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Peri-Urban Hydroponics for Future Prospects

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Urban or Peri-urban agriculture is a key solution to rapid population growth, urbanization, food crisis and climate change. According to reports of FAO, by 2050, more than 6 billion populations will be dwelling in urban areas, which is almost double the current population of 3.5 billion. In case of India, the reports by UN state of the world population 2007, by 2030, 40.76 % of country's population will reside in urban areas. The continuous augmented demand of food production is escalating with increase of world population. The traditional farming system will not be able to cover the world's emergent demand for food with rising pollution level and oscillations in climate. In India exotic vegetables have already gained popularity in urban areas. There are various types of urban agriculture, like, kitchen gardening, rooftop gardening, vertical farming, Hydroponics etc. There are large number of advantages of peri-urban farming, like, providing employment and daily wages to poor farmers, educating children, strengthening the community, improving social and emotional wellbeing etc.

Peri-urban farming

Cultivation of crops in the city outskirts or perimeter of the urban areas is peri-urban farming. The farmers can follow large scale production systems by setting up polyhouses, animal husbandry, horticulture, beekeeping, mushroom cultivation, Hydroponics, agro-forestry etc. This production system is mainly followed in India, where, 65 % of the produce in urban markets in India comes from peri-urban production (Bhat and Paschapur, 2020).

Advantages of Peri-urban farming

- The cost of transportation, commissions for middlemen are greatly reduced or almost zero in this system.
- Highly perishable leafy herbs and seasonally and regionally available vegetables and fruits are cultivated and sold.
- These farms are close to the market, thereby improving quality and reducing spoilage. Hence, food waste is decreased in the supply chain.
- Less need for storage, Refrigeration, and transportation infrastructure, compared to food coming from rural areas.
- Local employment for farmers and food processors.
- Organic matter readily available in urban waste.

Hydroponics

Technology of growing plants (without soil) in nutrient solutions that supply all nutrient elements needed for optimum plant growth. With or without the use of an inert medium such as gravel, vermiculite, rockwool, peat moss, saw dust, coir dust, coconut fibre, etc. to provide mechanical support (Sharma *et al*. 2014).

The term Hydroponics was derived from the Greek words hydro means water and ponos means labour. The science of hydroponics proves that soil is not required for plant growth but the elements, minerals and nutrients that soil contains are essential (Prasad *et al*. 2014).

Agriculture without soil includes hydro agriculture (Hydroponics), aqua agriculture (Aquaponics) and aerobic agriculture (Aeroponics) as well as substrate culture. Among these hydroponics techniques is gaining popularity because of its efficient management of resources and food production. Various commercial and specialty crops can be grown using hydroponics including leafy vegetables, tomatoes, celery, peppers, cabbage, and many more (Pandey *et al.* 2009)

In 1929 Dr. W.F. Gerick coined the term hydroponics. Promoted commercial potential of liquid culture. Wrote the book named 'Complete Guide to Soilless Gardening'.

Advantages of Hydroponics

- The production in hydroponics may be increased approximately two times as compared with soil cultivation (Because plants do not have to compete for moisture and nutrients).
- Offers opportunities to provide optimal conditions for plant growth and therefore, higher yields can be obtained.
- A small hydroponic garden can be setup almost anywhere even in upstairs or balconies, because land is not necessary.
- Hydroponics helps to reduce some of the problems experienced in conventional crop cultivation.
- Heavy manual operations like digging, making beds, weeding, ploughing etc. are eliminated.
- Off- season cultivation is possible.
- There will be no fear of soil borne diseases.
- Many plants were found to give early yield in hydroponic system.
- Less water is needed when compared to normal cultivation.
- Less disease and pest infestation.
- There is no need of crop rotations.
- Offers a clean working environment and thus hiring labour is easy.

Limitations of Hydroponics

- Higher initial capital expenditure.
- High degree of management skills.
- Limited to high value crops of the area of cultivation.
- Energy inputs are necessary to run the system.
- Yields were found to decrease when temperature of the solution rises during hot days.
- It requires a trained personnel.

Why Peri-urban Hydroponics?

Now a days due to rapid urbanization, peri urban regions are under threat of urbanization. Peri- urban region has a huge risk of loosing Agricultural land, therefore in this case Hydroponics plays a major role in food production. As we saw earlier Hydropnics has greater advantages over usual soil cultivation.

Scope of Hydroponics

- Growing crops in hydroponics under protected cultivation can be considered the most complex production system available today.
- Hydroponic as a "high input – high output –high risk" system.
- Site selection – In proper light intensity and duration rather than locating close to a population center.

- Another important factor is temperature. For example, if tomatoes are selected as the crop to be grown year-round, low elevations must be avoided.
- Important consideration for site selection is that the site should be free of insects that might be vectors for severe viral diseases.
- There are many choices available for energy sources such as natural gas, propane, fuel oil and electricity.

International status of hydroponics

- The area under hydroponics began to expand significantly in Europe and Asia during 1950s and 1960s.
- Large hydroponic systems were developed in the deserts of California, Arizona, Abu Dhabi, and Iran.
- At present, the largest commercial hydroponics facility in the world is "Eurofresh" Farms in Wilcox, Arizona.
- Almost 20 years have passed since the last real commercial interest in hydroponics, but today there is renewed interest among growers to establish hydroponics systems.
- Many more hectares are planned, not only in the Southwest, but in Mexico too.
- The future for hydroponics appears more positive today than any time over the last 50 years.

National status of hydroponics

- Hydroponics did not reach India until 1946.
- The first research studies were started at the Government of Bengal's Experimental Farm at Kalimpong in the Darjeeling district.
- It is now planned to double the production to 20 million rose stems by installing the hydroponics system on 12 hectares in Kuched village of Navsari district.
- In India, several tracts of wastelands having poor quality soil but plenty of water can be brought under hydroponics.
- All that will be needed is to create an impervious surface at the bottom and bunds to hold water.

Conclusion

Food is one of life's fundamental necessities. Humankind has learnt a lot to control and manipulate its environment. As the population grows, agricultural innovations must continue in order to feed the planet. If the current situation continues, in future due to rapid urbanization, our agricultural industry will surely face a downfall and food scarce will occur. To avoid this, we should adopt to the modern technologies like Hydroponics which is environment friendly and also has many advantages over normal soil cultivation.

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