



Urban Horticulture for Food Security: Scope and Challenges

Abhay Singh¹, Vivek Singh^{1*}, K.N. Shah¹, D.K. Rana¹ and Nabdeep Singh²

¹Department of Horticulture, HNB Garhwal University, (249161), Srinagar Garhwal, Uttarakhand, India

²Department of Rural Technology, HNB Garhwal University, (249161), Srinagar Garhwal, Uttarakhand, India

*Corresponding Author: bibek007singh@gmail.com

Introduction

The demand for food, water, and space in cities is expected to increase as the percentage of people living in cities worldwide rises to 68% by 2050 (UN, 2018). Urban horticulture, the practice of cultivating, processing, and distributing food in or around urban areas, is gaining significant importance in the face of rapid urbanization, food insecurity, and climate change. A vital component of horticulture crops, fruits, and vegetables are high in fiber, minerals, and bioactive substances that promote a well-rounded diet. It offers a long-term way to guarantee the availability of food in cities, promote livelihoods, and improve environmental quality. In order to accommodate the growing populations of both the developed and developing worlds, commercial smallholder and large-holder farmers must find niches in peri-urban and urban areas (Bowman, 2013; Abraham and Pingali, 2020). Vegetable gardens, rooftop farming, vertical farming, and community gardens are all examples of urban gardening, which has become a practical strategy for improving food security and encouraging sustainability in urban environments. It helps create a robust and self-sufficient urban

food system in addition to bridging the gap in food supply between rural and urban areas. The current COVID-19 pandemic problem has had a substantial influence on the food supply chain, pricing, and the sustainable fresh food supply. To feed the population, it becomes necessary and crucial to ensure a safe and enough supply of reasonably priced, nutrient-dense food that is high in vitamins and minerals.

Horticulture and global food security

In the case of a food crisis, it offers a workable strategy for enhancing local food production, particularly in urban areas. According to Devaux *et al.* (2020), food security encompasses four aspects: availability, access, usage and quality, and stability. It is not only about having food available. Urban gardening may improve food security and nutrition security by increasing the availability of fresh, healthful, and culturally acceptable vegetables. It also plays a major role in improving nutritional consumption, reducing food poverty, and strengthening family ties through community-based gardening projects. Additionally, urban gardening



may support sustainable food production systems by improving public health, promoting environmental sustainability, and reducing dependency on international trade. Overall, it can help solve the complex issue of global food poverty by promoting environmental sustainability and improving public health outcomes (Congreves, 2022).

2. Scope of Urban Horticulture

Improving Nutrition and Food Security

Urban gardening encourages the local cultivation of perishable crops including fruits, vegetables, and leafy greens, giving city inhabitants direct access to wholesome food. This closeness to customers decreases food costs and minimizes transportation expenses, particularly for low-income households. It promotes healthy eating among urban populations and increases food availability amid supply chain interruptions. Due to the industrialization and urbanization of fertile regions, food security is under grave danger on a global scale. Global food consumption is predicted to rise to 43% by 2030 (FAO, 2011).

Environmental and Climatic Benefits

Advantages for the Climate and Environment by lowering air and surface temperatures, the integration of horticultural areas into urban infrastructure helps lessen the impact of the urban heat island. Urban vegetation enhances ambient air quality, increases storm water absorption, and

serves as a carbon sink. Urban forests, rooftop gardens, and green walls provide ecosystem services while bolstering climate resilience. Compared to conventional approaches, high-tech urban gardening improves food production throughout the year, which lowers CO₂ emissions from transportation (Fanelli and Di Nocera, 2017).

Creation of Jobs and Livelihoods

Generation of Employment and Livelihoods by generating jobs in a variety of industries, such as marketing, value chain logistics, agro-processing, and nursery management, urban horticulture may boost regional economies. Initiatives in urban gardening, which offer chances for skill development and entrepreneurship, empower women and young people in particular. Its economic significance is further demonstrated by the growth of farmers' markets and community-supported agriculture.

