

# Nature and Spatial Typology of Urban Agriculture in Southern Corporations of Kerala in India

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## ABSTRACT

*Urban agriculture is an increasingly popular topic around the world, considering its importance in mitigating problems of rapid urbanisation. For strategic urban planning, it is necessary to understand the nature and spatial typology of urban agriculture. Therefore, the present study was conducted in Southern Corporations of Kerala, namely Thiruvananthapuram, Kollam and Kochi corporations, to understand urban agriculture practices, nature and spatial typology of urban agriculture in the mentioned locations. The total sample size for the study was ninety urban farmers, thirty each from selected locations. The data was collected from respondents using well-structured interview schedule and field observations. Information collected included land ownership details, type of urban agriculture practiced, area utilized and types of crops grown. Data analysis was done using percentage and frequency analysis. The result indicated the most prominent type of urban agriculture in Southern Corporations of Kerala were rooftop gardening (44.44 %). All the land area used for urban farming was under private ownership and the farmers grew a combination of crops in their field. The main combination of crop grown was solanaceous+ legumes + crucifers+ leafy, which was observed in 20.00 per cent of respondents. It is expected that the present study will aid in making a sustainable urban food production system, which is environmentally and socially sound.*

**Keywords:** Corporations, Urban Agriculture, Spatial Typology, Kerala, India

## Introduction

The number of people living in cities worldwide climbed from 0.8 billion in 1950 to 4.4 billion in 2020, and is expected to reach 6.7 billion by 2050. It is expected that more than 60 per cent of the global population and approximately 50 per cent of the nation's population will be urban by 2030 (UN, 2018). The increased population can further lead to problems like environmental degradation, pollution, climate change, health issues, unemployment and food insecurity (Sujathamma, 2019). It is also observed that along with the rise in urban population the number of

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slums and urban poor around cities are increasing. Therefore, urban and peri-urban agriculture can be offered as a viable livelihood strategy for alleviating poverty, ensuring household food security (Khumalo and Sibanda, 2019), and tackling these problems. Therefore, cities worldwide are developing new urban food policies and supporting Urban Agriculture (Li et al., 2020).

Urban agriculture is defined as agricultural activities involving the planting, processing and distribution of agricultural products from crops and livestock by conserving natural resources and applying waste management techniques in urban areas for the benefit of the surrounding communities by Othman et al. (2017). The major function of Urban Agriculture is to increase food supply and income generation in cities (FAO, 2007). It also enhances food availability and quality across nations and economies, and community members participating in urban agriculture practices show great dietary consumption (Zezza and Tasciotti 2010). Particularly in low-income communities with limited access to affordable, nutritious foods, urban agriculture can boost access to fruits and vegetables. The present study identifies different urban agricultural practices like crops cultivated by farmers, land areas used for understanding nature and spatial typologies.

### **Review of Literature**

The construction of a strategy for enhancing Urban Agriculture production requires an awareness of the appropriate Urban Agriculture typologies and forms. This aids even more in assuring the availability of the product and optimising the production space available to ensure the area's food security (Rogemma, 2015). Residential gardens, community gardens, urban farms, institutional garden and illegal gardens were the main typologies identified in Urban Agriculture areas in Rome by Pulighe and Lupia (2016). According to Napawan (2016) main spatial typologies of Urban Agriculture include kitchen gardens, allotment farming, edible landscapes, small-scale farms, large-scale farms and retail, distribution, and support sites. Concerns about pollution, health, and climate change can all be lessened by disseminating Urban Agriculture typologies (Krisker, 2016).

According to the Urban Agricultural Act in Korea, the five spatial types of Urban Agriculture in Korea are Urban Agriculture in residential buildings, Urban Agriculture in neighbourhoods, Urban Agriculture in city centres, Urban Agriculture in a farm or park and Urban Agriculture for school education and (Oh Kim, 2017). Thornton et al. (2020) reported that there exists a wide diversity among urban agriculture typologies in the Brazilian town of Sao Paulo. The types of Urban Agriculture can vary from professional and privately owned holdings to community gardens. The main urban spaces that can be used for Urban Agriculture includes transition spaces, unconsolidated urban spaces,

peri-urban agriculture spaces, farm built clusters, residual spaces, rural settlements and low-density urban spaces (Marat-mendes et al., 2021). Kumari and Shirisha (2022) reported that 43.3 per cent urban farmers cultivated three to four food types including fruits and vegetables. The majority of respondents, 88.0 per cent engaged in urban gardening on terraces, while 37.0 per cent worked in front yards. To make sustainable food production that is environmentally and socially sound urban food economy, it is high time to design, plan, and construct intricate relationships between the urban, suburban, and rural areas of production (Bohn and Chu 2021).

