

# Urban Agriculture: The Saviour of Rapid Urbanization

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## ABSTRACT

Urban agriculture is a key solution to rapid population growth, urbanization, food crisis and climate change. According to reports of FAO, by 2050, more than 6 billion populations will be dwelling in urban areas, which is almost double the current population of 3.5 billion. In case of India, the reports by UN state of the world population 2007, by 2030, 40.76% of country's population will reside in urban areas. Considering the above statistics, we can estimate the burden on rural production system to meet increasing demands of fruits and vegetables in urban markets. So, urban agriculture could be the saviour to avoid food crisis and inflation of market. The idea of urban agriculture is age old and started in the mid 19<sup>th</sup> century and has gained popularity in urban areas throughout the world. There are various types of urban agriculture, like, kitchen gardening, rooftop gardening, vertical farming, container gardening, urban beekeeping, aquaculture etc. Multiple auras of crops can be cultivated in the minimal available space, right from herbs, vegetables and fruits to aromatic and medicinal plants. There are large number of advantages of urban farming, like, providing employment and daily wages to poor farmers, educating children, strengthening the community, improving social and emotional wellbeing and environmental justice to tackle climate change. Many cities across the world are practicing urban farming and have achieved success in production, marketing and educating people. In India, urban farming is still in infant stage and has to be given much more importance by both Government and private agencies to popularize and harness the profitability of urban agriculture.

**Key words:** Urban agriculture, Population growth, Food crisis, Inflation, Environmental justice, Employment generation

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## I. INTRODUCTION

Urban agriculture, urban gardening or urban farming is the practice of cultivating, processing and marketing of food and food products in and around urban localities. Urban agriculture also involves animal husbandry, aquaculture, beekeeping and horticulture. There is also a cultivation practice in peri-urban areas (city outskirts

or perimeter of the urban area) called peri-urban agriculture, which has entirely different characteristics. According to the reports of FAO, by 2030, 60 per cent of the people in developing countries will likely live in cities. This rapid growth of city population in the developing world is placing enormous demands on urban food supply systems leading to food shortages during the time of crisis. Urban agriculture is the only solution left to overcome this crisis. The minimal land available in heavily populated town or so called concrete jungles are utilized for cultivation of crops. The high value vegetables and perishable green leafy vegetables are mostly cultivated to meet the daily needs of a family or a small community and excess is sold out to local markets. The main idea behind practicing urban agriculture is to have easy access to locally grown food, understand the way of cultivation and gain basic knowledge of crop husbandry. The knowledge of how food grows, what grows regionally and seasonally, how it is treated after harvest and how it moves from one place to other in a food route before final consumption are all important lessons of urban agriculture. Urban agriculture also provides fresh food, generates employment, recycles urban wastes, creates greenbelts and strengthens cities resilience to climate change.

Recently, urban farming is gaining importance as a hobby, whereas, few urban farms are built for education purpose, training the school children and young professionals or re-entry programmes. Many are built to improve access to healthy food in a specific community or to continue cultivation of traditional culinary. Some are built for earning economic benefits for those communities that are economically disadvantaged. The urban farming also has role in environmental justice along with improving health benefits of people. In this article we focus on history of urban agriculture, types of urban farming, major crops cultivated, and advantages of urban agriculture, success stories and future scope of urban agriculture in India.

## II. HISTORY OF URBAN AGRICULTURE IN WORLD:

The idea of supplemental food production through urban agriculture is not new. It has been used during war and depression times when food shortages arose, as well as during times of relative abundance. The history of urban agriculture is mentioned in chronological order in the following paragraph.

