

Vertical Farming: Breathing Green Scraper

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Introduction

For thousands of years, the human population has farmed the land for food but with the sharp rise in the number of people on the planet over recent centuries with increase industrial revolution increase the living standard and falling mortality rate most challenging task for agriculturists is to ensure continuity and quality supply of food and maintaining the environmental factor and restoring imbalance caused due to overuse or unscientific use of natural resources. According to “the world population prospects 2019: highlights” published by the population department of the united nation world the population is expected to add nearly 273 million people between 2019 and 2050.

Vertical farm

As urban populations continue to rise, we need to think beyond traditional farming as a way to feed everyone and simultaneously have less impact on our land and water resources. Vertical farming is the solution that’s been implemented around the world. By Vertical Farming, food crops can be cultivated easily in urban areas by planting in vertically stacked layers to save space and use minimal energy and water for irrigation. The modern concept of vertical farming was proposed in 1999 by Professor Dickson Despommier. His concept was to grow the food in urban areas itself utilizing less distance and saving time in bringing the food produced in rural areas to the cities. Growing crops in indoor protected environment allows farmers to control water, temperature, and light conditions to maximize yield. He intended in growing food within urban environments and thus have fresher foods available faster and at lower costs. Vertical farming is beyond rooftop gardening they are an entire building filled with plants and fruits and vegetables which our local food supply sources 24 hours a day 365 days a year and beyond

Techniques of Vertical Farming

1. Hydroponics

Hydroponics is the method of growing plants in chemical solutions rather than growing plants in soil. With the continual increase of industrialized society, large farms are becoming drastically less common, and growing plants hydroponically is fast becoming one of the most popular methods of farming.

When growing plants hydroponically they are easily monitored and any nutrition lacking can be seen and immediately added. Plants mature 30-50% faster and produce 30% more than plants grown in soil. Since nutrients are fed directly into the plant's roots, they don't have to work hard trying to obtain the nutrients from within the soil. Plants can focus on growing tall instead of growing a deep root system.

2. Aquaponics

The term *aquaponics* is coined by combining two words: *aquaculture*, which refers to fish farming, and *hydroponics*—the technique of growing plants without soil, to create symbiotic relationships between the plants and the fish.

The symbiosis is achieved as nutrient-rich waste from fish tanks which serves as “fertigate” to hydroponic production beds. In turn, the hydroponic beds also function as bio-filters that remove gases, acids, and chemicals, such as ammonia, nitrates, and phosphates, from the water

3. Aeroponics

Aeroponics is the process of growing plants in an air or mist environment without the use of soil or an aggregate medium. The word "aeroponic" is derived from the Greek meanings of *aer* ("air") and *ponos* ("labor"). Aeroponic culture differs from both conventional hydroponics, aquaponics, and in-vitro (plant tissue culture) growing. Unlike hydroponics, which uses a liquid nutrient solution as a growing medium and essential minerals to sustain plant growth, or aquaponics, which uses water and fish waste, aeroponics is conducted without a growing medium.

Advantages of vertical farming

- Conservation and recovering of natural resources
- Vertical farming includes hydroponics aeroponics which requires comparatively less amount of soil and water and produces a larger amount of vegetables than traditional farming by practicing vertical farming we are providing time for natural resources to regenerate and replenish.
- Increase in production and availability of vegetable: vertical farming ensure a year-round supply of vegetable irrespective of environmental stress as in vertical farming one can control temperature like nutrient supply which can help to ensure a better yield and crop in an open field
- Less area is required and space-saving : in vertical farming multi-level design provide nearly eight times more growing area than a regular farm
- urban growth vertical farming will help the urban area to overcome population issues and can continue to supply food

Disadvantages of vertical farm

- High initial cost every step in vertical farms from selecting a plant to choosing land and building requires a substantial amount of money
- High energy require
- Only a few varieties can we produce economically

Construction vertical farm

For several reasons vertical farm construction is vastly different from other types of high rise building common features installed in modern vertical farms are

1. Plant rack
2. Climate control
3. Aeroponics
4. Hydroponics
5. Control room
6. Airflow and spacing

Conclusion

Vertical farming will enable more harvests throughout the year. Since harvests are not dependent on climate they can be done year-round. Some fruits and vegetables can have up to 30 harvests in a year rather than five or six. Consumers no longer have to wait for products to be available in particular season.

Vertical farming plays a significant role in sustainability efforts as well as the greater good of the earth. According to recent studies, vertical farms use up to 70 percent less water than traditional farming system. By Vertical Farming, food crops can be cultivated easily in urban areas by planting in vertically stacked layers this not only save space but also use minimal energy and water for irrigation. A vertical farm makes farming within the confines of a city, a reality. And when the farms are nearby, the products are quickly delivered and always fresh.

In our country vertical farming is at nascent stages, however, there are few start-ups & agri-tech companies working to revolutionize the field. As the vertical farming industry expands it is worth noting that it has limitations – it only works for some crops, is labor-intensive, plus start-up technologies and urban locations can be expensive.

Yet, the mix of traditional farming with high yield, local growers offers to rebalance agriculture and address concerns about global nutrition and feeding more people with the same or fewer resources

