

## **Application Practice of Horticultural Plant Soilless Culture**

Yuyu Zhang<sup>1, a</sup>, Jiani Liu<sup>2, b</sup>, Shengguang Xu<sup>3, c</sup>, Zebin Chen<sup>4, d</sup>, Lei Yu<sup>5, e\*</sup>

<sup>1,2,3,4</sup> Kunming University

<sup>1,2,3,4</sup> Yunnan Urban Agricultural Engineering & Technological Research Center

<sup>1,2,3,4</sup> Key Laboratory of Special Biological Resource Development and Utilization of Universities in Yunnan Province, Kunming, 650214, China

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**Abstract.** Soilless cultivation technology is the product of science and technology and it mainly refers to the use of natural soil without the use of the substrate or only nursery with the substrate, after planting with nutrient solution for irrigation cultivation. Horticultural plant soilless cultivation technology has been more and more used in garden plants than traditional soil culture. In this paper, the application of soilless cultivation techniques of horticultural plants has been studied, hoping to play a certain role in promoting the soilless cultivation of horticultural plants.

### **Introduction**

Soilless cultivate in the actual application process, do not need to rely on the soil to complete the whole process of plant growth, belonging to the facilities cultivation technology, can promote the plant and the surrounding environment between the formation of mutual coordination and interaction between the plant can provide the growth of the conditions needed to achieve high yield and income, which incorporates a large number of modern planting techniques, through artificial technology to promote plant growth and development, and focus on a large number of modern agricultural achievements, as the current an important agricultural planting technology , And promote the rapid development of Chinese modern agriculture.

### **The Characteristics of Soilless Cultivation Techniques**

Soilless cultivation is not the use of matrix or natural soil, with nutrients to cultivate plants or other fertilization methods to plant plants. The soilless cultivation of flowers is the soilless cultivation techniques applied to the cultivation of flowers above. ① fast growth, flowering quality is good, relatively long flowering, flowering more. ② for different needs of different flowers and the allocation of nutrient solution, not only simplifies the traditional cultivation of many labor links, but also saves water and fertilizer, reducing the waste of resources. ③ by the inorganic salt to supply the nutrients needed by plants, reducing the occurrence of pests and diseases, to ensure that the environment clean. ④ soilless cultivation technology to break the space on the plant restrictions, can make full use of three-dimensional space for plant cultivation, with great potential for production.

### **The Type of Soilless Cultivation Techniques**

Chinese soilless cultivation of flowers can be divided into two types of hydroponics and solid substrate culture.

Solid substrate culture refers to the growth of flowers in natural or synthetic solid matrix to fix the roots and provide the necessary nutrients for the plant. There can be a lot of raw materials for the matrix such as perlite, sand, gravel, ceramsite, and some can be mixed with the use of some can also be used alone. The common feature of these matrices is the basic function of the soil, can be continuous and balanced to the plant to provide water and nutrition, a certain drainage and water

retention, there is a certain stability and strength, can not contain harmful substances. The ideal substrate should not cause pollution, do not emit irritating odor and have a stable chemical buffer capacity. In addition, the solid matrix should also have the nutrients needed by the plant, so that you can reduce the amount of fertilizer, reduce the cost of cultivation.

Hydroponics refers to the root system of plants directly grown in the nutrient solution, the general cultivation of flowers, in addition to nursery when the use of solid matrix, the general will not use solid matrix. Flower growth needs the nutrients are generally O, H, N, C, P, S, K, Ca and other large elements, and very little trace elements involved. Nutrient solution configuration will directly affect the survival and growth of flowers, so its rationing and management is the core issue of soilless cultivation. In the preparation of nutrient solution, should be based on different varieties of flowers and their different growth and regional conditions to determine the amount of various elements and the proportion of the final addition of the required amount of water, dubbed a specific nutrient solution.

