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Hydroponics System : A Potential Farming System

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Introduction

In 1937, a scholar raised tomato vines in his backyard using different varities of mineral nutrients. This person was none other than William Frederick Gericke. He was the first person to coin the term "hydroponics". Till date hydroponics system is saving liters of water and human labor to produce enough vegetables, few specific varities of fruits and flowers worldwide.

Hydroponics system is basically a system of soilless culture in which plants are grown without soil but with the help of all the basic mineral nutrients provided to the roots of plants directly with the help of the pumped water. Electric current is the backbone of this system. This system provide production of vegetables, fruits and flowers without or very less infestation of pests, insects etc.

Need for Hydroponics in Agriculture

The United Nations (UN) has projected the global population to reach nearly 10 billion people by 2050, with "roughly 83 million people being added to the world's population each year until then." In 2019 alone, an estimated 124 million people faced acute food shortages from climate-related events such as flooding, irregular rains, droughts and high temperatures. Given that hydroponics can grow food in a controlled environment, with less water and in higher yields, the Food and Agriculture Organization of the United Nations has been implementing hydroponic farming in areas of the world that suffer from food shortages. There are currently ongoing projects to establish large hydroponic farms in Latin American and African countries.

The technology used in hydroponic systems being implemented in developing countries around the world are largely based off hydroponic systems that were designed at NASA. In the late 20th century, physicists and biologists got together to figure out a way to grow food in one of the starkest climate known to humans space. Aerospace plant physiologists at NASA began experimenting with growing plants on the International Space Station using hydroponics technology because it requires less space and less resources than conventional farming. After extensive tests, astronauts ate the first space-grown leafy vegetables in 2015. How did NASA get the idea to use this technology in space? It was from a century of work by scientists who found that plants were surviving and thriving while being grown in water.

In 19th century a botanist named Julius sachs dedicated his career in understanding the nutrients requires by the plant for the growth. He concluded that if the plants are provided with these nutrients plants can thrive any where, plants does not need soil to grow. In 1860 sachs published "nutrient solution" formula which become the base for the modern day hydroponics

In 1937 American scientists Dr. W.E Gericke study how this method can be used to grow large amount of crops in agriculture. He studied the fluid dynamics to understand how the roots of the plants can uptake the nutrients more efficiently.

Hydroponics system now a days are more sophisticated, it includes ph meters, thermo-meters, electro – conductivity metres etc.

There are many types of hydroponics system working nowdays.

a. Wicking system

b. Deep Water Culture (DWC)

c. Nutrient Film Technique (NFT)

d. EBB and flow

e. Aeroponics

of these NFT and DWC is more in common.

In NFT channels are made of PVC of desirable diameter depending on the type of vegetable you are going to grow. Tech channel is connected with the individual pipe and then with the common pipe. Which uptake the nutrients with the help of pump. The nutrients are dissolved in water tank.

Merits

- This system runs on motors and machines, so it cuts down the labour charges.
- Once established, runs efficiently upto 3-4 years.
- Being soil less culture it bypasses the infestation of many soil borne nematodes and insects.
- It is boon for urban farming and can full fill the requirement of major cities like Bangalore, Delhi, Kolkata etc.
- One can easly establish the system in his backyard for kitchen gardening.
- A country like India where Government is providing sufficient subsidies, it becomes very easy to establish and runs the system.

Demerits

- This is totally a new farming system in our country.
- Data and other information related to the farming is quite scant.
- A country like India where electricity is still a dream for many houses, this system does not fit very much.
- This system involves more technicality than the conventional way of farming.

Hydroponics in Indian context

Hydroponics in India is still have to find its potential with the increasing population and limited soil resources, India has to find its alternative form of farming to feed the population. Prime Minister Shri Narendra Modi once gives the slogan "per drop more crop" which basically emphasizes to cut off the water uses. Hydroponics is then a boon to such slogan. In recent years hydroponics farming has become a centre for many researchers in universities and other research station. On the other hand this farming is also becoming favourite for entrepreneurship in agriculture sector

Some of the major Indian hydroponics farms :

- Aqua farms : https://www. acquafarms. org/
- LetcetraAgritech:http://www. letcetra-agritech.com/
- Urban kishan : https://www. urbankisaan. com/
- Future Farms, Chennai : https://www. business.futurefarms.in/
- Ela Sustainable Solutions, Cochin https:// www.elagreens.com

Source of Nutrients

As we know that in hydroponics plant grow in soil less culture. So, we have to add the nutrients in the water manually. For that we have to study about all the mechanism of nutrients uptake by the plants, individual role of nutrients like N, P, K, Mg etc., in the plant growth and development, at which stage we have provide which type of nutrients in the

water like during the vegetative growth N play a very vital role but during flowering/ reprodutive phase Phosphorus requirement is crucial for the plants.

Besides the nutrients in the solution, the pH, TSS, EC and the Temperature of the soluiton must be monintored time to time. We also have to send plant samples to the lab for the nutritive analysis according to this we have to balance the the nutrients in the solution.

Conclusion

In the final I can interpreter that the data and the information related to grow plants in hydroponies is insufficient in India and there is a lot of work to be done in this area for the enhancement and the betterment. So that it becomes easy for the farmers to accept and rely on the hydroponics farming to grow their pants. Hydroponics has a better future in India. Specially for urban areas where the demand of the organic vegetables is increasing day by day.

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