

Low-technology innovations in urban agriculture



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Low technology (low-tech) innovations in urban agriculture involves using simple, affordable, and sustainable methods to grow food within city environments. This approach emphasizes the use of readily available materials, traditional techniques, and minimal reliance on high-tech solutions. Here follows some key applications and benefits of low technology in urban agriculture.

Key Applications in Urban Agriculture:

1. Container Gardening:

- **Description:** Growing plants in containers such as pots, buckets, or repurposed materials like fruit bins or tyres.
- **Benefits:** Utilizes small spaces like balconies, rooftops, and patios. It's flexible and easy to manage.

2. Raised Bed Gardens:

- **Description:** Creating elevated plots using wood, bricks, or other second-hand materials like wood pellets.
- **Benefits:** Improves soil quality, drainage, and accessibility, reducing the need for bending.

3. Vertical Gardening:

- **Description:** Growing plants upward using structures like trellises, wall-mounted planters, or stacked containers.

- **Benefits:** Maximizes space utilization, ideal for limited urban spaces.

4. Composting:

- **Description:** Converting organic waste into nutrient-rich compost for soil enrichment.
- **Benefits:** Reduces waste, lowers the need for chemical fertilizers, and improves soil health.

5. Rainwater Harvesting:

- **Description:** Collecting and storing rainwater from roofs for irrigation.
- **Benefits:** Conserves water reduces dependency on municipal water and provides a sustainable water source.

6. Community Gardens:

- **Description:** Shared garden spaces where individuals or groups grow food collectively.
- **Benefits:** Promotes social interaction, education, and community resilience.

7. Mulching:

- **Description:** Using organic materials like straw, leaves, wood chips, or grass clippings to cover the soil.
- **Benefits:** Retains soil moisture, suppresses weeds, and enhances soil fertility.

8. Seed Saving and Exchange:

- **Description:** Collecting and storing seeds from plants for future planting or sharing.
- **Benefits:** Preserves plant varieties, reduces costs, and fosters biodiversity.

BENEFITS OF LOW-TECHNOLOGY INNOVATIONS IN URBAN AGRICULTURE:

1. Accessibility and Affordability:

- Low-tech methods are inexpensive and easy to implement, making urban agriculture accessible to a broader range of people.

2. Sustainability:

- Emphasizes the use of natural processes and local resources, reducing the environmental impact.

3. Education and Skills Development:

- Encourages learning about agriculture, sustainability, and self-sufficiency, which can be especially beneficial in urban settings where such knowledge is less common.

4. Food Security and Nutrition:

- Increases the availability of fresh, healthy produce in urban areas, contributing to improved nutrition and food security.

5. Community Building:

- Fosters community engagement and cooperation through shared gardening projects and communal spaces.

6. Environmental Benefits:

- Enhances urban green spaces, improves air quality, and promotes biodiversity by

providing habitats for pollinators and other beneficial organisms.

EXAMPLES OF LOW-TECHNOLOGY URBAN AGRICULTURE INNOVATIONS INCLUDE:

Grow Bags:

Grow bags are an excellent option for community vegetable gardens, offering several benefits over traditional ground planting or raised beds. These bags are made from fabric materials like felt or polypropylene, which provide great drainage and air circulation. A wicking gardening system is an efficient low-technology and low-maintenance way to grow plants, ideal for community gardens and urban settings. This system uses capillary action to draw water from a reservoir up to the plant roots, ensuring consistent moisture levels. This system can be combined with the grow bag technology for maximum benefit. Here are some key points and tips on using grow bags in community gardens:

Benefits of Grow Bags:

1. Mobility:

- Grow bags are lightweight and portable, allowing gardeners to move plants to optimize sunlight exposure or protect them from adverse weather.

2. Space Efficiency:

- Ideal for small or urban gardens, grow bags can be placed on patios, rooftops, or balconies, maximizing available space.



3. Root Health:

- Fabric grow bags promote air pruning, which prevents root circling and encourages a healthy root system.

4. Drainage and Aeration:

- The fabric material provides excellent drainage and aeration, reducing the risk of overwatering and root rot.

5. Temperature Control:

- Grow bags tend to stay cooler in the summer as the breathable fabric allows excess heat to escape.

Choosing the Right Grow Bags:

1. Material:

- Choose high-quality, durable fabric grow bags that are UV-resistant and can withstand exposure to the elements.

2. Size:

- Select appropriate sizes based on the type of vegetables being grown. For example:
 - 4-20 litre bags for herbs and small greens.
 - 20-40 litre bags for medium-sized plants like peppers and eggplants.
 - 40-80 litre bags for larger plants like tomatoes, potatoes, and zucchini.

3. Handles:

- Bags with sturdy handles make it easier to move them around.

Planting in Grow Bags:

1. Soil Mix:

- Use a high-quality potting mix rich in organic matter. Consider adding compost, coco peat, perlite, or vermiculite for better drainage and nutrient retention.

2. Watering:

- Grow bags dry out faster than traditional pots, so regular watering is essential. Consider using a wicking system or drip irrigation system for consistent moisture.

3. Fertilizing:

- Because nutrients can leach out more quickly in grow bags, regular fertilizing with a balanced, slow-release fertilizer or manure is recommended.

