

Vertical Farming

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SUMMARY

A growing population places increasing demand on food availability. As farmers struggle with bridging the gap between demand and supply of crops using traditional farming methods, more innovative and efficient cultivation techniques continue to surface. One of these methods is vertical farming. Given the recent advancement in technologies more agri- businesses and cultivars are inclining towards this farming method to enhance productivity and availability of quality food.

INTRODUCTION

Vertical farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques such as hydroponics, aquaponics, and aeroponics. Some common choices of structures to house vertical farming systems include buildings, shipping containers, tunnels, and abandoned mine shafts. As of 2020, there is the equivalent of about 30 ha (74 acres) of operational vertical farmland in the world.

Techniques of Vertical Farming

Hydroponics

This method involves propagating plant growth without soil in nutrient- enriched water. There are several sub- methods under this technique. Probably , the most common hydroponics technique is the floating raft system. Growers place a polystyrene raft in a large container holding water and nutrients for the plants. The raft has holes or net pots to grow the light-weight, fast growing plants like lettuce and spinach or herbs such as basil and parsley.



Aquaponics

Aquaponics is soilless farming that integrates aquaculture where producers raise fish and other aquatic animals in a closed environment and hydroponics into one production system. The excrement these fishes produce acts as fertiliser for crops, mimicking how natural ecosystem use organic waste from one element to benefit another. An aquaponic system is incredibly water-efficient, where about 1/6th of the water can produce upto eight times more food per acre when compared to traditional agriculture.



Aeroponics

This technique is an advanced form of hydroponics that uses nutrient-rich mists instead of water. Unlike the earlier two systems this one has no growing medium. Cultivators plant the seed in pieces of foam stuffed into small pots. While the plant crown remains exposed to light, the roots get nourishment from the periodical spraying of nutrient-rich water or fine, high pressure mist. The inspiration for the NASA trials on crop cultivation in space. Aeroponics also promotes faster plant growth than the above methods and is highly water-efficient.



Why is Vertical Farming Gaining Popularity?

The main objective of vertical farming is to maximise yield against minimal usage of natural resources. It promotes precision farming as well as sustainable agriculture way more than traditional techniques of cultivation. Here, the vertical method of cultivation aims to overcome the challenges posed by conventional farming techniques. These are unpredictable climatic conditions, plant diseases and long supply chain.

Advantages of Vertical Farming

- Stable crop yields
- Protection from outside conditions
- Crop yields all year long
- Protection against pests
- Fewer crop losses
- Increase in profits
- Protection from animals & invasive plant species
- Ability to grow all kinds of plants
- Savings in water
- Vertical farming can be fully organic
- Fewer crop imports needed
- More efficient land use
- Less habitat destruction
- Energy generation through composting

Disadvantages of Vertical Gardening

- Expert needed to set up a vertical farming project
- High upfront costs
- Significant operational costs
- High energy consumption
- High labor costs
- Significant maintenance efforts
- Carelessness could lead to a spread of pests
- Pollination problems
- May need official permissions
- Technology not mature yet

- Infrastructure regarding processing of crops is missing
- Only suitable for certain kinds of plants
- Plants may contain fewer nutrients
- Technology issues may cause huge problems
- People in rural areas may lose their livelihood

Vertical Farming in India

India has hopped onto this farming trend with various entrepreneurs setting up indoor- farming areas. Vertical farming in India is mostly poly-housebased, resulting in higher yield. There are several factors contributing to this farming methods popularity. These are

Ever- rising population: The current Indian population stands at 1.27 billion and could potentially rise by 25% by 2036 as per the National Commission on Population (NCP). An increasing population demands greater food availability.

Land scarcity: India is currently experiencing desertification and land degradation resulting in scanty land availability. Vertical farming can be an innovative solution to overcome this issue.

Water consumption: Farmers utilize 84% of the total available water for irrigation in the country. Technologies like aquaponics are expected to reduce water consumption by up to 95%. There are several existing vertical farming starts up in India aiming to address food scarcity in urban agglomerations. One of such technology based platforms is to promote sustainable farming via several of its products. Considering how much we have achieved with vertical farming and its ample scope for effortless, sustainable agriculture, the Asia Pacific region may experience a 29% growth rate by 2026. Further research and progress in the field will only aid in vertical farming becoming the future of agriculture.

CONCLUSION

Vertical farming technologies are still relatively new. Companies are yet to successfully produce at scale and make it economically feasible to meet the growing food demand. The performance of farms like Aerofarms will determine how important a role vertical farming will play in the future to face the challenge of growing food demand. It is worth nothing however that technologies developed foe vertical farms are also being adopted by other segments of the indoor farming sector such as greenhouses which can utilize natural sunlight, albeit requiring much more real estate and longer routes to market.

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