## **Methodology**

The most urbanised districts in Southern Kerala include Thiruvananthapuram, Kollam and Ernakulam (GOK, 2012). Therefore, the study was conducted in purposively selected three Corporations in Southern Kerala which are Thiruvananthapuram, Kollam and Kochi Municipal Corporation. Thirty progressive urban farmers involved in rooftop and homestead cultivation were purposively selected in consultation with the officials and ward members from each corporation. From each corporation five wards were chosen and from these wards six respondents each were selected making up a total of thirty respondents from a corporation. The total number of respondents for the study was ninety. The data was collected using a well-structured interview schedule. Spatial typology is used to program and design local food production elements in urban areas. An inventory of the different types of urban agriculture, nature of ownership, land area and types of crops was made based on observations. . Data analysis was done using percentage and frequency analysis.

## **Result**

### **Profile Characteristics of Urban Farmers**

#### **Age**

The mean age of respondents was 51. Among respondents 58.89 per cent of farmers belong to the middle age category and 22.22 per cent to young age and 18.89 per cent to the old age category.

#### **Gender**

Among 90 respondents, there were 47 female farmers and 43 male farmers. The frequency of female farmers was higher (52.22 %).

#### **Educational Status**

The result indicated that, most of the urban farmers belonged to the graduate and above category, followed by higher secondary school and high school. No

respondent belonged to illiterate, can read and write only and primary school category. This may be because of the better socio-economic characteristics of urban population and high literacy rate in Kerala. Most of the farmers (51 %) belonged to the graduate and above category.

### Occupational status

Occupational status refers to the main activity done by the respondent by which contributes to his income. The majority of respondents belonged to urban farming + employee category (47.78%), followed by urban farming (30%) and urban farming+ business (22.22%).

### Annual income

The respondents are categorized into low, medium and high annual income based on mean and standard deviation. The result indicated that 66.67 per cent of the respondents were medium in the income category, 17.78 per cent in high income and 15.56 per cent in low income category.

**Table 1: Distribution of Respondents based on Annual Income**

| Sl.No.                                 | Categories                    | Frequency | Percentage |
|----------------------------------------|-------------------------------|-----------|------------|
| 1                                      | Low income ( $\leq$ 3 Lakhs ) | 14        | 15.56      |
| 2                                      | Medium income ( 3-9 Lakhs)    | 60        | 66.67      |
| 3                                      | High income ( $\geq$ 9 Lakhs) | 16        | 17.78      |
|                                        | Total                         | 90        | 100        |
| Min=1 lakh, Max=20 Lakhs, Mean=6, SD=3 |                               |           |            |

### Urban Farming experience

The classification of farmers into low, medium and high urban farming experience was done based on mean and standard deviation. Most of the farmers (61.11 %) belonged to the medium category of farming experience while 22.27per cent of respondent had low experience, lowest frequency was observed in high experience category (16.67 %).

**Table 2: Distribution of Respondents based on Urban Farming Experience**

| Sl. No. | Categories                      | Frequency | Percentage |
|---------|---------------------------------|-----------|------------|
| 1       | Low experience (< 4 years)      | 20        | 22.22      |
| 2       | Medium experience ( 4-14 years) | 55        | 61.11      |
| 3       | High experience (> 14 years)    | 15        | 16.67      |
|         | Total                           | 90        | 100        |

Min= 2 years, Max= 28 years, Mean=8.65, SD=5.45

### Nature and Spatial typology of Urban Agriculture

Nature and spatial typology is the inventory of the different types of urban farming along with the area used and crops cultivated. The main type of urban agriculture practice was rooftop farming in grow bags and containers, about 44.44% of respondent were cultivating crops in their rooftops. The next common practices were home gardens, kitchen gardens, polyhouse cultivation and urban farms, the percentage of farmers involved in these were 21.11 per cent, 15.56 per cent, 5.56 per cent and 3.3 per cent respectively. The various combinations of home gardens, poultry, fisheries, rooftop cultivation, rain shelter and kitchen gardens were collectively observed among 11.08 percent of respondents.