Resource Efficiency and Waste Recycling

Urban horticulture encourages the composting of biodegradable municipal garbage, such as garden trimmings and kitchen trash. Water use efficiency is increased by reusing greywater and using rainwater harvesting devices for irrigation. By turning garbage into useful inputs, cutting down on municipal waste disposal expenses, and lessening the environmental impact of cities, these techniques promote a circular urban economy.



Challenges in Urban Horticulture

Space and Land Limitations

One of the biggest obstacles to urban gardening is the dense population and fierce rivalry for land in metropolitan areas. There is little room for agriculture since available open places are frequently given priority for infrastructure or building projects. Vertical farming and rooftop gardens can compensate for space constraints, but they need more funding and structural preparation.

Institutional and Policy Gaps

The majority of urban planning policies do not acknowledge urban horticulture. Urban agricultural activities are not supported, regulated, or promoted by any specific authority or structure in the majority of cities. As a result, there is little cooperation between many players, including NGOs, municipalities, and agricultural agencies, leading to fragmented activities. One obstacle to urban agriculture is the absence of legislation promoting its incorporation into land use planning, urban greening, urban habitat variety, and noise and pollution reduction (Ziwenga, 2014).

Knowledge and Technical Barriers

Technical proficiency in integrated pest management, soil health management, and contemporary cultivation techniques like container gardening and controlled-environment agriculture are necessary for successful urban horticulture. Urban dwellers could not have access to training

programs or extension services, though, which could result in less than ideal output and poor sustainability.

Pollution and Water Scarcity

It might be difficult to allocate water for urban agriculture due to the growing demand for drinkable water in metropolitan areas. Furthermore, microbiological diseases, heavy metals, or industrial effluents can pollute water sources, endangering human health and compromising the safety and quality of horticultural products. Safe irrigation techniques and wastewater treatment are two examples of solutions that are required.

Economic Viability

Installing rooftop gardens, hydroponic systems, or sheltered buildings sometimes requires a large upfront cost. Even if indoor farming systems are resource-efficient, their cost is still high (Bohn and Viljoen 2011). Urban farmers find it difficult to maintain their businesses in the absence of guaranteed markets, government subsidies, or low-interest financing. Profitability may also be impacted by informal and small-scale horticulturists' lack of access to cold storage, market infrastructure, and branding assistance.

Way Forward and Policy Recommendations

Integration with Urban Planning:

City master plans, zoning regulations, and infrastructure projects should all methodically



include urban horticulture. Community gardens and vertical farms can be established on land banks, vacant plots, and public structures because compared to rural regions, cities have a significantly lower diversity of flora and fauna (Aronson et al., 2014).

Building Capacity:

To teach individuals about crop planning, soil health, organic inputs, and intelligent irrigation methods, governments and organizations should offer training courses, demonstration plots, and online resources.

Innovative Technologies:

Through research funding and technology transfer initiatives, promote the use of climate-smart technologies, including vertical farming, aquaponics, and aeroponics. Productivity may be increased by utilizing solar-powered systems, smartphone apps, and sensor-based irrigation. Through increased agricultural productivity, this most recent technology advancement in digital agriculture can help farmers better handle any future food system crises (Linn *et al.*, 2020).

Public-Private Partnerships (PPP):

Working with organizations in the private sector can introduce new ideas, capital, and connections to markets. Urban greening projects and CSR (Corporate Social Responsibility) funds can help urban horticultural clusters.

Incentives and Subsidies:

For new businesses, financial assistance in the form of direct subsidies, interest-free loans, and tax refunds can reduce the barrier to entry. Government programs and market advantages should be made available to producer groups and urban farming cooperatives.

Conclusion:

The potential for converting urban landscapes into resilient, self-sufficient, and productive food systems is enormous with urban horticulture. In cities, it is essential for resolving issues of food security, environmental sustainability, and socioeconomic empowerment. Strategic policy interventions, stakeholder engagement, and the adoption of new methods can assist expand its influence, despite the fact that there are severe obstacles such space restrictions, policy gaps, and technological impediments. In the world that is becoming more and more urbanized, horticulture must be integrated into urban ecosystems in order to provide food and nutritional security.

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