4. Placement:

- Ensure the bags are placed in a location that receives adequate sunlight for the specific plants being grown.

Maintenance Tips:

1. Check for Pests:

- Regularly inspect the plants and bags for pests and diseases. Fabric grow bags can be more susceptible to pests due to their proximity to the ground.

2. End-of-Season Care:

- At the end of the growing season, empty the soil, clean the bags with mild soap and water, and store them in a dry, cool place to extend their lifespan.

3. Rotation:

- Rotate crops each season to prevent soil depletion and reduce the risk of disease build-up.

Community Garden Considerations:

1. Education:

- Provide community members with guidance on using grow bags, including workshops or instructional materials.

2. Shared Resources:

- Consider communal composting with earth worms and soil mixing stations to reduce costs and encourage sustainable practices.

3. Accessibility:

- Grow bags can be placed on raised platforms to make gardening accessible to individuals with mobility challenges.

Using grow bags in a community vegetable garden offers versatility and numerous bene-





fits that can enhance the gardening experience for all participants.

Air Pots:

Air pots, also known as air-pruning pots, are specialized containers designed to improve the root system development of plants. They are particularly effective for community vegetable gardens due to their ability to promote healthier and more efficient root growth. By understanding how to set up and maintain air pots, community gardeners can maximize their harvests and enjoy healthier, more robust plants. Better aeration for the plants means a healthier growing medium which allows for more even germination right across the tray. The tap root of the newly germinated plant is air pruned at the base, stimulating lateral root branching. Increased oxygenation also means healthy bacteria release more nutrients, which the seedling's healthy root system can immediately absorb, leading to faster growth. In a conventional seed tray the growing tap root is deformed when it meets the base of the tray. At the same time, a lack of oxygen in the growing medium means less healthy bacteria to release nutrients to the plant.

Benefits of Air Pots:

1. Enhanced Root Development:

- Air pots promote air pruning, where roots are exposed to air through holes in the pot walls. This prevents root circling and encourages the development of a dense, fibrous root system.

2. Improved Aeration:

- The design of air pots allows for better air circulation around the roots, which can lead to healthier plants and improved nutrient uptake.

3. Efficient Drainage:

- Air pots have excellent drainage properties, reducing the risk of overwatering and root rot.

4. Increased Growth Rates:

- Healthier root systems lead to more vigorous plant growth and potentially higher yields.

5. Versatility:

- Suitable for a wide range of plants, including vegetables, herbs, and flowers.

Aquaponics:

Aquaponic systems are an innovative and sustainable approach to urban agriculture, com-

binning aquaculture (raising fish) with hydroponics (growing plants in water). This method creates a symbiotic environment where fish waste provides an organic nutrient source for the plants, and the plants help to filter and clean the water for the fish. Here are several key points and benefits of using aquaponic systems in urban agriculture:

1. Space Efficiency
2. Water Conservation
3. Sustainable Production
4. Year-Round (continuous) Production
5. Local Food Production (reduces the carbon footprint)
6. Educational Opportunities
7. High Yields and Quality Produce

Aquaponic systems represent a promising solution for sustainable urban agriculture, offering numerous environmental, economic, and social benefits. Aquaponic systems can be expensive to set up though compared to traditional gardening methods. This includes costs for tanks, pumps, grow lights (if indoors), and plumbing systems. But they can be designed on a low-technology level. For the management one would require a certain level of technical understanding and maintenance. Operators need to monitor water quality, pH levels, and nutrient balances regularly. While there are some challenges to be addressed, the potential for local, fresh, and sustainable food production makes aquaponics an attractive option for cities looking to enhance food security and sustainability.



Vertical Grow Towers:

An innovative project on Welgevallen Experimental Farm in Stellenbosch is using vertical grow towers inside a greenhouse to grow a wide range of crops including leafy greens, herbs, and strawberries using aeroponic towers. This system uses a minimal amount of water by delivering a nutrient solution directly to the plant roots, which improves oxygenation and nutrient uptake. These towers require only 5% of the water used in traditional farming and eliminate the need for pesticides. The core principle of the design was to use as little floor space as possible and to optimize the amount of crops per square meter, especially where fertile land is scarce and higher production is needed. The working and ease of use is completely unique to other related products on the market. The sharp lines and radical look of the tower is not to be aesthetically pleasing but rather to be functional. These towers use a simple yet effective low-technology design where a nutrient solution trickles down inside the tower allowing for flexible irrigation rates and maximizing production efficiency. The towers are lightweight, modular, and easy to maintain, making them suitable for both small-scale and commercial operations. To save space the tower has a diameter of 310mm and stands 1300mm tall. These tower sections are designed to be stacked on top of each other to utilize all the possible vertical growing space. This system allows for five to six times the production output compared to traditional methods.

Challenges in Urban Agriculture:

- **Space Limitations:** Urban areas often have limited available space for agriculture.
- **Soil Contamination:** Urban soils can be contaminated with pollutants, requiring soil testing and remediation.
- **Resource Constraints:** Limited access to water, compost, and other resources can pose challenges.

Conclusion:

Low technology in urban agriculture offers practical, sustainable solutions for food production in cities. By leveraging simple techniques and community collaboration, it enhances food security, environmental health, and social cohesion, contributing to more resilient urban food security and ecosystems.

Pictures by Henk Stander
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