The crop cultivation was mainly seen in a mixed combination rather than cultivating a single crop, farmers grew different types of vegetables and fruits in the limited area available for them. The combinations were mainly of solanaceous, legumes, crucifers, leafy vegetable, fruit crops and tubers. The solanaceous+ legume, crucifers + leafy vegetable combination was cultivated by 20 per cent of farmers, followed by the solanaceous+ leafy+ legumes combination by 16.67 per cent. The next common combinations were leafy+ legume +solanaceous +fruits 14.44 per cent and leafy+ legume+ solanaceous+ fruits + cucurbit combination by 14.44 per cent of farmers.

**Table 3: Nature and spatial typology of urban agriculture**

| Sl. No | Types of urban agriculture                | Frequency | Percentage | Area (sq.ft) |
|--------|-------------------------------------------|-----------|------------|--------------|
| 1      | Rooftop- grow bags                        | 36        | 40         | 33150        |
| 2      | Rooftop-container                         | 3         | 3.33       | 2600         |
| 3      | Rooftop-grow bag + container              | 1         | 1.11       | 800          |
| 4      | Home garden                               | 19        | 21.11      | 150          |
| 5      | Kitchen garden                            | 14        | 15.56      | 10,016       |
| 6      | Polyhouse                                 | 5         | 5.56       | 4300         |
| 7      | Urban farm                                | 3         | 3.33       | 13,0680      |
| 8      | Home garden +poultry                      | 3         | 3.33       | 8274         |
| 9      | Home garden+ rooftop                      | 1         | 1.11       | 7302         |
| 10     | Rooftop + home garden +poultry            | 1         | 1.11       | 2877         |
| 11     | Home garden +rooftop + poultry +fisheries | 1         | 1.11       | 2542         |
| 12     | Kitchen garden + rooftop                  | 1         | 1.11       | 1603         |
| 13     | Rooftop + rain shelter                    | 1         | 1.11       | 1350         |

|    |                               |    |      |     |
|----|-------------------------------|----|------|-----|
| 14 | Kitchen garden + rain shelter | 1  | 1.11 | 871 |
|    | Total                         | 90 | 100  |     |

**Table 4: Crop combinations in Urban Agriculture**

| Sl. No. | Types of crops grown                           | Frequency | Percentage |
|---------|------------------------------------------------|-----------|------------|
| 1       | Solanaceous+legumes +crucifers+leafy           | 18        | 20.00      |
| 2       | Solanaceous+leafy+legumes                      | 15        | 16.67      |
| 3       | Leafy+legumes+solanaceous+fruits               | 13        | 14.44      |
| 4       | Leafy+legumes+solanaceous+fruits<br>+cucurbits | 13        | 14.44      |
| 5       | Solanaceous+legumes+crucifers                  | 8         | 8.89       |
| 6       | Solanaceous+tubers+fruits+cucurbits            | 7         | 7.78       |
| 7       | Solanaceous+tubers+fruit                       | 6         | 6.67       |
| 8       | Leafy+legumes+cucurbits                        | 4         | 4.44       |
| 9       | Solanaceous+fruit crops+crucifers              | 2         | 2.22       |
| 10      | Solanaceous+legumes+crucifers +cucurbits       | 2         | 2.22       |
| 11      | Solanaceous+legumes                            | 1         | 1.11       |
| 12      | Solanaceous+fruit crops                        | 1         | 1.11       |
|         | Total                                          | 90        | 100.00     |

### Domestic Waste Management

Domestic waste management refers to how urban farmer disposes his/her household wastes. The waste generated mainly included plastic and food waste. The main method of disposal was waste collection by municipal workers and waste van collection. It was also seen that most of the respondent have compost or biogas units in their household, which is used to decompose food waste and later the slurry or residue after decomposing was used as manure for growing plants. The details like types of waste generated, the waste disposal methods, the usage of organic waste and disposal methods are given in the following tables.

