Journal of Computational Science & Engineering
Available at http://www.asocse.org ISSN 1710-4068 57(2022) 80-83

Research and Analysis on Soilless Cultivation Techniques of organic green vegetables and plants

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Abstract: Soilless cultivation is a method of optimizing production mode on the basis of saving land resources, cultivating high-quality organic products through reasonable nutrition ratio, using advanced scientific ideas and control mode, so as to meet people's needs for high-quality organic products, strengthen the management of food quality and ensure the quality requirements of products.

Keywords: Soilless cultivation; Research; Analysis; Organic

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Received 03 August 2022, Revised 18 August 2022, Accepted 24 August 2022

1.Introduction

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Soilless cultivation technology of organic vegetables is to use the nutrient solution containing various mineral elements, place organic vegetables in the nutrient solution, and grow in the cultivation substrate through scientific irrigation and management technology. Under soilless cultivation, as long as the cultivation equipment meets the requirements and through reasonable management methods, organic vegetables can be mass produced in a certain period of time, which can effectively meet the demand for vegetables in less places and ensure the demand for vegetables everywhere. As a new cultivation technology, soilless cultivation technology has a short development time compared with traditional soil cultivation technology. It has only developed for decades, but it is widely used and can be used for the cultivation of many plants.

Soilless cultivation techniques are mainly divided into two kinds, one is solid substrate cultivation, the other is liquid substrate cultivation, that is, hydroponic culture. Soilless cultivation has the characteristics of less total equipment investment, easy control, less cost investment and high yield, so it has a good promotion. The solid substrate of soilless cultivation is generally some mineral materials with good water absorption, such as perlite, vitrified beads, peat, etc., which can generally make vegetables grow rapidly; Liquid substrate generally uses floating plate wool film and nutrient liquid film to place vegetables in liquid to provide nutrients and ensure stable growth. Hydroponic culture has high requirements for liquid, and the requirements for each component of nutrient solution and liquid temperature should be well guaranteed, otherwise it will affect the stable growth of vegetables.

2.Background

Development status and significance of soilless cultivation of organic vegetables with the continuous improvement of soilless cultivation technology, there are also many practical technologies in the cultivation of organic vegetables, which have a good plant protection effect on low stem plants. In some areas with complex plant protection, with advanced equipment and technology, the disadvantages of traditional cultivation can be effectively solved, especially in hilly areas. Traditional cultivation techniques are often unable to effectively plant and grow organic crops, but soilless cultivation combined with advanced equipment and technology can be effectively planted in hilly areas. China has always used sprinkler equipment to automatically spray organic vegetables to ensure that organic vegetables absorb all kinds of nutrients, which is also the traditional way of cultivating organic vegetables. Compared with other developed countries in the world, China pays more attention to soilless cultivation technology later, but it has developed rapidly in a short time, and many soilless cultivation technologies in line with China's national conditions have emerged. However, at this stage, most of the new soilless cultivation technologies developed in China are in the small-scale experimental demonstration stage, and there is a certain gap compared with the mature soilless cultivation technology system and extensive market recognition abroad: the developed countries such as the United States, Japan and the Netherlands have a high degree of mechanization of soilless cultivation, and a large number of computer automatic control have realized the annual supply of products, high output value and

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remarkable economic benefits; In contrast, China mostly adopts manual and semi manual management. Due to low efficiency and high relative investment cost, the promotion of soilless cultivation in China is also limited, and there is still huge development space for soilless cultivation technology. With the rapid development of domestic agricultural technology and the research and development of various mechanical equipment, soilless cultivation technology has also made great progress. Since 2013, soilless cultivation technology has been applied to organic vegetables. According to the requirements of the national government, pilot demonstration has been carried out in various parts of the country. According to the actual situation of environmental growth in different regions, soilless cultivation technology with certain characteristics has been realized and experience has been comprehensively summarized, Analyze the existing problems and Countermeasures to lay a firm foundation for the full implementation and promotion in the next step. The popularization and application of soilless cultivation technology provides a new idea for agricultural production. At present, there are more than 100 countries and regions that have put soilless cultivation technology on the market in the world, and the cultivation technology is making continuous progress. Therefore, in order to understand the development process, main forms and application fields of soilless culture technology at home and abroad, the types, characteristics and development direction of soilless culture technology are summarized and analyzed with the keywords of "soilless culture", "matrix culture", "fog culture" and "hydroponic culture", so as to provide reference for the research and industrial development of soilless culture technology in China.

