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ROOFTOP GARDENING: ENHANCING HOME FOOD PRODUCTION

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Abstract

Rooftop farming has gained traction in urban areas during the 20th century as a solution to the scarcity of garden space. Utilizing rooftops and balconies of concrete buildings, this practice harnesses ample sunlight and water to grow a variety of crops. Beyond mere urban greening, rooftop farming contributes to urban planning by mitigating the urban heat island effect, enhancing building insulation, reducing energy consumption, and improving stormwater management. This method accommodates diverse plants, including seasonal vegetables and leafy greens, grown in containers like pots, grow-bags, and plastic drums. By integrating organic farming practices and efficient resource use, rooftop farming supports sustainable urban living, offering continuous access to fresh produce and promoting environmental stewardship.

Introduction

Rooftop farming gained popularity in the 20th century, especially in urban areas where land for gardens is scarce. It utilizes rooftops and balconies of concrete buildings for gardens, benefiting from ample sunlight and water. This practice aids urban planning by reducing the urban heat island effect, insulating buildings, lowering electricity use, and improving stormwater management. Not all apartments in high-rise buildings have roofs, enabling containers to be placed on balconies and windowsills for urban farming. Urbanization in India is rapidly reducing agricultural land while the population continues to grow exponentially. This trend poses a serious challenge: less land for food production and more people to feed. Rooftop farming emerges as a crucial solution for our future.

Benefits of rooftop gardening

- ✓ We can enjoy fresh produce year-round at home, saving both money and time.
- ✓ Eating fresh and organic food helps us maintain good health.
- ✓ Instead of discarding them, we can repurpose various waste materials like plastic bottles as containers and convert our kitchen waste into compost.
- ✓ It aids in reducing air pollution and helps in capturing rainwater.

Tips for rooftop gardening

- Arrange containers in a straight line between two roof pillars to distribute the weight and reduce stress on the building.
- Using coco peat and perlite reduces the weight of pots, making it easier to relocate containers as needed.

STEPS TO BEGIN ROOFTOP FARMING

1. Selection of pots

To develop a rooftop garden, start by choosing suitable pots like plastic, earthen, cement, grow bags, tin boxes, wooden barrels, or fertilizer bags. Thoroughly wash the containers and create drainage holes to optimize plant growth. Earthen pots are recommended for all climates, including summer and winter.

2. Making potting mixture

Once you've chosen suitable pots, prepare the potting mixture using garden soil, compost, and sand in a ratio of 1:1:1, or garden soil, compost, and cocopit in a ratio of 1:1:1, using a hand hoe and shovel. Avoid using heavy soil for rooftop farming. Cocopit, the lightweight coconut fiber, enhances aeration and drainage in soil.

It's available in brick form for long-term use and can be purchased from the market. When mixed with soil, cocopit serves as an effective potting mixture.

For optimal results, perlite can also be added to the mixture. Perlite aids in excellent drainage and helps maintain optimal pH levels, which benefits rooftop plants.

Before filling the pots with potting mixture, make holes at the bottom of containers and cover them with stones or pebbles. These holes serve as a drainage system, preventing soil from washing out while allowing excess water to drain. Leave a 1-2 inch gap at the top of the pot to conserve soil during irrigation.

3. Planting of plants in potting mixture

After filling the pots with potting mix, plant the seeds or seedlings according to the appropriate season.

For vegetables that need to be transplanted, prepare a nursery by filling shallow pans and tubs with a fine mixture of soil, sand, and compost in equal parts (1:1:1), and then sow the seeds. Water the pots right after sowing. Cover the soil with a layer of dry grass or straw until the seedlings appear, then remove it.

Typically, the seedlings are ready for planting about a month after sowing. Seeds of specific vegetable crops that can be directly sown should be planted in chosen pots or polythene bags. The depth for sowing should be roughly two and a half times the size of the seed.