### **The Application of Soilless Cultivation in Flower Planting**

**Nursery.** The soilless seedling of flowers is mainly divided into cuttings, seedling and tissue culture. The use of soilless cultivation of seedlings, strong seedling rate, more neat, easy to mechanized production. Gao Lei et al. Showed that the survival rate of vermiculite + perlite + peat was 1: 1: 2, the survival rate of the seedlings was the highest, the seedlings were healthy and the seedlings were healthy and the vermiculite + perlite + 1: 2: 2 ratio of the treatment of Anthurium colonization of the higher survival rate, plant growth is also more prosperous leaf growth, and raw materials are very cheap, suitable for the matrix of Anthurium. It can be seen from the above examples, compared with the traditional breeding methods, soilless cultivation method is more time and labor, cultivated seedlings root system is also more developed, transplant survival rate is relatively high, suitable for large-scale factory breeding.

**Cut Flowers and Potted Flowers.** Cut flower is the main research is suitable for cultivation of fresh cut flowers matrix, nutrient solution formula and environmental factors such as the regulation of technology in the application of soilless cultivation techniques. Potted flower research focuses on its suitable planting of the substrate, cultivation and management conditions and nutrient solution formula and so on. For example, Zhang Xiaobei has carried on the sufficient comparison research to the soilless cultivation nutrient solution of the rose; Chen Wudi has studied the soilless cultivation technology of Chinese carnation. There are many types of cut flowers and potted plants in China, and their formulas, environmental factors and nutrient solutions are different, and still require a lot of research to meet the needs of production to provide better technical support for the further development of cut flowers and potted plants.

**Roof Greening.** People's living standards continue to improve, the living and working environment also put forward higher requirements. In order to meet the needs of people's modern life, improve the living environment, purify the city's air, increase the green area, China began to study the roof greening. But roof greening has a lot of problems, such as building loads, water and drainage problems. In order to solve these problems more effectively, China has also introduced the soilless cultivation technology in the roof greening project.

**Water Green.** As the name suggests, water greening is in the waters within the green conservation. After a variety of previous experiments, the surface of the soil-free floating planting technology has become more mature, a variety of flower plants, such as banana, large cover grass and dry umbrella grass, has been fully adapted to the surface floating cultivation techniques. Water greening both beautify the environment, but also purified the water quality, expanding the application of soilless cultivation, with a very good development prospects.

**Lawn Greening.** Lawn greening plays an important role in urban landscaping. The coverage of lawn greening is one of the important indicators to measure modern city. Lawn production in the past are based on the soil as the substrate, lawn molding effect is relatively poor, but also a waste of seeds, planting the high cost. The soilless cultivation method applied to the cultivation of lawn to solve these problems, not only the formation of good results, save the seeds, but also reduce the cost

of planting.

### **Advantages Analysis of the Floral Soilless Culture**

The soilless cultivation techniques of flowers have been applied to more than 100 countries, such as the flower industry is famous in the Netherlands, soilless cultivation of flower products sold around the world, is the application of flowers soilless cultivation of one of the most successful countries, and Chinese flowers originated in the seventies and eighties of last century, its representative for the Beijing Forestry University, Professor Ma Taihe. Soilless cultivation technology is not restricted any place as long as there is water and air can use this method, compared with the traditional soil culture method has obvious advantages. This article summarizes it:

**Fast Growth, High Yield of Flowers, Good Quality and Easy to Control.** The nutrient solution required for soilless cultivation techniques is configured according to the nutrition needed for the flowers, which ensures that the plants have sufficient nutrients and are well ventilated to ensure normal breathing needs and can promote the growth of flowers. And the growth rate of flowers is generally accelerated. Therefore, most of the cultivated flowers are beautiful, moist and rich, and long, such as carnation, impatiens and so on, can increase their flowering and increase their yield and quantity.

**Save Human Resources, Fertilizers and Water Resources.** According to the related research, soil nutrient loss, such as nitrogen, phosphorus and potassium, is usually higher than 50%, and the water consumption is different from that of the other. Soilless cultivation compared to also higher than 7 times. Soilless cultivation technology can avoid the above-mentioned defects caused by soil culture, soilless cultivation is in accordance with the needs of floral plants to prepare nutrient solution, simplifying the soil cultivation of soil preparation, cultivation and other technical aspects, as long as the regular replenishment of nutrient solution Well, the process of which uses more computer and modern technology control, thus saving the human resources, fertilizer, and water resources.

