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Urban Organic Farming: Growing Food Sustainably in Cities

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Abstract
The global expansion in urbanization is posing serious challenges to our food systems. As cities expand and agricultural land is exhausted, there is a pressing need for innovative and sustainable food production techniques. Urban organic gardening has becoming more and more popular as a possible solution to these issues. Small land plots, roofs, vertical gardens, and public spaces are all used in urban organic farming to promote sustainable lifestyles. It assists communities to re-establish a connection with nature, and produce nutritious food. Growing crops and raising cattle within a city's borders using organic practices is known as urban organic farming. It entails cultivating food in urban environments, including rooftop gardens, communal gardens, vertical buildings, and other small urban land plots. The objective is to grow food in a sustainable manner without the use of artificial fertilizers, pesticides, or genetically modified organisms (GMOs). In nations where there is an increasing demand for food and a need for greater space, the practice is becoming more and more common. Because of these factors, urban farming is also thriving in India. Furthermore, a number of programs in India are encouraging urban farming and addressing the country's growing food needs.

Keywords: Urban organic gardening; Rooftop gardens; Communal gardens; Sustainable food production techniques; Genetically modified organisms

INTRODUCTION

The global community is beginning to confront the issue of urban sustainability in a world where cities are becoming more and more dominant. Habitat Agenda 21 start of the process, which was carried on in the 1996 UN City Summit in Istanbul. According to the 100-page Agenda, which was signed in Istanbul by 180 countries, the carrying capacity of ecosystems and the preservation of possibilities for future generations must be respected. In order to create sustainable human settlements and maintain the ecosystems on which they rely, science and technology are essential.[1]

The use of artificially manufactured agro-inputs is forbidden in organic farming, which helps in maintaining soil productivity, fertility and manage pests under conditions of sustainable natural resources and a healthy environment. Other than chemical substances it uses organic material, such as crop residues, animal residues, legumes, and bio-pesticides. However, removing chemical or synthetic inputs is just one part of the organic production system. More significantly, it promotes a whole-system approach wherein

each of the constituent elements—soil minerals, organic matter, microorganisms, insects, plants, animals, and people—contributes to the creation of an ecosystem that is self-regulating and sustainable. Through the programs of Mission Organic Value Chain Development for North Eastern Region (MOVCDNER) and Paramparagat Krishi Vikas Yojana (PKVY), the government has been encouraging organic farming across the nation since 2015–16. Both programs place a strong emphasis on providing organic farmers with end-to-end assistance, which includes post-harvest management assistance, processing, certification, and marketing. Every state in the nation, with the exception of the north-eastern states, is implementing PKVY. The MOVCDNER program is only used in the Northeastern United States.

Literature Review

It is acknowledged that cities nowadays generate an excessive amount of garbage and use an excessive amount of natural resources. Numerous species' habitats are being eradicated by the ecological footprints of cities. The city's influence extends well beyond its borders. Additionally, cities must contend with a growing population and, consequently, a growing number of hungry individuals. Thus, urban agriculture plays a significant role in promoting the long-term sustainability of cities in conjunction with other programs and endeavors.[1]

In addition to offering a nutritious source of food that might otherwise be insufficient, urban agriculture can generate jobs, offset food expenses, and increase household income. Urban agriculture is sometimes practiced by populations for social reasons. People congregate in gardens and rooftop farms for mutual gain, which frequently strengthens the city dwellers' shared social and cultural identity. Through vocational training and other educational initiatives, larger urban farms also contribute to community enrichment, many of which aid marginalized communities. Lastly, urban agriculture can contribute significantly to a city's environmental sustainability. Urban farms and communal food gardens are examples of green infrastructure that assist lessen the effects of urban runoff and urban heat islands.[2]

The conventional agricultural sector has evolved into a water-intensive, environmentally harmful, and polluting industry. By moving at least a portion of agricultural production to urban farms, urban farming could help to mitigate some of these issues. Urban farmers need to understand plant growth. This entails understanding the effects of water, light, and temperature on plant growth as well as identifying and managing pests and diseases that may endanger plants. Furthermore, it's critical to understand how hydroponics, which uses nutrient-rich water rather than soil, may support plant growth. This technique is especially useful in urban areas where there is little room for farming and the soil is often poor. Hydroponics requires an understanding of plant nutrient requirements, water chemistry, and environmental management.

Objectives

- To identify the techniques of Urban farming
- To understand the benefits of urban organic agriculture
- To analyse the contribution of Urban Organic Farming towards food security in cities

Materials and Methods

This study focuses on a qualitative research though secondary data, which analyse the research conducted in different parts of the world and it interlinks the urban organic agriculture with food security which is closely connected to SDG 2

Data Collection

The study collected data from various sources like

- Different reports (Including Government and local authorities)
- Previous studies and articles from various journals with international standards

Criteria for Data Inclusion

Past 15 years' studies and related data are considered for the study, so that the study clearly shows the practical implementation of Urban Organic Methods in agriculture in different countries at different stages.