Although China's soilless cultivation technology has made great progress, at present, it is superficial in theoretical research, and the benefits of soilless cultivation crops are less. With the continuous development of scientific and technological equipment, soilless cultivation technology has also made more progress, which not only increases the yield of organic vegetables, but also improves the soilless cultivation technology, and improves the cultivation efficiency of organic vegetables. Especially in 2016, the soilless cultivation technology of organic vegetables has been able to carry out systematic operation, and the output of cultivated organic vegetables has increased greatly. The key points of soilless cultivation technology of organic vegetables are as follows. To do pilot demonstration in different regions of China, we can study the various effects of plant protection technology in soilless cultivation according to the differences of geographical environment and temperature difference environment in different regions, make rational analysis according to the cultivation situation, and master the accurate information in different environments, so as to provide reasonable research schemes according to the differences of various regions in China and ensure the development of soilless cultivation technology.

Generally, the cultivation tank will be excavated into the soil. Generally, the cultivation tank will be excavated downward by 25cm along the ground. The ground width and surface width of the cultivation tank are 25cm and 45cm respectively, and different cultivation tanks are 140cm apart. During the construction of cultivation trough, we should pay strict attention to its depth. If the depth is less than 25cm, it will affect the water evaporation and make the water evaporate rapidly, which can not ensure that the crop roots can effectively absorb nutrient solution and reduce the yield. The construction of cultivation tank is the basis of soilless cultivation of organic vegetables. Generally, soilless cultivation is cultivated in the greenhouse, which can not only control the temperature, but also effectively irradiate the sunlight into the greenhouse to ensure the photosynthesis of vegetables. Under the condition of ensuring the depth of the cultivation tank, it is also necessary to isolate the contact between soil and matrix materials to ensure that they are not mixed together. Greenhouses are generally built in the east-west direction, while cultivation tanks are basically perpendicular to the direction of greenhouses, along the north-south direction. Soilless culture substrate can be divided into organic substrate and inorganic substrate. Organic matrix includes rotten leaves, peat, bark, etc., while inorganic matrix includes gravel, ceramsite, rock wool, perlite, vermiculite, etc. Among them, rock wool is convenient and easy to use, with high water retention and air permeability, which provides good conditions for root growth, and is more conducive to regulating crop nutrition and growth to achieve high yield. It is the main soilless cultivation substrate in the Netherlands and other countries and regions. The basic operation mode of rock wool cultivation is to divide the rock wool matrix into blocks of the same size, make it into a wrapped shape with plastic film, and then use it for plant planting. According to whether the nutrient solution is recycled or not, it can be divided into open and closed rock wool cultivation. Closed rock wool cultivation increases the nutrient solution collection channel on the basis of open rock wool cultivation for the recycling of excess nutrient solution. At the beginning of the 20th century, rock wool cultivation technology entered a mature stage in European and American countries and regions and was widely used. At first, the promotion speed of rock wool cultivation in China was relatively slow. The main reason is that rock wool cultivation has high requirements for rock wool material, which should have good hydrophilicity and ensure that the shape and porosity remain unchanged after long-term use; The internal fibers should be evenly distributed, which is conducive to the extension and growth of

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plant roots; However, the quality of agricultural rock wool in China can not meet the planting standards, and the management technology is not perfect. However, domestic companies continue to innovate on the basis of digesting and absorbing foreign technologies, which has greatly promoted the development of technology, and the cultivation of rock wool in China is becoming more and more mature. In 2020, Zhejiang xuanming New Material Co., Ltd. developed agricultural planting rock wool which is conducive to the lateral growth of plant roots, which can improve crop yield; The following year, a rock wool structure conducive to water storage and planting was disclosed. Rock wool cultivation can minimize the occurrence of diseases and pests and produce green and pollution-free food. It is believed that with the increase of the demand for green vegetables in the consumer market, rock wool cultivation technology will be more and more favored by growers.