- a. **Mid 19<sup>th</sup> century:** the concept of “allotment gardens” came up in Germany to fight poverty and food insecurity in economically backward populations dwelling in urban areas. The people were allotted government owned lands to cultivate crops and earn their livelihood.
- b. **1893-“Pingrees Potato Patches”:** Mayor Hazen S. Pingree, came up with the idea of vegetable cultivation in Detroit. The citizens of depression struck Detroit city were allotted lands to cultivate potato in vacant government plots. The intent was to gain income, increase food supply and even boost independence during times of hardship.
- c. **1914-1918 (WWI) and 1939-1945 (WWII)- “Victory gardens”:** during World war-I, president of US, Woodrow Wilson called upon citizens of America to utilize the open spaces for food cultivation, seeing the damaging situations of

- war and possible food shortages in near future. By the year 1919, over 5 million plots were growing food and over 500 million pounds of produce was harvested.
- During world war-II, National victory garden programme was set up to systematically establish functioning of urban agriculture within cities. The new plan in action lead to production of 9 million pounds of fruit and vegetables in a year, accounting to 44% of US grown produce throughout that time.
  - d. **Great depression of 1920's:** Urban agriculture played a major role of providing jobs, food and income to people living in and around cities in US and thus saving them from clutches of Great depression. Over 208 million dollars worth of food was produced through urban farming.
  - e. **1960's:** Community gardens were established in United Kingdom influenced by the movement in US.
  - f. **1970's Seattle's P-Patch or Community gardening:** The idea of community gardening was put forth by Darlyn Rundberg in 1973. Where, she utilized a 2.5 acre of land in her neighbourhood to cultivate crops and she insisted people to take part in the process of gardening. The programme gained huge popularity over the years and as of December 2017, Seattle had some 90 P-Patches tended by more than 3,125 gardeners.
  - g. **2010- The Severn project in Bristol:** The project started with the intention to provide support to prisoners, drug addicts and people with mental health problems. The community interest company produced salad leaves and herbs. The company produces 34 tons of produce per year and employs people from disadvantaged backgrounds.

### III. TYPES OF URBAN AGRICULTURE:

Urban agriculture can be classified into large number of types based on area, type of commodity produced, multiple methods and medium used for cultivation. The following are common types of urban agriculture

- a. **Kitchen gardening:** Cultivation of vegetables and herbs in and around the domestic area for daily kitchen use. It is a very small scale cultivation, wherein, the products are used for household purpose and there is no excess production for sale. This is to meet daily needs of a small family and to become less dependent on the market availability.
- b. **Rooftop gardening:** cultivation of vegetables and herbs on the roof of a house or an apartment by single or group of families to meet the daily needs of a family or a community. The focus here is to utilize empty space available on the rooftop and reduce dependence on the markets.
- c. **Vertical farming:** Cultivation of crops in vertically stacked layers. The main advantage of vertical farming technologies is the increased crop yield per unit area utilized. The vertical farming can be followed in tall apartments, abandoned old buildings and also on walls. The focus here is to multiply the minimum area available to produce vegetables.

- d. **Street landscaping:** The vacant area alongside of the streets can be utilized for cultivation of vegetables. Like, garden streets in the neighbourhood, the vacant area alongside the public roads etc., and these areas are cultivated mainly for recreation and educational purpose. The vegetables cultivated here can be sold in the community or in the nearby markets.
- e. **Green house gardening:** the large empty areas in and around the locality can be covered with the greenhouse for production of high value crops. These can be managed by an individual or community or commercial owners. The green houses are known for the production of high value crops under controlled environmental conditions and yield higher quantity of produce than open field cultivation. The products also fetch better price in the markets and the produce if healthy is accepted in the super markets for sale.
- f. **Wasteland utilization:** The vacant and abandoned government lands are allotted to interested farmers for fruit and vegetable cultivation. The product is sold in local markets and farmers gain higher profits by cutting costs on transportation and commissions.
- g. **Container gardening:** Utilization of waste materials available in the urban areas for cultivation of crops. The main focus here is to reduce, recycle and reuse the waste materials leading to pollution in the cities. Waste material may include plastic bottles, torn shoes, broken containers like drums, buckets, mugs and other urban wastes.
- h. **Peri-urban farming:** Cultivation of crops in the city outskirts or perimeter of the urban areas is peri-urban farming. The farmers can follow large scale production systems by setting up polyhouses, animal husbandry, horticulture, beekeeping, mushroom cultivation, agro-forestry etc. This production system is mainly followed in India, where, 65% of the produce in urban markets in India comes from peri-urban production. The cost of transportation, commissions for middlemen are greatly reduced or almost zero in this system. Highly perishable leafy herbs and seasonally and regionally available vegetables and fruits are cultivated and sold.
- i. **Urban beekeeping:** Maintaining bee colonies in and around urban gardens or peri-urban areas for pollination and for their honey is called urban beekeeping. This is mainly practiced as a hobby by countable number of people in densely populated urban areas. The bee colonies can be maintained in peri-urban areas and rooftop gardens to gain higher yields by bee pollination and also use other products like honey; wax etc, from the bee colony.
- j. **Aquaculture (Fish culture):** Raising aquatic animals such as fish, prawn, lobsters, crab etc., in a city. This is typically accomplished by capturing storm water to sustaining system. Usually the fresh water fishes are cultured and sold in the local markets.
- k. **Small scale animal husbandry:** Raising animals for food. For example, cities that allow residents to raise a limited number of chickens for meat and egg purpose, cow and buffaloes for milk purpose. These products help farmers to