Data Analysis

The study is based on theoretical analysis by reviewing different literatures and analysing is importance at application level. It also assesses the importance agriculture in Urban areas in order to meet food security. It highlights the deterioration of agricultural land and its impact on the society as well as environment. It also insists different methods of sustainable farming which has been already been implemented in many countries across the world. Organic Urban Farming can ensure food security for urban areas.

Urban Farming Theory

Communities developed into urban centers, and farmers' markets were regularly held there for residents from distant villages and urban areas. But those customs were insufficient to satisfy the needs of a sizable metropolitan populace. Many agricultural items required to be delivered promptly to the areas of consumption after harvest since they quickly perished. Many of the products deteriorated throughout the lengthy journey since there were inadequate transportation networks. Using Chicago as an example, German economist and agricultural planner J. H. communities developed into urban centers, and farmers' markets were regularly held there for residents from distant villages and peri-urban areas. But those customs were insufficient to satisfy the needs of a sizable metropolitan populace. Many agricultural items required to be delivered promptly to the areas of consumption after harvest since they quickly perished. Many of the products deteriorated throughout the lengthy journey since there were inadequate transportation networks. Using Chicago as an example, German economist and agricultural planner J. H. Von Thunen (1783–1850) proposed in 1826 that city farming should be situated in the center of a "Isolated State" in order to address this issue.

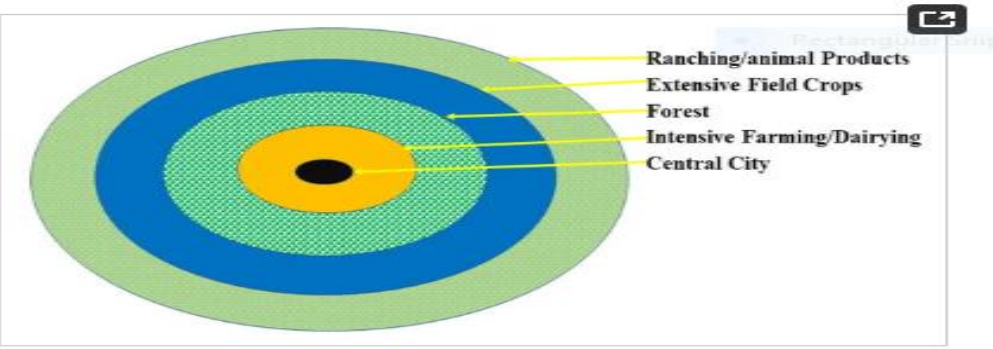

Fig:1 Von Thunen model of land use [3]

Results and Discussion

The study reviewed many article related to Urban organic farming and trying to provide Urban organic farming techniques in real life which can be implemented by countries in the coming days.

Selbsternte

IT is a new urban organic farming concept created in Vienna by consultants, organic farmers, and environmentally conscious consumers. An area of arable land known as the Selbsternte plot is prepared by organic farmers, who then plant or sow rows of 18–23 different plant varieties. The plots are separated into subplots in mid-May, each containing 2–6 m of each seeded species, and rented to self-harvesters for a duration of around 136 days. Self-harvesting was conducted in 15 plots in Vienna or nearby cities in 2002. There were 861 subplots totalling 68,740 m2, and 12 organic farmers were in charge of 861 registered self-harvesters. Experimental subplots were set up in the Roter Berg plot to assess yields and the worth of the collected produce.[4]

Peri-Urban Organic Farming

Due to the relative lack of access to contemporary farming tools and agricultural accessories, rural farmers typically use traditional farming practices in the crowded Kathmandu Valley(Nepal). On the other hand, the availability of infrastructure creates opportunities for ecological farming to expand in peri-urban regions. According to gross margin research, growing organic vegetables is a profitable business in the region. Although urbanites are willing to purchase organic veggies, farmers and organizations involved in organic agriculture should consider the greater cost and lack of certification of organically grown vegetables. Assistance of nongovernmental organizations, government-run institutions, cooperatives can boost this concept.[5]

