

Urban and Peri-Urban Agriculture Practices in Different Countries: A Systematic Literature Review

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ABSTRACT

Urban and peri-urban agriculture (UPA) is the activities carried out on land and in other locations within the cities and their surroundings that produce food and other products through agricultural production and associated processes. A systematic literature review on the urban and peri-urban agriculture practices followed in different countries using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method is presented in this paper. Using several search strings and advanced searches, 1014 articles were identified from the Scopus database. Later using inclusion, exclusion, and quality assessment criteria, 32 articles relevant to the subject were included in the study. This systematic review identified the UPA practices in nearly 20 countries like The Netherlands, Kenya, Italy, Nepal, India, Brazil, Ethiopia, Zimbabwe, Argentina, Nigeria, and a few more worldwide. The practices followed in the countries and the critical reasons behind the practices are analyzed in the study. However, in most peri-urban areas, agriculture is followed only for family consumption or for selling the produce in the local markets or communities. Vegetable gardening and mixed farming are the prevalent agricultural practices in urban and peri-urban areas. Co-operative model worker's gardens and collective plots of the shared garden are practiced in France that encourage the united farm work of villagers. UPA is reported to reduce the food miles and supply chain thereby reducing the carbon footprint. Farms cultivating many short-duration crops in a single field for multiple seasons increase soil fertility. Farming kits like 'Do-it-yourself' horticultural kits in India and 'Mushroom growing kits' in Switzerland and other such government kits were used to promote UPA. A greater number of studies were found in the eastern countries when compared with other countries around the world. Further research is required to identify the practices followed in other countries.

Keywords: Urban Agriculture, Peri -Urban Agriculture, Good Agriculture Practices

Introduction:

Urban and Peri-urban agriculture is a need to ensure the food safety and security of the growing urban population in the globe. Urban and Peri-Urban Agri-

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culture (UPA) is followed by different practices in different countries as per the need or demands of the people and the suitable environmental conditions prevalent in the country. However, most of the practices include the cultivation of vegetable and fruit crops (Lovell, 2010). UPA is practiced for satisfying the family needs or selling the produce in the local market. Roof top farming and vertical farming practices not only meet the food needs of the people but also reduce the impact of heat on summer days (De Zeeuw et al., 2011).

A systematic literature review is a formal and standard research method for finding, evaluating, and analyzing all studies that attempt to address related topics. A systematic review is a formal research study that follows a well-defined structure to find, review and analyze studies that attempt to answer associated questions. This SLR deals with the different agricultural practices followed by the urban and peri-urban places of different countries.

Methodology

The search was performed in the Scopus database. Various combinations of algorithms were considered, and the outcome of the research was used for the paper. Algorithms included the combination of keywords from each of the following search strings: a) “peri-urban agriculture” b) “urban and peri-urban agriculture” c) “urban and peri-urban agriculture practices” and d) “urban and peri-urban farming practices”.

Initially, the screening was done based on the inclusion and exclusion criteria (Table 1). Later stages of article screening were done based on the title and abstract reading, where the studies related to a) Urban or peri-urban agriculture practices in a country and b) Different agricultural practices in an urban or peri-urban land area were included.

Table 1. Inclusion and Exclusion criteria

Criteria	Inclusion	Exclusion
Initial identification		
Literature type	Research articles	Review papers, Book chapters, series
Source type	Journal	Trade journal
Publication stage	Final	Press
Access type	Open access	Restricted access
Subject area	Agricultural sciences, Environmental and biological sciences	

Language	English	Non-English
Timeline	2013-2023	<2013
Screening		
Title and Abstract	Existence of predefined search strings in the title, abstract, keywords or introduction of the paper. Considered the agricultural practices followed in the urban and peri-urban area.	
Full text	Explained the urban and peri-urban agriculture practices in the State/ country.	

The number of studies from each database using the above-mentioned search strings was presented in table 2. The database search resulted in a total of 1014 articles. From the automation filters provided by the databases, 422 articles were marked as ineligible using the inclusion and exclusion criteria determined for initial identification (e.g. non-English, restricted access, review papers, etc.) and deleted from the records. From the remaining 1229 articles, using the Rayyan software, 337 articles were excluded after duplicate removal.

Further after screening the title and abstract 103 studies were eliminated for not having peri-urban agriculture, non-farmer population, and non-existence of predefined keywords in the title, abstract or keywords as a part of the paper. A total of 32 studies were chosen for quantitative analysis based on suitability, relevancy, and clarity of addressing socio-economic variables.