**Table 5: Types of Waste Generated**

| Sl.No. | Types of waste          | Frequency | Percentage |
|--------|-------------------------|-----------|------------|
| 1      | Plastic waste           | 67        | 74.44 %    |
| 2      | Plastic and paper waste | 10        | 11.11 %    |

|   |                        |    |          |
|---|------------------------|----|----------|
| 3 | Plastic and food waste | 10 | 11.11 %  |
| 4 | Plastic waste and cans | 3  | 3.33 %   |
|   | Total                  | 90 | 100.00 % |

**Table 6: Waste Disposal Methods**

| Sl. No. | Disposal Methods                | Frequency | Percentage |
|---------|---------------------------------|-----------|------------|
| 1       | Workers collected               | 37        | 41.11 %    |
| 2       | Waste van                       | 39        | 43.33 %    |
| 3       | Roadside dumping+workers        | 5         | 5.56 %     |
| 4       | Dumping site                    | 6         | 6.67 %     |
| 5       | Workers collected+ dumping site | 3         | 3.33 %     |
|         | Total                           | 90        | 100.00 %   |

**Table 7: Distribution of Respondents based on Household Organic waste generated and used for Urban Agriculture**

| Sl. No. | Category                                     | Frequency | Percentage |
|---------|----------------------------------------------|-----------|------------|
| 1       | Respondents using household waste for UA     | 74        | 82.22 %    |
| 2       | Respondents not using household waste for UA | 16        | 17.78 %    |
|         | Total                                        | 90        | 100 %      |

**Table 8: Organic waste disposal methods**

| Sl. No. | Disposal methods   | Frequency | Percentage |
|---------|--------------------|-----------|------------|
| 1       | Biogas             | 45        | 60.81      |
| 2       | Compost            | 19        | 25.68      |
| 3       | Bucket compost     | 6         | 8.11       |
| 4       | Biogas and compost | 4         | 5.41       |
|         | Total              | 74        | 100%       |

### Problems faced by Urban Farmers

The constraints faced by urban farmers were collected using open ended questionnaire. The results indicated that the major constraint faced by farmers was the incidence of pest and diseases (90.00 %) followed by not getting quality

inputs for urban agriculture (80.00 %). The least frequency (46.66 %) was observed in case of risk of building damage due to urban agriculture.

**Table 9: Problems faced by Urban Farmers**

| Sl.No. | Constraints                                                                                                              | Frequency | Percentage |
|--------|--------------------------------------------------------------------------------------------------------------------------|-----------|------------|
| 1      | There are no remunerative prices for commodities                                                                         | 72        | 80.00      |
| 2      | Incidence of pest and disease                                                                                            | 81        | 90.00      |
| 3      | The produce is considered inferior by consumers because of the shape and size of the produce and cannot sell the produce | 68        | 75.60      |
| 4      | Not getting quality inputs                                                                                               | 75        | 83.33      |
| 5      | High level of competition                                                                                                | 75        | 83.30      |
| 6      | Lack of time to spent on agricultural activities                                                                         | 52        | 57.77      |
| 7      | Not having adequate space for cultivation                                                                                | 58        | 64.44      |
| 8      | Risk of building damage                                                                                                  | 42        | 46.66      |

## Conclusion

The present study indicated that most of the farmers involved in urban agriculture are cultivating their crops on rooftops in grow bags. They were cultivated crops as the combination of vegetables. The main problems faced by urban farmers include higher incidence of pests and diseases and not getting quality inputs for farming. In the present scenario of grow bag ban and decreasing land area in farming. It is necessary to come up with policies and strategies that can reduce these issues and scale up urban agriculture.

The main strategy for scaling up Urban Agriculture should conversion of fallow land and vacant land to cultivable areas. There are many vacant spaces in urban areas that are underutilised, this has to be identified and should be allotted to individuals who are interested in farming. This can be done by making an inventory of urban agriculture state-wide. It can further help to understand various typologies and common cultivation practices among farmers and the problems faced by them.

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