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Prospects of Vertical Farming: Promising Technology for Farming with Limited Water Resource

Bhalerao L. K.[1], Bhalerao A. K.[2] and Kamble A. L.[3]
[1]M.Sc. Scholar, Dept. of Environmental Science, Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon, (M.S.)
[2]Scientist, Training and Education Centre, ICAR - Indian Veterinary Research Institute, Pune, (M.S.)
[3]Scientist, ICAR-Central Institute of Fisheries Education, Mumbai, (M.S.)

SUMMARY

The demand for food is constantly increasing. Farmers are constantly trying their best to grow maximum food from farms but due to the constraints like water availability, labor shortage, power shortage, market unavailability, etc. yield stagnation is experienced. Therefore, through this article authors are providing an information about the pioneer technology of vertical farming to address the constraints faced by farmers.

INTRODUCTION

Vertical farming is the practice of growing produced in vertical stacked layers (bin Ismail & Thamrin, 2017). This farming method uses soil, hydroponic or aeroponic crop growing methods. According to the definition from WhatIs.com (2021) Vertical farming attempt to produce food in challenging environment, like where arable land is rare or unavailable. In difficult terrains like mountainside towns, dessert and cities farmers could cultivate diverse fruits and vegetables with the help of Vertical farming. Most vertical farms use enclosed structures like greenhouse that stack vertically, either directly above each other or staggered for better natural light exposure. It allows saving of space and reduce water consumption by 70% if hydroponics followed. Run off farm doesn't take place in case of hydroponic or aeroponic and it makes potted vegetation heavier. A mix of natural lights and artificial lights are generally used in this farming method. Some professionals believe that this farming type can substantially support the food security and consumers will get health vegetarian food. It could decrease deforestation and pollution, and help urban areas to be self-sufficient. Whereas critics of vertical farming are concerned about the cost of electricity needed for artificial illumination.

Vertical Farming in Indian Context

In India vertical farming is presently practiced only for high value crops. Cultivation under poly-house and net house is done mostly in case of export-oriented flowers and some vegetables. Vertical farming is a systematic approach for producing disease-free planting material for crops like banana, sugarcane, citrus fruits and many flowering plants. Most commonly mushroom cultivation is a successful example of vertical farming. Gradually, a scope of vertical farming is increasing. The scheme has been reflected as one of the high priority areas. Presently, good technical and financial support for vertical farming is made available. India is one of the major producer of vegetables and fruits. In India, vertical farming has been introduced. According to online article by Kukku Joseph Jose (2017) ICAR experts are working on the concept of 'vertical farming' in soil-less conditions, in which food crops can be grown even on multistoried buildings in metros like New Delhi, Mumbai, Kolkata and Chennai without using soil or pesticides. Kukku Joseph Jose (2017) also added that Scientists at the Bidhan Chandra Krishi Vishwavidyalaya in Nadia (Mohanpur, West Bengal) have already had initial success in working on vertical farming hydroponically on a small scale in growing brinjal and tomato. Punjab also has succeeded in producing potato tubers through vertical farming (Rameshwarkumar et. al., 2020). An online article published by Explore Agriculture (2020) aptly provides the overview of recent development.

According to article *"How to Start Vertical Farming in India with Minimal Cost"* Idea-farms, an Indian design-in-tech company is producing Vertical farms grow and is preferred because of predictable supply, good quality and organic food. Similarly, a Bengaluru based *startup Greenopia* is selling kits with smart self-watering pots, enriched soil and the right seeds. The sensor optimally irrigate soil in pots and sends a notification to user if there is a need to fill water in irrigation tank. Such initiatives by start-ups have massive potential to transform vertical farming for India as a most efficient way of producing vegetables. In addition, an online article published by Indian express in 2018 titled *"Young startup brings vertical farming to your doorstep"* reported that a Mumbai-based start-up firm U-Farm Technologies is transforming individual apartments and supermarkets into

vertical farming modules using hydroponic gardening technique. It's a good sign that a good number of start-ups in vertical farming are coming up in India.

Advantages of Vertical Farming

Vertical farming has many advantages and the prime one is it enables farmers to harvest maximum crop yield. With this farming, particular crop can be taken at any period of year and seasonal dependency is terminated. Some of the key advantages are as following.

- Limited water consumption is possible. The experiences from Saudi-Arabia and Israel demonstrated the commercial success in desert areas also.
- Agricultural success can be achieved independent of land and soil quality.
- Soil composition doesn't matter because soil isn't used in the farming process.
- Intensive food production can be achieved to overcome land constraints.
- The maximum output per square foot of land per year can be achieved using 3-dimensional growing system of vertical farming.
- The Vertical farming units can be constructed near consumers. Ex. if protected farming set up can be established near market then it will save transport cost.
- Yields are independent from any seasonal adversity. Success rate is higher.
- Price stability is possible with regular supply of farm produce.
- The mechanical system used in vertical farm is simple and reliable.
- Higher organic qualities of the products.
- Less drudgery for farm workers

Limitations of Vertical Farming

On the other hand, there are some limitations such as cost of initial investment is very high. Then high standards of sanitization and cleanliness are needed in farm unit. The system maintenance might be costly and labor is needed to operate it regularly. Most importantly, electricity back up is needed. If there is no electricity for longer time then it may cause severe damage.

CONCLUSION

Vertical farming has lot potential to save the space and water. But before setting faming unit one shall ensure the regular and steady water supply. Use of energy efficient appliances will reduce the cost of electricity consumption. In fact, possibility of installing solar panels on the roofs shall be checked for better profits.

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