lowest and highest temperature values of each green space is the same as that of the corresponding control points, which is more consistent. Because the roof garden is not connected with the ground, its environmental factors such as temperature, light, moisture, soil, atmosphere and wind are quite different from the ground environment, which affect the growth and development of plants together. Figure 3 shows the split level of green plants planted on the roof.

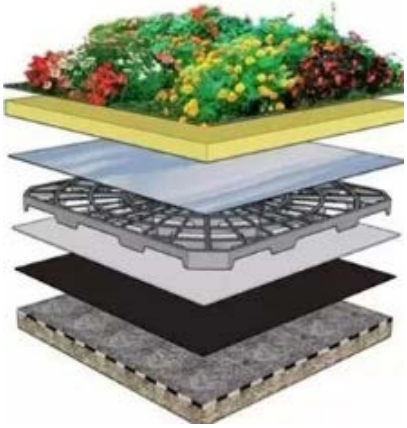

Figure 3 Split levels of roof planting green plants

If the temperature difference changes greatly, it will cause plant damage. In summer, high temperature causes leaf burn, and low temperature in winter will easily cause root damage. As an important factor affecting the quality of urban environment, the thermal environment change, which is led by the heat island effect, has been paid more and more attention. The ability to change the regional temperature has gradually become the most important task of plant greening.

4. Conclusions

At present, all over the world are developing rapidly in urbanization, and the development and utilization of the land has reached a limit. Because too much energy has been put into economic development, many developed countries and regions have experienced various environmental problems. Air pollution, noise pollution, heat island effect, dry and wet island effect, urban rain and flood problems and so on. Nowadays, with the rapid development of society, the area of construction land is reduced, and greening has been raised to a very high level. However, bearing capacity is the primary consideration considering that it is universal in the whole city, especially for some old buildings with light load. In the future design of roof greening, we should better compare the adaptability of plants to roof environment and strengthen the research on roof environment. In particular, it is necessary to strengthen the research on carbon fixation and oxygen release of plants suitable for roof greening, so as to provide powerful conditions for the improvement of urban environment and make contributions to the sustainable development of energy conservation, emission reduction and low-carbon environmental protection. The importance of roof greening research is to effectively enhance the green quantity of urban space and improve the urban ecological environment. Only by strengthening the evaluation index system of ecological benefit, landscape value and function of urban roof greening, and comprehensively evaluating the plants to be applied in roof greening, can we scientifically select greening plants and put forward plant configuration mode according to different roof conditions, so as to provide basis for urban greening planning and design department in guiding urban greening construction and promote the development of urban roof greening.

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