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To cite this article: Lin Gao 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **252** 052069

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Current Situation of Cultivation Techniques of Facility Vegetables and Problems in Production Also Its Sustainable Development Strategies

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Abstract. This paper introduces the cultivation techniques of facility vegetables, and analyzes the main problems in the production of facility vegetables, also proposes its development strategies.

1. Introduction

With the rapid development of science and technology and the wide application of new technology in agriculture, facility cultivation has become an extremely important innovation production also an important means to resist natural disasters and achieve high efficiency in off-season cultivation.

2. Facility vegetable cultivation technology

2.1. Vegetable cultivation system

The vegetable cultivation system refers to the system of vegetable arrangement and mouthwash replacement within a certain period of time and a certain land area. It includes crop rotation, intercropping, intercropping, multiple cropping and row planting. The main characteristics of the vegetable cultivation system are extensive intercropping, increasing the multiple cropping index, increasing the utilization rate of light energy and soil fertility, also paying attention to the system of cropping, freezing, then drying to reduce pests and diseases, as well as restore and improve soil fertility.

2.1.1. Continuous production and rotation. Continuous cropping means cultivating the same crop continuously or successively on the same piece of land. Continuous cropping easily causes the spread of the same pests and diseases, and the output is decreasing year by year. At the same time, the organic acids and toxic (or harmful) substances secreted by the roots during the growth process are not easy to eliminate, resulting in poor plant growth.

Rotation refers to the rotation of several crops with distant relatives or different natures on the same piece of land, which are commonly referred to as “changing” or “squatting”. Rotation is an effective measure to rationally use soil fertility and reduce pests and diseases.

When arranging production, in addition to mastering the above principles, it is also necessary to determine whether it can be continuous or rotated, and the length of the interval, based on the characteristics of the vegetable variety and its incidence. Such as ordinary cabbage, cabbage, broccoli, celery, onion and garlic, etc. can be properly continuous on the plot without serious disease, but we



need to increase the base fertilizer. On the other side, potato, yam, cucumber, pepper, etc. should be cultivated 2 to 3 years apart, while eggplant, melon, peas, etc. should be cultivated at intervals of 3 to 4 years, and watermelons should be rotated for 6 to 7 years.

2.1.2. Intercropping and mixing. Two or more kinds of vegetable partitions, rows or plants are regularly cultivated on the same piece of land and called intercropping. Mixing different vegetables irregularly is called mixing. Before the growth of the pre-cultured vegetables, they were used as vegetables after planting between the rows or between the plants. The time before and after symbiosis was short-term.

Correct use of intercropping and mixing techniques can effectively capture the seasons, grasp the space, make full use of the solar energy, and make the land share. It also helps to play the mutual benefit of several vegetables and improve their resistance. On a limited land, it will be overcharged to provide a rich and diverse product for the market. In addition to mutual assistance and benefit, there is also a contradiction between the masterpiece and the intercropping. Therefore, when intercropping is carried out, it is necessary to select crop varieties with more mutual benefit according to the characteristics of various vegetables. The following configuration principles should be followed for intercropping.

1) Reasonably match the types and varieties of vegetables. According to the roots of vegetables, the roots are deep and shallow, the plants are tall and short, the leaves are round and pointed, and the ripening period is fast and slow. They are properly mixed and planted. Close planting, and contradictions in soil, fertilizer, water, gas, light, etc., have the benefits of regulation and relaxation.

2) Arrange a reasonable field group structure.

3) Take appropriate cultivation techniques.

4) Note that the contradiction between the two crops in the management of fertilizer, water and ventilation should not be too great. Such as greenhouse cucumbers should not be intercropped with broccoli. In addition to vegetables and vegetables, the phenomenon of vegetables, food, vegetables and fruit is also common.

2.1.3. Multiple times and repeated work. On the same piece of land, a variety of vegetable plants are continuously cultivated within one year, and many systems called “multiple work” or “multiple crops” can be harvested. Repeatedly, the same vegetable plant is cultivated several times in the whole production season or part of the growing season of the year, and it is mostly used for green leafy vegetables or other vegetables with shorter growth period, such as Chinese cabbage and small radish.