Urban Organic waste Utilisation

A study conducted in Germany revels that in order to transition to sustainable food production, better circular nutrient management is necessary. Only 4% of the world's urban nitrogen (N) and phosphorus (P) sources are now recycled, despite the fact that urban organic waste contains organic matter and pertinent nutrients. Composting urban garbage for urban horticulture is one recycling strategy. Using lettuce plants in a container trial, researcher evaluated the fertilizing value of compost made from different municipal trash fractions. Vermicompost made from urban garbage and fecal compost show a high rate of plant-available calcium, magnesium, phosphorus, and potassium supply. These results encourage the creation of composts from urban garbage, advancing nutrient recycling initiatives.[6]

Agropolis

As the name suggests, Agropolis is a program that explores the myriad opportunities that come with urban agriculture. As a division of the International Development and Research Center, a liberal/green think tank with offices in Canada, England, and the so-called "Third World," Agropolis funds initiatives by awarding grants to support environmentally friendly small business, construction, and agriculture. The decreased food supply appears to have caused uncontrollable (by the government) outbreaks of populist movement, which started suddenly in 1989. People started rearing hens and bunnies on their little garden plots and growing vegetables in containers on their balconies. All of this was happening in Havana, a city that was formerly renowned for its peaceful compliance with local municipal authorities. Due to necessity, the locals disregarded the rules prohibiting them from cultivating crops in their yards.[7]

Community gardens

Industrialization eventually had an impact on agricultural activity in Spain. One notable effect has been the migration of people from rural areas to urban areas. Just 4% of Spain's working population was

employed in agriculture by the end of the 2010s. These gardens fit into a larger framework of urban community gardens that started to appear in Seville in the 1990s. They do not interfere with other properties or urban areas of exceptional public or private importance, and they are situated close to parks and green spaces. Their beneficiaries are often older, Spanish-speaking, primarily male. The majority of them are either unemployed (12%) or retired (82%). Only 6% of people are employed, and they work in a variety of professions. The allotments are owned for a set amount of time, which is regularly extended. Each individual can only be allotted one plot.[8]

Benefits of Urban Organic Farming

Taking the examples from East Asia, South America, or East Africa, it is clear that the social, cultural, technical, economic, environmental, and political aspects are influencing urban agriculture. The fact that 100–200 million urban farmers globally supply fresh horticulture products to city markets is proof of the benefits of urban agriculture for food security. Since the poor spend up to 85% of their income on food and the majority of urban farmers are from the poorest communities, urban agriculture promotes social improvement. Given that women make up 65% of urban farmers, sociologically speaking, urban farming promotes social inclusion as well as the decrease of gender inequality. By lowering waste in cities, enhancing biodiversity and air quality, and generally lessening the environmental burden associated with food storage and transportation, urban agriculture has positive ecological effects. The primary advantages of urban agriculture are demonstrated by the production of horticultural products.[9]

Urban Organic Farming Techniques

Rooftop farming

Rooftop farming can help to create a more sustainable and liveable city. A study conducted in the regions of Mirpur and Mohammadpur (Dhaka City) shows that the roof gardens guarantees local, fresh, and safe food. According to the results, rooftop farming can help the environment by lowering atmospheric carbon and increasing air quality. It can also help society by lowering the cost of storm water management. [10]

Aquaponics

This system combines two primary productive systems: hydroponic farming, which involves growing vegetables in a medium other than soil, and recirculating aquaculture, which involves raising fish and crustaceans in a tank. Both of these systems are globally recognized for their production performance, quality, and confirmed food safety. This includes the practice of raising fish and other aquatic animals in cities. In order to establish a self-sustaining recirculating system in tanks or artificial fish ponds, a system that collects runoff from within the city is used. It is a productive method of growing crops and a substitute for protein.[11]

Vertical Farming

Professor Despommier introduced the idea of vertical farming to increase yields more quickly, the farm employs traditional farming techniques including hydroponics and aeroponics. Large-scale cultivation in urban high-rise buildings is known as vertical farming. In general, vertical farming refers to a commercial farming technique in which plants, animals, fungi, and other living organisms are artificially stacked vertically above one another in order to be grown for food, fuel, fiber, or other goods or services. In order to lower transportation costs and make efficient use of land and water resources, the concept envisions the growing of fruits, vegetables, medicinal plants, fuel-producing plants, and other plant products in the city and their direct sale within the metropolis.[12]

Conclusion

From the study it is clear that the nation should find alternative sources of farming especially in urban areas in order to feed the people. Rather than depending on traditional farming methods, which take larger space, labour ad time, Urban Organic farming techniques can be followed on large scale. Different modes are available in this technique which will ensure food security and supply of farm products on time. It also ensures the eco-friendly farming which is highly recommended to minimise the pollution, Carbon emission and global warming. The study is looking forward towards sustainable urban farming across the wold.

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Conflict of Interest

Authors does not have any conflict of interest.

Ethical Statement

Animals, humans, or any other material requiring ethical approval were not used in this study.

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