Table 2. Keywords used and total number of publications from databases

Database	Search strings and search terms		No. of articles
Scopus	Main search- ing terms	"urban" AND "agriculture"	1014
		"peri-urban" AND "farm"	31
		"peri-urban" AND "agriculture"	30
		"urban" AND & AND "peri-urban" AND "agriculture" AND "practices"	128
		"perl-urban" AND "agriculture"	47
		"peri-urban" AND "farm"	31
		"urban" AND "agriculture"	117
		"urban" AND "agriculture" AND "practices"	208
		"peri-urban" AND "agriculture"	4

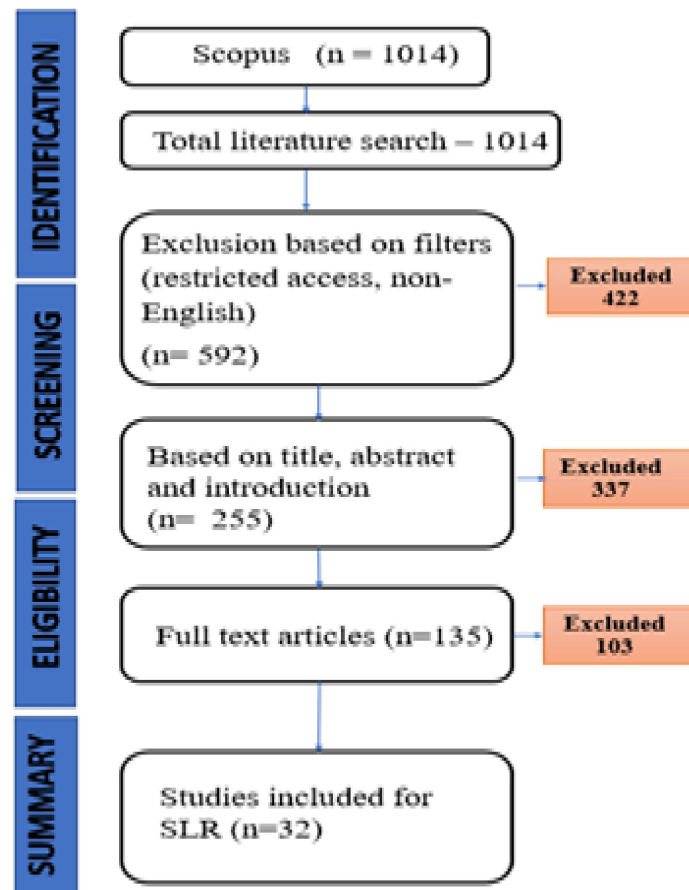


Figure 1: PRISMA flowchart depicting the number of studies inclusion and exclusion for identifying the Urban & Peri-urban Agriculture practice in different countries.

Results and Discussion

The focus of this study was to find the different agriculture practices followed in urban and peri-urban places around the world. In the peri-urban zone of Oosterwolde, Almere, The Netherlands, three types of agricultural practice are followed. Garden farming is practiced on smaller plots of land for kitchen gardening or poultry, while multifunctional agriculture is used for producing market gardens or livestock on larger plots of land. Conventional farming is carried out on even larger plots of land for national or global supply. The first two types are for local food needs, while the latter is for wider supply (Jansma et al., 2022).

In the urban and peri-urban regions of Nairobi, Kenya, people practice composting, open field farming, vegetable nurseries, various irrigation methods, farmyard manure, chicken rearing, multi-storey gardens, kitchen gardens, greenhouses, and cattle rearing mainly. In Turin, Italy, the protected areas of Stupinigi and La Mandria national parks are made greener by the woods and

the oak-hornbeam groves for recreational purposes (Gottero et al., 2021). In the areas of Kirtipu, Madhyapur thimi, Tarkeshwor, and Harsiddhi of Kathmandu Valley, Nepal, people practice vegetable farming, tomato, carrot, and green leafy vegetables. They conduct monthly meetings and use manure-treated vegetables that give higher yields and prices (Rai et al., 2019).

In La Pintana and Lyon of France and Chile, there are workers' gardens and shared gardens, respectively. Lyon, France has over a hundred shared gardens for local and sustainable organic production. These gardens are based on a cooperative model of government policy and collective gardening and harvest. The involvement of local stakeholders is said to be the key to the success of this practice. (Silva et al., 2022). In Italy, UPA on rooftops and the ground is expected to meet the city's vegetable demand (Lucertini et al., 2021). In the Kensington peri-urban plots of Zimbabwe, people have shifted from cultivating maize to mixed farming with horticultural crops and livestock management due to climate change affecting cereal yields (Dube et al., 2021). Zero Acreage Farms numbering 73, in various cities across North America, have Asia, Australia, and Europe, had the potential to promote sustainable urban agriculture by using innovative practices, and farming technologies, and creating new patterns of food supply and urban spaces (Thomaier et al., 2015).