Scientific arrangement of cornices should comprehensively use crop rotation, intercropping, intercropping, mixed cropping and multiple croppings, combined with the application of organic fertilizers, drying and freezing, and the combination of land use and land reclamation to maximize the use of ground power and light energy.

2.2. Cropping arrangement

2.2.1. Seasonal use of crops for rotation

1) Winter crop

According to the climate of local winter, the people usually use cold-resistant spinach, celery, lettuce, cabbage and other vegetables. Generally, the autumn field is broadcast live or nursed and transplanted, and it becomes the main pass for the supply of spring. The early wintering vegetables are good for the spring and summer vegetables. If the harvest is late, you can plant the late summer vegetables, etc., or you can use it as the previous crop of the the hot season or inoculate the autumn vegetables through the ploughing.

2) Spring crop

Vegetables such as Chinese cabbage, sage, spinach, celery, etc., can also plant spring potato and winter facility seedlings, early spring planted cold-resistant or semi-cold-resistant spring cabbage,

spring cabbage, spring broccoli and so on. Generally, in the early spring, the soil can be planted, and the growth period is 40 to 60 days. At the time of harvest, the summer issuance of the solanaceous fruits, melons and beans, and the “small off-season” after the large number of winter vegetables are released.

3) Summer crop

It refers to the warm-temperature vegetables that can be planted in the open field after the spring frost. It is the main season of the country. If the vegetables are in the market, they will be listed in large quantities from June to July, forming a peak season. Therefore, it is best to sown early, middle and late varieties and put them in batches in stages.

4) The hot season crop

It is a heat-resistant vegetable mainly used to block the autumn season. It is usually planted in June or July and it is available in the market from August to September.

5) Autumn and winter Crop

It is a kind of heat-tolerant vegetables, such as Chinese cabbage, cabbage, root vegetables and some warm fruits and vegetables, beans and green leafy vegetables. It is the largest season in the whole year. It is usually planted before and after autumn begins. It is available for sale from October to December. It is also the main crop for winter and spring storage. Later, it is used as wintering vegetables or frozen oysters to plant early spring or summer vegetables in the spring of the next year.

2.2.2. Land use of vegetables. It refers to the arrangement of various vegetables throughout the year on the same plot. Reasonable gangle arrangements, mutual complementation and cooperation have basically achieved the balanced production of vegetables. However, there are also contradictory aspects between the sputum, and excessive or inappropriate adjustment of a single type will inevitably affect the proportion of other types, causing other new seasons that are not expected. Therefore, it is necessary to comprehensively arrange according to factors such as production conditions and market demand to determine a reasonable proportion of the sputum to ensure the balanced production and supply of vegetables.

2.3. Soil disinfection and improvement technology

With the continuous cultivation of facility agriculture for many years, the pests and diseases have increased, the nutritional balance has been destroyed, the organic matter content is low, and the soil quality has been seriously degraded. These have become the key technical links that restrict the healthy development of facility agriculture. To this end, in solving the soil problem, various measures have been taken to sterilize the soil to prevent the occurrence of pests and diseases in the greenhouse due to soil bacteria. Before the planting, it is necessary to carry out disinfection in the whole shed, thoroughly remove the crops from the shed, and remove the weeds and debris in and around the shed. The following methods can be used for treatment, what is, summer high temperature stagnation method, formalin potassium permanganate disinfection method, artificial nutrient soil cultivation method, lime nitrogen straw sterilization technology and ridge soil disinfection technology for soil preparation and treatment.

3. Problems and countermeasures in the pollution-free production of facility vegetables

3.1. The main problems in the production of vegetable products

3.1.1. Scale and standardized production are not compatible with market demand. The proportion of large-scale production area of vegetables is not high. Nearly half of the vegetable production is planted by peasant retailers. There is no market and orders to determine the market, and the ability to withstand market risks is poor. Some vegetables are unsalable in the case of a large-scale vegetable market in the country in 2018. At the same time, the proportion of standardized production area is lower. Most vegetable production areas have poor quality and safety awareness and standardization

awareness in production. Vegetable products have low commodity prices, and even have potential safety hazards. Incompatible with the big market, it seriously restricts the development of the vegetable production.

