

Urban Rooftop: A Vegetable Farming Technique

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Abstract:

Local food production is favored by urban rooftop farming. Despite the perception that rooftop farming is a sustainable practice, there aren't many quantitative research on the subject. Three methods were used to grow lettuce, a leafy vegetable: soil culture, floating hydroponics, and nutrient film. On soils, we also cultivated tomatoes, watermelons, eggplants, and chillies. Life cycle assessment was used to examine the data for both economic and environmental performance. The results show that floating in the summer, which has 65–85% less environmental impact per kilogram than nutrient film, and soil production in the winter, which has 85–95% less environmental impact, are the best lettuce cultivation methods to combat global warming. In addition, compared to the nutrient film technology, floating output was 25% less expensive in the summer and soil was 65% less expensive in the winter.

Introduction:

In the 20th century, rooftop or urban rooftop farming became increasingly common. Most of the rooftop farming occurs in urban settings, where there is very little space for beginning a kitchen garden. Large concrete structures in cities feature spacious balconies. When there is sufficient space on rooftops and balconies, as well as access to sunshine and water, roof gardens may be built in the best possible way. Rooftop farms effectively absorb solar radiation, reducing the "urban heat island effect," insulate and cool the host building, which lowers electricity consumption, lowers the danger of rainfall, and improves storm water management. This is a game-changer for urban design. Not all apartments in high-rise buildings have roofs. Containers can be positioned on windowsills and balconies in this manner. In Indian civilization, urbanization has become a widespread occurrence. Our agricultural land is disappearing every hour because of the constantly expanding urbanization sprawl, while at the same time, the population is increasing at an exponential rate. It is concerning and presents a bigger issue for our future generations since it means we will have less area to grow food on and more people to feed. One practical solution to address this issue shortly is rooftop farming.

Objectives of Rooftop Farming:

- In general, rooftop gardens are created to make good use of the empty space on rooftops as well as the homeowners' free time. However, it may be carried out on a larger scale, where the entire city can use the same method to grow the veggies they need on a sustainable basis.
- Our own favourite fresh fruits and vegetables are always accessible.
- Vegetables that are rare and exotic are not available can be grown on the rooftop garden.
- Grow the plants naturally by using household organic waste and using less pesticides to produce fruits and vegetables that are free of toxins.
- Saving a specific sum of money by lowering the amount spent on flowers, fruits, vegetables, and spices.

Advantages of roof cultivation:

- Fresh items are always available at our home, saving us both money and time.
- Eating fresh, organic food helps us stay healthy.
- We may create compost out of our kitchen garbage rather than tossing it away by using different waste products, such as plastic bottles, as containers.
- It facilitates rainwater collection in addition to lowering air pollution.

Rooftop cultivation tips:

- The containers have to be arranged in a straight line between the roof's two pillars. As a result, the structure will weigh less.
- Pot weight is decreased by using perlite and coco peat. Moving the container from one location to another will be simpler as a result.

Inputs requirement to start rooftop farming:

- **Tools:** (a) Hoe (b) Spade /shovel (c) Rose can (d) Hand sprayer (e) Gardening hose with sprinkler (f) Bamboo stakes and jute strings
- **Other inputs:** (a) Quality seeds from reliable sources likes - stations/ National Seed Centre, (b) Good soil free from stones, weeds, and other indecomposable materials (c) Well decomposed organic manure (Compost/ FYM/leaf compost/ degraded coir pith) (d) Organic inputs (Neem oil, Neem seed kernel extract, Panchagavya) (e) River bed sand (f) Some chemical inputs (Fertilizer, Pesticide etc.).

Urban sustainability and rooftop farming:

A sustainable city is one that provides for its current inhabitants without compromising the capacity of future generations to provide for themselves. The problem of urban sustainability is already being addressed by the world community. Urban sustainability is the concept that a city may be structured so that it can power itself using renewable energy sources and not be unduly dependent on the surrounding countryside. The goal is to reduce the ecological footprint and pollutants produced, to use land efficiently, to compost old materials, to recycle or transform trash into energy, and to minimize the city's overall impact to climate change. The sustainability of social, economic, and environmental challenges is a prerequisite for achieving urban sustainability. Therefore, urban rooftop gardening plays a significant role in supporting future city sustainability together with other projects and activities. and others have enumerated the ways in which rooftop farming and urban agriculture might attain social, economic, and environmental sustainability. In conclusion, social sustainability can be attained through cooperative and active community involvement in communal green spaces and rooftop gardens; cooperative community cohesion while exchanging personal stories and gathering fresh produce; the creation of local jobs; the creation of common exercise and recreation areas; and the production of shared aesthetic benefits. Increased local food production and sales, increased food security and property value, improved roof durability, decreased building cooling load and energy costs, increased availability of biofuels, and so on are all examples of economic sustainability through rooftop farming. Reducing carbon emissions from food transportation, producing less packaging, composting organic waste, reducing waste generation, mitigating urban heat islands, boosting biodiversity, improving air quality, managing urban storm water, improving sound insulation and noise absorption, and other strategies can all contribute to environmental sustainability.

Vegetable crops suited for rooftop garden:

- **Transplanted vegetables:** Brinjal, chilli, tomato, capsicum, and onion etc.
- **Direct sown vegetables:** Okra/Bhindi, Amaranths, Cucurbitaceous vegetables, Radish, Carrot, Beet root, Spinach, Cabbage, Cauliflower, Broccoli, Cowpea, French bean, etc.
- **Spice crops suited for rooftop garden:** Turmeric, Ginger, Coriander, and Fenugreek.
- **Medicinal crops suited for rooftop garden:** Agathi, Aloe Vera, Periwinkle etc.

Conclusion:

The study examined the financial and environmental consequences of crop production in communal rooftop farming in Bologna, adding to the quantitative analysis of urban agriculture's sustainability. The cultivation method, crop yield, and crop time all had a significant influence on the crops' effects on the environment and financial expenses. Except for water usage, where floating lettuce production proved to be the most effective method, soil production of tomatoes and eggplants—which exhibited the largest crop yields—exhibited the best environmental and economic performance. Depending on the indication and season, soil production and the floating technique were the best solutions for green vegetables. Because the system is community-managed, the use of chemicals in soil crops may be reduced thanks to the home-made compost and pesticide-free production. The garden's year-round polyculture design helped to meet the neighbours' varied food needs, even if some crops' productivity is limited by a uniform design. Finally, depending on their crop management effectiveness and the rooftop farming's end products, users' knowledge and training can have an impact on economic and environmental variables.

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