earn their daily wages by sale of animal origin food and food products. Animal milk is also utilized for manufacturing other by-products like curd, paneer, kova, shrikhand etc.,

1. **Mushroom cultivation:** Mushrooms are scavenging fungi that can grow on organic waste and yield valuable products fit for human consumption. Mushroom is gaining acceptance in recent years as it is an excellent source of proteins, vitamins, minerals, folic acid and iron. The mushrooms can be cultured under controlled environmental conditions in urban areas and have very high market demand.

#### IV. MAJOR CROPS CULTIVATED IN URBAN AGRICULTURE:

Vegetables have a short production cycle; some can be harvested within 60 days of planting, so are well suited for urban farming. Urban and peri-urban agriculture aims at production of high valued, perishable and high demand fruits and vegetables.

- **Green leafy vegetables or herbs:** Spinach, Coriander, Curry leaves, kale, Water cress etc.,
- **Root crops:** Potato, Sweet potato, Cassava, Raddish, Beetroot, Turmeric, Ginger, Carrot etc.,
- **Vegetables:** Tomato, Eggplant , Chillies, Capsicum, Peas, Frenchbean, Guards, Crucifers etc.,
- **Fruits:** Avacados, Guava, Sapota, Mangoes, Banana, Citrus, Cherry, Coconut etc.,
- **Mushrooms:** Button mushroom, Paddy straw mushroom, Oyster Mushroom etc.,
- **Animals:** Poultry, Rabbits, Goats, Sheep, Cattle, Pigs, Guinea Pigs etc.,
- **Non-food products:** Medicinal and aromatic plants, Ornamental plants, Tree products etc.,
- **Bee products:** Honey, Wax etc.,

#### V. ADVANTAGES OF URBAN AGRICULTURE:

- a. **Nutritional and quality food:** Fruits and vegetables are a rich source of Vitamins and minerals. The time lapse in their transport, storage, packing and processing is almost nil in urban farming, thus providing fresh and quality produce at door steps. As the produce is less processed (cleaning, blanching, freezing and cold storage) the chance of loss of vitamins and minerals is least and the produce is rich in its nutritional values.
- b. **Health benefits:** As fruits and vegetables are cultivated in and around the human surroundings, there is increased chance of consumption of fresh, healthy produce and increased chance of staying away from chronic diseases like diabetes, heart disease and cancer. The crops cultivated in urban gardens are least exposed to pesticides, heavy metals and sewage waste, so, the food contamination is least and in turn has positive effects on human health.
- c. **Environmental justice:** Practicing of urban farming has several environmental benefits like, reduction in plastic pollution due to recycling and reuse of waste

plastic containers, reduction in air pollution and reduction in water pollution etc., thus, urban agriculture is making a great justice to environment in the era of climate change where urban areas are highly resilient.