3.1.2. The structure of the facility is not standardized. In recent years, a number of steel frame greenhouses with a span of 8 meters, insect nets and other equipment have been pushed, but there is still a certain proportion of simple facilities. The space is small and the performance is poor. The shed type is not suitable for the species, and the materials are cumbersome, also the mechanical matching rate of the facilities is not high, the labor intensity is high, and the output is not high. Under the situation of large circulation of vegetables in the country, when the southern vegetable is in the north and the winter and spring are in the off-season, there are a large number of vegetables in the north of Shandong, and there are “natural greenhouses” in Hainan Province in the north.

3.1.3. Continuous cropping obstacles are getting worse. With the increase in the number of years of planting vegetables, long-term application of chemical fertilizers, heavy nitrogen fertilizers, etc. lead to soil acidification, secondary salinization, nutrient imbalance and other continuous cropping obstacles, and some areas with serious salinization can no longer grow vegetables. When the secondary salinized soil is dry, the white salt efflorescence is formed on the surface, and when the soil is wet, moss or even red moss appears on the surface.

3.1.4. The degree of mechanization of production is low. At present, the degree of mechanization of the vegetable production is low. Compared with rice and other food production, the distribution of vegetable plots is relatively scattered, and greenhouses and other facilities are independent bodies, which are not suitable for mechanized production. Vegetable production requires intensive cultivation, labor management, and domestic vegetable production equipment is less, most of which need to be introduced from developed countries, greatly increasing the cost of input. There are many varieties of vegetable production and many kinds of vegetable cultivation. Different kinds of vegetables need to be equipped with different agricultural implements, and different agricultural machinery and tools are needed for each production process. The matching is poor, and the practicality of the combination is also poor.

3.2. Countermeasures for pollution-free production of facility vegetables

3.2.1. Under the guidance of scientific development, according to the local land conditions, industrial base, location advantages, planting habits, and mass demand, we should make rational planning and layout under the principle of adhering to the advantage zone. According to the concept of park construction, the type of facilities should be based on the planting content, investment capacity. According to the requirements of strong structure, superior performance, reasonable cost, select the appropriate shed type, and conditionally promote the wide-body steel frame greenhouse also multi-purpose greenhouse.

3.2.2. Increase support and multi-party financing. The key to developing facility vegetables is funding. Facility vegetables are a fund-raising, technology and labor-intensive production with early investment. Finance at all levels should increase investment in special funds, support the construction of a large number of large-scale facility vegetable parks, and increase investment in facility agriculture. At the same time, it is necessary to take effective measures to fully implement existing policies, including land use policies, to attract industrial and commercial capital, social capital and foreign capital to build facilities for vegetable parks. It is necessary to encourage the establishment of vegetable professional cooperatives and the use of shareholding systems to establish good practices. The park operation mechanism mobilizes farmers' investment enthusiasm and promotes the rapid development of facilities.

3.2.3. Introduce new agricultural machinery and improve the level of mechanization. Vegetable production in most regions is dominated by decentralized household production models, and the degree of scale is low, which is not conducive to mechanized production. We should start with professional cooperatives and large-scale farms, and introduce vegetable production machines such as planters, cultivators, seedlings, vegetable transplanters, leafy harvesters, etc. to realize vegetable plotting, land preparation, trenching, and ridges.

3.2.4. Broaden sales channels and promote vegetable industrialization. Guided by the market and science and technology, we will strive to form an integrated service of production, supply and marketing, and comprehensively promote the process of vegetable industrialization. Diversified development of sales model, such as, through the broker to sell the products to the farmers market in the cities and surrounding cities, docked with the supermarket to sell the products to the supermarkets, through the docking with schools, institutions and canteens, through processing and exporting to the markets of Europe, America and Southeast Asia. It can be sold to all parts of the country through e-commerce platforms, and scheduled sales through orders.

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