Vegetable crops ideal for rooftop gardens

- Vegetables suitable for transplanting include brinjal, chili, tomato, capsicum etc..
- Vegetables that can be sown directly include okra, amaranths, cucurbits, radish, carrot, beetroot, spinach, cabbage, cauliflower, broccoli, cowpea, French beans, and others.
- Spice crops suitable for rooftop gardens include turmeric, ginger, coriander, and fenugreek.
- Medicinal crops ideal for rooftop gardens include agathi, vasaka, aloe vera, periwinkle, and others.

4. Irrigation

Plants in pots or containers require careful and regular attention. It's crucial to water them appropriately, considering factors like season, crop type, plant species, and container size. A good rule of thumb is to check the top inch of soil—if the subsoil is moist, immediate irrigation may not be necessary. Irrigation can be managed through drip systems, sprinklers, or using a rose cane or sprayer. It's advisable to water crops in the evening to mitigate water loss due to direct sunlight and high evaporation during the day.

5. Staking

Depending on their growth stage, plants often require support. Crops such as lablab, bottle gourd, pumpkin, bitter gourd, and snake gourd need staking or training using a trellis method for adequate support. Additionally, plants like tomato, brinjal, and pepper should be staked two months after planting to ensure proper support as they grow.

6. Fertilizer application

To achieve maximum crop growth and yield, it's beneficial to combine organic fertilizers with inorganic ones. Applying nitrogen fertilizers like DAP or urea as top dressing enhances plant growth and productivity. For effective results, applying small amounts of urea (5-10 g) in moist soil once a week, or 3 weeks after sowing, or 2 weeks after transplanting is recommended. Typically, complex fertilizers containing NPK mixtures such as 17:17:17 or 20:20:20 are applied in three stages for optimal nutrition and growth.

- At 30 days after planting during the vegetative stage, apply 5-10 grams of fertilizer per plant.
- At 60 days after planting, during the flower set stage, apply 15-20 grams of fertilizer per plant.
- At 90 days after planting, during the fruit set stage, apply 15-20 grams of fertilizer per plant.

7. Care and management

Protecting crops from diseases and pests is essential. Whenever possible, prioritize

the use of organic pesticides. Utilize insect traps like pheromone traps to safeguard plants. When cultivating on rooftops, employ nets to prevent pests effectively. Given the limited pollination opportunities by insects or bees on rooftops, ensure careful hand pollination. Techniques such as 3g cutting can also be employed to enhance female flower production, thereby maximizing crop yield.

8. Harvesting

A rooftop garden allows for year-round vegetable harvesting by planting in all seasons. For annual plants, after harvesting, uproot them and remove all the potting mix from the pot. Add additional nutrients to prepare the pot for the next planting.

Factors that contribute to reducing the Urban Heat Island Effect

Maintaining permanent green soil or vegetation coverage on rooftops is crucial for effectively lowering air temperatures. To achieve measurable effects on urban heat islands, reduce energy use, and manage storm-water runoff, it's typically necessary for more than 75% of the rooftop to be covered with soil or vegetation. Plants with expansive leaf surfaces, perennial crops, self-seeding varieties, and fast-growing species play key roles in establishing and sustaining this green cover.

Selection of Plants for Rooftop Farming

The selection of crops for cultivation hinges on several factors including feasibility, market demand, and their resilience to environmental and climatic challenges. Options such as fruit trees, leafy greens, flowers, and vegetables are suitable for growing in containers like pots, grow-bags, and even plastic drums.

Seasonal vegetables

Vegetables like beans, brinjals, tomatoes, carrots, broccoli, garlic, green peas, okra (bhindi), sponge gourd, ridge gourd, snake gourd, bitter gourd, and bottle gourd thrive well when grown on the southern or western sides of rooftops. This positioning ensures adequate sunlight exposure for optimal growth and productivity.

Leafy green plants

Sweet potatoes, lettuce, spinach, potatoes, coriander, turmeric, and ginger can be successfully cultivated in individual plastic bags or deep pots that accommodate tubers well. This method provides sufficient space for root development and facilitates their growth effectively.