- d. **Efficient utilization of time (Agriculture as a hobby):** In the era of information and technology, people can make agriculture as a hobby and spend valuable time to learn about crop and animal husbandry, beekeeping, mushroom cultivation and aquaculture. Children can also be educated and encouraged to take up farming as a hobby and continue our age old tradition of farming.
- e. **Efficient utilization of land and resources:** the vacant and abandoned lands in urban areas can be utilized for agriculture through allotting lands to poor and interested farmers and in turn help them earn their livelihood. The urban green waste can be used as manure, waste water from kitchen and lavatories can be used for irrigation, biodegradable waste can be used for composting etc.,
- f. **Social and emotional well being:** urban farming on community bases leads to social interaction among people of the locality, children can learn agriculture, people can share their produce with neighbours and social interactions will improve over time. Agriculture as a hobby is a best mental and physical exercise to improve your emotional wellbeing. The kids these days have high IQ (Intelligence quotient) and low EQ (emotional quotient), the urban farming may help in striking balance between the two and also introducing agriculture techniques and methods in academic curriculum for children can also be considered.
- g. **Economic benefits:** Urban agriculture provides employment and incomes for poor women and other disadvantaged groups. Urban women can spend their time in farming and earn some money to support their families economically. The poor and disadvantaged can be allotted waste government lands to practice farming and earn their daily wages. As urban farming does not involve middlemen for long distance transport, storage and processing the profit for production directly reaches the producer.
- h. **Educational benefits to younger generations:** The younger generation have least knowledge and interest in farming. Establishing urban farms can teach them how food is grown, harvested, transported and processed to give it a final consumable form. This process can illuminate them to reduce food wastage. The idea of weekend agriculture can be inculcated in urban population where they can spend 2-4 hours on their weekends for farming and learn the divine art and science behind crop cultivation.

## **VI. DISADVANTAGES OF URBAN AGRICULTURE:**

- a. Urban farming is unrecognized in agricultural policies and urban planning thus ignoring its importance in agriculture production system.
- b. Growers often operate without permits. Since it is officially "invisible", the sector receives no public assistance or oversight in many cities.

- c. Urban agriculture carries health and environmental risks – potential use of contaminated land and water and inappropriate use of pesticides, fertilizers and of raw organic manure that can leak into water sources. These issues require proper attention.
- d. Drastic reduction in rainwater infiltration into the soil (In Harare, Zimbabwe, it was noticed that there was 28.5% reduction in rainwater infiltration leading to depletion of groundwater)
- e. The main challenges faced by urban farms are higher production costs, difficulty in managing pests and weeds and changing climatic scenario.

## VII. SUCCESS STORIES OF URBAN AGRICULTURE IN INDIA AND WORLD:

To facilitate food production and supplement that from rural production to meet the rising market demands, some private organizations, government agencies and NGO's are establishing community based farming projects in urban areas. The major types among them are community gardening and allotment garden models. The most successful and popular among them are explained in brief in the following paragraphs

- a. **Cairo, Egypt:** Development of rooftop gardens and cultivation of organic vegetables
- b. **Queensland, Australia:** Aquaponics and urban gardens are established
- c. **Havana, Cuba:** Urban gardens are established by Government agencies in collaboration with local residents to produce 90% of city's fresh vegetables
- d. **Bangkok, Thailand:** Urban gardens were established by NGO and Government agencies to teach members of the community the benefits of urban green space, poverty reduction through urban gardens and community capacity building.
- e. **Beijing, China:** The two tier city farms are established by Chinese Government around 10 km away from city centre. Wherein, first tier is located very near to city and produces perishable items and the second tier is located little farther, that produce hardier vegetables like, potatoes, carrots and onions. This system allows producers to sell the produce in the city markets just few hours after harvest.
- f. **United States:** The urban farms in US are either non-profit or solely owned. The farms mainly practice raised bed cultivation, greenhouse, beekeeping, container gardens and animal husbandry (hens and sheep). Due to heavy contamination of city soil because of vehicle exhausts and remnants of old construction, the two alternative means of growing are practiced; rooftop gardens and hydroponics.
- g. **Yorkshire, United Kingdom:** Yorkshire has established a successful urban agriculture model. 17,000 inhabitants of the city voluntarily participate in farming and passers-by and visitors are allowed to pick and use the produce. There are a total of forty gardens throughout the city and are named "propaganda gardens" as they promote growing local vegetables, to eat seasonal food, to consider provenance of food, and to enjoy fresh and healthy food. These

gardens are located along side the streets, car parking area, rail stations, police stations, in the cemetery and town schools.

