

New Technologies for higher and quality production of Horticultural crops and Horticulture Entrepreneurship

The degradation of land and water resources by continuous intensive cultivation of present cropping sequence, to provide nutritional security to the masses, due to globalization of markets, climate change and to increase the profit margin with cultivation of land has led to the thought of diversification. For crop diversification growing Horticultural crops is best option. Horticulture comprises of the production and maintenance of fruits, vegetables, and flowers, spices mushroom, medicinal and aromatic plants. The cultivation of horticulture crops is highly specialized, technical and remunerative venture as compared to traditional crops being grown by the farmers. Apart from this, majority of Horticulture crops, being perishable in nature, requires systematic planning for their development. Horticulture development has assumed greater importance in recent years since this sector has been identified as remunerative for diversification of land use which provides increased employment opportunities, better return per unit area besides filling the nutritional gaps. Keeping this in view this article will describe the latest technologies in horticulture viz Aeroponics and Hydroponics for horticultural crop production, protected cultivation and micro irrigation also in sustainable farming in horticulture, horticulture entrepreneurship for higher profit and sustainability.



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CULTIVATION OF HORTICULTURAL CROPS IN PROTECTED CULTIVATION

The production of vegetables, fruits and flowers in India has increased gradually over the last decade, but Our productivity and quality of vegetables, flowers and fruits are very low compared to other developed countries. Which has a lot of potential to increase. Moreover the profit gained by the farmers' traditional cultivation is very low. One can get more value by growing high quality vegetables, flowers and fruits in protected structures. It can be grown easily for a long period in "protected cultivation". Protected cultivation of fruits has proved to be a very good technique. There are many benefits of protected farming viz it is a very important component of agricultural investment, through which there is water and fertilizers saving with systematic use of water and nutrients, helps in reducing weeds. Green house technology better space utilization, extreme weather conditions and high rainfall

areas. It is very useful in in highest potential of crop production. It provides a favorable environment for the growth and development of plants which helps in early plant production of various crops.

There is a great demand for high quality vegetables, flowers and fruits in Metro cities like Delhi and in big cities. There is the high demand for these horticultural crops in the shops, hotels, offices and embassies. Usually in vegetables Tomato, cherry tomato, capsicum, colored capsicum, seedless cucumber, brinjal etc. in fruits Strawberry, Papaya, Banana etc and flowers in Gladiolus, Carnation, Chrysanthemum, Lilium, Gerbera are grown in Protected Cultivation. However, the cost of these climate controlled greenhouses is high. But in the end it's a Profitable business. Day by day demand for off-season vegetables, fruits



and flowers in big cities are increasing continuously. Therefore, farmers can make their living by adopting protected cultivation of horticultural crops and can increase income more and more. Nowadays there are many such technologies in our country such as Hi-Tech Green House, Natural Air Conditioned Green House, Plastic Low Tunnel House, Insect Repellent Net Homes, walk-in-tunnels and shady net houses have been developed, where high quality vegetables, Flowers and fruits can be grown. Furthermore the plug trays of these structures are of high quality, you can get more profit by preparing saplings.

Protected cultivation offers several other advantages like- to produce high quality seedlings of vegetables, ornamentals, spices and fruit plants. This enhances the crop yields and make feasible to grow crops during the off season when prices are higher, thus using the land and other resources more efficiently. The quality planting material and micro propagation are the important aspects for successful protected cultivation of horticultural crops. So the protected cultivation becomes relevant to horticulture farmers who have land holding smaller than 1 ha (small and marginal farmers). Other advantages of protected/greenhouse cultivation includes timely harvest as per market demand, higher yield due to better management. The protected cultivation of horticultural crops is emerging as a potential tool for the development of horticulture in Haryana by increasing the production and productivity per unit area. So the area under protected cultivation is increasing due to change in the perception of growers and support from central and state government through various schemes to encourage protected cultivation.

GROWING OF HIGH VALUE AND EXOTIC VEGETABLES

Growing of high values vegetable and fruits can be very profitable for the farmers as these are in very high demand in urban areas. These vegetable fetches very high price of in the market. These includes coloured capsicum, cauliflower, Bok choy, Celery, lettuce, asparagus, zucchini etc. These vegetable are not only have different taste in eating but have very high nutritive values also



AEROPONICS

The modern system of aeroponics has been started commercially by farmers in Haryana, Punjab and other states for producing virus free seed potatoes. Along with potatoes, this system is also being adopted to grow other vegetables. It is a process through which plants are grown in moist environment without soil and storage medium. In this process the hanging roots of the plants grow in a sealed box or chamber in complete darkness without light. The roots get nutrients in the form of mist. Although this system was initially used for vegetables, but it has been successful in producing small-sized potatoes in large quantities without virus in potato seed production. This technology is being developed and proving effective as a solution for many problems in seed potato production like good quality seed and low yield.

THIS IS HOW IT WORKS:

In this system, nutrients are given to the roots of the plants in an appropriate amount through a time controlled spray system. In this way the roots of plants get nutrients and grow. The soluble nutrients are stored in the tank and given to the roots of the plants under pressure. The excess soluble nutrients can also be reused.

ADVANTAGES:

This system has many advantages over other traditional systems. The availability of oxygen in aeroponics provides favorable root consciousness, so that higher yield is obtained. In this system water is used in very less quantity and proper control of nutrient circulation and pH can also be controlled for plant growth. At the same time, more production can be achieved by using less space. It is possible to

plant at a shorter distance and produce more. There is no loss of fertility in this system because soil is not used in this system. Due to which you will also get rid of soil borne diseases. Aeroponics system helps in keeping the environment clean. Because we use water and fertilizers in the right amount in the right way, this can avoid water pollution and the use of harmful chemicals and pesticides, which proves to be very beneficial for wildlife and human health.