**Clean, Healthy, Less Pests and Diseases.** Soil cultivation of flowers in the process of planting often applied organic fertilizer and these organic fertilizers often with a smell, while with a large number of virus pests; while indoor planting flowers in the watering process, the bottom of the flower pot is easy to leak muddy water, Pollute the environment, and easily bring pests and diseases. Compared with the soil culture, soilless cultivation method is the use of inorganic elements of the nutrient preparation of nutrients, both clean and sanitary, reducing the occurrence of pests and diseases, while ensuring the clean environment.

**Flexible Cultivation Expand the Flower Cultivation Area and Space.** Flowers soilless cultivation can be any place as long as there is air and water can be planted, the cultivation of a great choice, while three-dimensional cultivation can be fully improved space utilization, and to improve the yield per unit area. At the same time soilless cultivation of flowers is very suitable for indoor cultivation, through the water culture with a variety of exquisite chic, beautiful shape of the apparatus, making the roots, stems, leaves, flowers, water, stone, fish, mountain set in one, greatly improved the ornamental value of flowers.

**Make the Flower Production Factory.** Soilless cultivation of production technology is an important manifestation of modern industrial technology, the characteristics of its factory production, fully demonstrated that agriculture can be the same as industrial production, to achieve mechanization, automated production of crops.

**Improve The Utilization of Facilities.** In the process of flower cultivation, often using greenhouses and other fixed facilities as the cultivation of space, and because of greenhouse cultivation and high efficiency, multi-level, the implementation of scientific rotation is very difficult, but the use of soilless cultivation method of cultivation of flowers, Make full use of the space of these facilities, the three-dimensional planting, make full use of indoor shed light, temperature, gas, to maximize the use of facilities to improve the yield per unit area development. Therefore, the application of soil cultivation in the cultivation of soil-free cultivation is more very great its

superiority and practicality.

### **The Key Technologies of Soilless Cultivation**

**Soilless Culture Substrate.** Soilless culture Substrate is a basic material used to immobilize cultivated crops and provide moisture and nutrients to crop roots. It requires a certain condition, that is, the ability of fixed crops, to maintain and diffuse capacity, a certain degree of breathability, but also requires safety and health, light and beautiful. At present, we are in the production of flowers and vegetables are more common organic substrate peat, peat, sawdust, bark, rice husk and so on. Inorganic substrates are particulate substrates (eg, gravel, pumice, etc.), foam substrates (such as polyethylene, polypropylene, etc.), fiber matrix (rock wool, etc.), others such as perlite and vermiculite.

A wide variety of soil-free matrices, but whether it is flower producers or flower consumers, in the selection of soilless cultivation of the substrate, should be based on different forms of cultivation, different types of flowers to choose the appropriate matrix or matrix combination. Only by first understanding some of the basic physical or chemical properties of the soilless matrix, and then choose the type of flowers suitable for planting in order to make the cultivation effect to achieve the best condition.

**Nutrient Solution.** Nutrient solution is an important part of soilless cultivation and it directly affects the crop fertility and economic use of fertilizer. In the preparation of nutrient solution, the content of trace elements in different water quality is different, so the amount of nutrients will be different. Because tap water is one of the main water sources of soilless cultivation in China at the same time, rainwater, well water and distilled water can also be used as the water source for the preparation of nutrient solution. Therefore, it is necessary to analyze the different types of water quality in different regions and according to the material content of the nutrient solution in some of the components of the corresponding adjustments. Nutrient solution used in the preparation of nutrients in addition to iron salt, the basic can be more stable state in the aqueous solution, so should avoid the direct use of ferrous sulfate, ferric chloride, etc., should use iron complex.

### **Conclusion:**

Soilless cultivation technology is the product of science and technology, which is widely used in the development of modern agriculture. It can promote the increase of agriculture and ensure the quality of crops, which plays an important role in saving land resources and protecting the ecological environment. We need to vigorously promote soilless cultivation techniques to improve people's lives. Soilless cultivation technology has a very broad development prospects, there will be a vigorous development of the situation in the future.

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