3.Conclusion

Organic ecotype soilless cultivation is a substrate cultivation technology developed according to China's national conditions. This technology uses organic solid fertilizer to provide nutrients for plants and irrigates with clean water. The above organic solid fertilizer is processed from by-products and wastes of planting and breeding industry. The preparation operation is simple and the management is convenient. Organic solid fertilizer is rich in nutrients required for plant growth without additional nutrient solution, so it greatly reduces the capital and time cost required for plant batch culture. The nitrate content of wastewater from cultivation system is only 1 ~ 4mg / L, which will not pollute the environment. Organic ecotype soilless cultivation is mostly used to plant vegetables with high quality requirements, through the selection of new varieties with high quality, high yield and strong disease resistance.

1）Soilless Seedling Raising: the main forms of Soilless Seedling Raising include sowing seedling raising, tissue culture seedling raising and cutting seedling raising. Compared with the traditional seedling raising methods, Soilless Seedling raising has the characteristics of high strong seedling rate, high reproduction coefficient, strong and tidy seedlings, labor-saving and time-saving. It is convenient for scientific and standardized management and is suitable for large-scale industrialized seedling raising.

2）Vegetable cultivation: soilless cultivation can effectively solve soil salinization, soil borne diseases and insect pests and other soil continuous cropping obstacles, and make full use of land space. It is suitable for popularization in desert, saline alkali land, mining area and other places where vegetables are not suitable for soil planting. The vegetables planted by this technology have less diseases, no pollution, and save fertilizer, water and labor in the production process. It is an important way to realize the automation, large-scale and mass production of vegetable production. Flower cultivation: the flowers cultivated in soilless cultivation grow fast and have beautiful flowers.

3）Beautiful, high-quality, clean and sanitary, and few diseases and pests. These advantages make the soilless cultivation of flowers and plants highly praised in the world, especially in countries with developed horticultural technology such as the Netherlands. The soilless cultivation of flowers in China started late and is still in the development stage. At present, the soilless cultivation of flowers is mainly carried out by hydroponic culture and matrix cultivation.

4) Fish vegetable symbiosis: it is a comprehensive system born by the combination of fish culture technology and plant hydroponic cultivation technology. It is a compound plant and crop cultivation system. In this symbiotic system, the metabolic waste produced by fish becomes the nutrient that can be used by plants through the biotransformation of nitrifying bacteria. The clean water resources purified and absorbed by plants will flow into the fish pond again to provide a suitable living environment for fish fry.

5) Ecological Sightseeing: soilless cultivation can also be used in sightseeing agriculture such as ecological hotels, ecological restaurants and ecological parks, as well as the construction of agricultural popular science education bases in primary and secondary schools such as modern soilless cultivation bases. These places use soilless plant cultivation as technical support, which well reflects the new concept of harmonious development between man and nature.

The application of soilless cultivation technology of organic vegetables can not only cultivate vegetables in sandy land and alkaline land, increase the domestic land use area, but also improve the local economic benefits and ensure the economic source of growers. Although China's soilless cultivation technology is not yet mature, as long as it is studied by scientific and technological personnel, there will be new development and improve China's agricultural strength. With the development of soilless cultivation technology, there are more and more applications of soilless cultivation technology of organic vegetables in China. Especially in recent years, the soilless cultivation technology has gradually matured and began a large-scale pilot application.

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