HYDROPONICS

Water culture or hydroponics is a technique in which crops can be grown with only water and nutrients without being planted in the soil. It is also called aquaculture. Hydroponics is a method of growing plants using mineral nutrients solutions, in water, without Soil. Plants may be grown with their root in the mineral nutrient solution only or in an inert medium, such as perlite gravel, mineral wool or coconut husk. The plants grown with this Hydroponics require very less water. This technique require only 10% water used by conventional method of growing plants. This mean growing plants in hydroponics saves lot of water.

There is a big difference in the yield of plants grown in soil and plants grown by this technique. Many crops can be taken by this method throughout the year. Especially green leafy vegetables, fruits etc. can be planted successfully. This technology can be used by farmers, entrepreneurs and businessmen for production of fruits, vegetables, flowers etc. in urban and rural areas and near cities. This system is a major part of modern farming techniques of precision farming. For the increasing population of the country, there is a need to adopt this technology for high quality horticultural crops in large quantities. Entrepreneurs, farmers can be benefitted as soon as possible and the educated youth can be given employment in rural areas near towns and cities.

This technique of growing plants is very useful

for our environment. The success of growing crops in the hydroponics highly depends of plant nutrition provided by adding various fertilizers. This article discuss the essential nutrient, their quantity, and methods of application and water management and other problems related to plant nutrients and water in Hydroponics.

MICRO-IRRIGATION

Sensing the significance and probable benefits of the process to double the farmers' income along with agricultural sustainability and environmental quality, the Union government launched a comprehensive flagship programme called Pradhan Mantri Krishi Sinchai Yojana or "more crop per drop".

Under the programme, financial assistance of up to 55 per cent is available for small and marginal farmers and 45 per cent for other farmers for adoption of micro-irrigation systems. The funding pattern between the Union governments and the state government's share since November 2015 has been 60:40 for all states except the North East and the Himalayan states, for which the funding pattern is 90:10. Micro-irrigation can increase yields and decrease water, fertiliser and labour requirements. By applying water directly to the root zone, the practice reduces loss of water through conveyance, run-off, deep percolation and evaporation.

Drip irrigation is the most effective practice with water use efficiency of around 85-90 per cent. Significant electricity saving, on an average 30.5 per cent have been estimated and high fertilizer-use efficiency reported, resulting in an average consumption reduction of 28.5 per cent, according to a Federation of Indian Chambers of Commerce and Industry report.

Another advantage is maintenance of optimum soil moisture conditions that help increase overall productivity and profitability. Across various studies, it has been found that the adoption of micro-irrigation systems helped boost the yield of fruit as well as vegetable crops.

The productivity for fruit crops increased 42.3 per cent and that of vegetable crops by 52.8 per cent. There was an average reduction of 31.9 per cent in irrigation cost thorough higher water use efficiency. Another gain has been the adaptation of diverse cropping patterns.

It is quite evident that importance of micro-irrigation to achieve sustainability in Indian agriculture cannot be neglected. But it's a long way ahead and requires extensive demonstrations, training and awareness programmes to bring Indian farming community abreast with micro-irrigation practices.



HORTICULTURE ENTREPRENEURSHIP FOR HIGHER PROFIT AND SUSTAINABILITY

Horticulture agro-based important industry which helps in productivity of the land, generating employment, improving economic conditions of the farmers and entrepreneurs. It also enhance exports and above all, providing nutritional security to the people. Horticulture sector includes growing of various Fruits, Vegetables, Flowers, ornamental trees, Seeds and seedlings, Medicinal plants, Herbs, Nuts, Mushrooms, non-food crops such as grass. The various entrepreneurship in horticulture include Organic cultivation of vegetables, Cultivation of vegetable in Peri-urban area with modern techniques.

Floriculture: A Lucrative Industry, Dry flowers, Implements for horticulture and landscaping, Machine and major equipment, Cultivation of fruit, Vegetables and flowers under Protected Cultivation, Growing Apple is now possible tropical and semi arid condition with variety HRMN 99, Growing fruits of semi-arid region i.e our indigenous fruits and value addition like Aonla fruit is process in many Ayurvedic preparations vitamin C tables, Trifla, Chavan prash,

similarly another medicinal plants and creating Herbal garden can be one of these Hydroponics and Aeroponics, Mushroom cultivation for example Reishi mushroom (*Ganoderma lucidum*). *Ganoderma lucidum* is the most important medicinal with global trade of about 2 billion \$. Food processing of horticultural product viz Pickle, nuggets, Cookies, soup powder, Ketchup, Candy, Papad, Powder, Juices, Spices processing unit, Raisin processing unit, Tea processing unit, Neem and Karjan oil extraction, Black piper processing unit, Cashew nut Processing Unit, Essential oils, Fruit soft drink, Packing bag and manufacturing unit, Manufacturing of bio fertilizer and PGR. The other Entrepreneurship can be Mushroom Compost Unit, Making of Planter for kitchen garden. Aprt from these there can be Agriculture consultancy, Beekeeping and consultancy, Banana export, Agro tourism, Soil and water testing laboratory, Drip irrigation trading center, Onion seed production, Vegetable seed production, Tissue culture banana sapling, Forestry nursery raising , Landscape nursery and landscape



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