- h. **Rosario, Argentina:** The Government of Argentina under its Land use plan 2007-2017 has specific provision for the agricultural use of public land. The Government has developed “Green circuits”, the area around the city is transformed for family and community gardens, large scale commercial vegetable gardens and orchards. In 2014 more than 30 ha of land were used to grow vegetables, fruits, medicinal and aromatic plants. This land is also used for cultural, sports and educational activities along with agriculture.
- i. **Mumbai, India:** Dr. Doshi’s method of city gardening is famous in Mumbai, which emphasises on pure organic production and waste recycling. Locally available agriculture and household wastes like sugarcane waste, polyethylene bags, tires containers, cylinders and soil are used for crop cultivation. This revolutionary method can be applied in reduced spaces as terraces, balconies and civil construction walls.
- j. **Mumbai, India:** The Mumbai Port Trust (MBPT) practices organic farming on the rooftop of their central kitchen (280m<sup>2</sup>) and distributes food to approximately 3,000 employees per day.
- k. **Mumbai, India:** “Fresh and Local” a private organization in Mumbai takes underutilized spaces and transforms them into places of community empowered food production. The main objective is to improve the health and wellbeing of people.
- l. **Hyderabad, India:** Urban agriculture is a new form of agriculture that is gaining popularity in the city outskirts of Hyderabad wherein, more than 4,000 families are self reliant for the vegetable needs of family. The government is taking keen interest in promoting urban farming through providing subsidy kit worth 360 Rs to interested farmers dwelling in and around the city.
- m. **Delhi, India:** The concept of urban agriculture is not new to Delhi, because the farmers living on the banks of Yamuna River are producing vegetables from many generations and selling in the markets. But, their future is vulnerable due to lack of Government support and development of metro stations along the Yamuna banks.

## VIII. CONCLUSION:

The rapid increase in the population, excessive immigration into urban areas and increased demand for fruits and vegetables has caused frequent food shortages, inflations in food prices and sometimes food crisis in Indian markets. The saying “agriculture is a gamble with climate” suits the fluctuations in production and productivity in rural areas. Understanding these lacunas would suggest “urban farming” as a major solution.



- The transformation of cities from only consumers of food to generators of agricultural products contributes to sustainability, improved health, and poverty alleviation.
- Introducing agriculture as a course curriculum in schools and colleges would educate children and enlighten them about importance of food.
- The idea of "Weekend farming" can be inculcated in the young generations to transform agriculture.
- Agriculture as a hobby is a best medicine for social, emotional, mental and Physical wellbeing.
- Efficient utilization and recycling of urban wastes into valuable produce
- Allotment of waste and abandoned Government lands to farmers for cultivation would improve the agriculture production.
- Reduction in chronic diseases like diabetes, heart diseases and cancer due to consumption of fresh, healthy and untreated fruits and vegetables.
- Urban horticulture can generate one job every 100 sq m garden in production, input supply, marketing and value-addition from producer to consumer.
- The Government should also take responsibilities to promote urban agriculture in major cities of India in order to become self sufficient and reduce burden on rural production.

## REFERENCE

- Awasthi, P. (2013). Urban agriculture in India and its challenges. *International Journal of Environmental Science: Development and Monitoring (IJESDM)*, 4(2), 48-51.
- Bailkey, M., and J. Nasr. 2000. "From Brownfields to Greenfields: Producing Food in North American Cities," *Community Food Security News*. Fall 1999/Winter 2000:6
- Hampway, G.; Nel, E. & Ingombe, L. "The role of urban agriculture in addressing household poverty and food security: the case of Zambia" ([https://www.fanrpan.org/archive/documents/d0\\_0780/](https://www.fanrpan.org/archive/documents/d0_0780/)). Gdnet.org. Retrieved 1 April 2013.
- Hazen S. Pingree. Monument (<http://historicdetroit.org/building/hazen-s-pingree-monument/>). <http://historicdetroit.org/>. DAN AUSTIN. External link in |website= (help)