In Córdoba, Argentina, a total variety of 30 vegetable species were found across sampled farms, with 15 most common crops being grown. The practice of diversified farming aims to promote ecosystem functioning and related services such as soil fertility and productivity conservation, as well as crop diversity (Marinelli et al., 2023). In most parts of Nigeria, they practiced mixed cropping, which involved planting more than one crop on a single piece of land. Fluted pumpkin (*Telfairia occidentalis*) is primarily cultivated for its leaves and fruits in Nigeria (Oluwole et al., 2022). The text mentions that only images captured during the dry season with low to no cloud cover were chosen for analysis in Bolgatanga, Ghana. However, using dry season images may result in the misclassification of bare lands and farmlands as their spectral reflectance can appear similar (Kuusaana et al., 2022).

Agricultural activities continue to be practiced in the peri-urban areas of Sogamoso, where the soil is highly fertile, including in vacant spaces between residential and backyards and patios. The crops grown include various vegetables such as chard, chili pepper, celery, and fruits like apples, pears, and figs (Feola et al., 2020). Sixteen varieties of edible plants were grown using cultural techniques for pest control, which resulted in vegetables that were free from pesticides. In addition, converting household green waste into compost to improve soil nutrients and using rainwater and greywater for irrigation

purposes are practiced (Gajbe et al., 2021). In Ethiopia, there is a need to improve milk production, and urban and peri-urban farms are crucial in achieving this goal. Peri-urban farms have more oxen and bulls than urban farms because they practice mixed-crop livestock farming. Common forages used to improve livestock feed quality include alfalfa, elephant grass, Rhodes grass, and sesbania (Balcha et al., 2022). Agriculture takes place through community gardens here. In Cuba, government policies encourage agricultural activities within the cities, including intensive vegetable gardens, gardens in companies and factories, and suburban farms, among other initiatives (Gomes et al., 2019).

In Andalucía, Spain, Collaborative SFSCs provide several benefits, including a variety of products for consumers, sharing of resources among producers, preservation of local food chain infrastructure, increased bargaining power for small producers, reduced competition between small producers, and mutual support to combat isolation and stress (Ochoa et al., 2020). Urban farming systems come in a range of technological levels, from high-tech options to low-tech ones, and are marketed to both professional farmers and consumers in other industries (Van-Tuijl et al., 2018). In Sunqiao vegetables, fruits, and herbs are grown vertically on skyscrapers. In Shanghai, more than half (56%) of the local population prefer leaf vegetables, which grows in hydroponic and aquaponic systems (Zareba et al., 2021).

Table 3. Urban and Peri-urban Agricultural Practices followed

Country	Urban and Peri-urban Agricultural Practices followed
Oosterwolde, Europe	Garden, multi-functional and conventional
Nairobi, Africa	Multi storey gardening, open field farming and vegetable nurseries
Kathmandu valley, Nepal	Vegetable farming
France and Chile	Permaculture, Shared Gardens
São Luís, Brazil	Intensive vegetable gardens, company and factory gardens, and suburban farms.
Venice, Italy	Roof top
Kensington peri-urban plots, Zimbabwe	Mixed farming
New York city	Zero Acreage Farming
Córdoba, Argentina	Diversified farming

Owo, Okitipupa and Akure, Ondo state, Nigeria	Mixed farming
Bolgatanga, Ghana	Irrigation-based vegetable production
Sogamoso, Colombia	Back gardens and patios
Funchal, Madeira island	Integrated kitchen gardens
Nagpur city, Maharashtra, India	Urban rooftop farming
Taipei, Taiwan	Zero acreage Farming

Summary and Conclusion

This systematic review identified the UPA practices in nearly 20 countries. The practices followed in the countries and the critical reasons behind the practices are analyzed in the study. In most peri-urban areas, agriculture is followed only for family consumption or for selling the produce in the local markets or communities. Vegetable gardening and mixed farming are prevalent agricultural practices. Co-operative model workers' gardens and collective plots of shared gardens are practiced in France that encourage the united farm work of villagers. UPA is reported to reduce the food miles and supply chain thereby reducing the carbon footprint. Farms cultivating many short-duration crops in a single field for multiple seasons increase soil fertility. Farming kits like 'Do-it-yourself' horticultural kits in India and 'Mushroom growing kits' in Switzerland and other such government kits were used to promote UPA. A greater number of studies were found in the eastern countries when compared with other countries around the world. Further research is required to identify the practices followed in other countries of the globe.

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