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The Concept of Urban Agriculture – Historical Development and Tendencies

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Abstract. The change in the concept of urban agriculture has been driven by social, political and economic factors, changing the role of agriculture in the urban environment. From the second half of 20th century topicality and practices of urban agriculture are growing widely not only in social initiatives but also in scientific research (the number of articles in scientific databases has increased 18-30 times since 2000). Growing interest has identified various variations and tendencies in the interpretation of the concept of urban agriculture, having regard to the current United Nations definition that is broad, but in research works and case studies researchers adapt the definitions to the local characteristics and aim of the study, thus creating a number of risks in the interpretation of the concept, including limited possibilities for quantitative comparisons between studies. The aim of the article is to identify the historical development stages of the concept of urban agriculture and to determine the main research tendencies in its application. To achieve this aim, the method of monographic and descriptive analysis was used for theoretical discussion, analysis, synthesis and deduction - for information gathering, logical systematization and classification. As a result of the study, it was identified that the concept of urban agriculture is developed in three different stages - originally associated with the technical solutions of urban planning for providing food for city dwellers, it is currently developing in tendencies of different directions: analysis of agriculture's role in urban areas (including mitigating climate change risks), classification of types of urban agriculture, opportunities for adapting innovations and technological solutions to urban agriculture, the place and context of urban agriculture for sustainable development in the circumstances of urbanization. Such in-depth research of the experience and impact of urban agriculture on sustainable development could increase dynamically due to environmental considerations, aspect of the circular economy, and new paradigms in planning urban and peri-urban areas.

Key words: urban agriculture, urban farming, concept tendencies.

Introduction

As the level of urbanization increases at accelerating speed, the interest in the role of agriculture and its potential in cities is renewed. However, there is relatively little research on the historical aspects of the concept and tendencies in the development of the concept of urban agriculture. Moreover, although the focus of scientific research on urban agriculture has been increasing rapidly since the 1990s, the Food and Agriculture Organization's definition is still very broad, thus creating various

possibilities for interpretations and trends in the usage of the concept of urban agriculture in scientific researches. Historical development of the importance of urban agriculture is relevant to the redefinition of the role of agriculture in cities, while trend analysis in scientific articles provides an opportunity to classify different approaches to urban agricultural research by identifying directions in the field of research.

Hypothesis: the development of the concept of urban agriculture can be divided into development stages, influenced by the evolution of urban

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agriculture. *The aim* of the article is to identify the historical development stages of the concept of urban agriculture by identifying tendencies in its use in research. To achieve this aim, the following research tasks were set: 1) to identify the historical development stages of urban agriculture, 2) to determine and analyse research tendencies in urban agriculture.

Materials and Methods

To achieve the aim and perform tasks, the research employed several methods: the method of monographic and descriptive analysis was used for theoretical discussion, analysis, synthesis and deduction - for information gathering, logical systematization and classification. The scientific databases Scopus, Web of Science, EBSCO, ScienceDirect, Wiley Online Library were used to collect statistical data.

Results and Discussion

Historical development of the Concept of Urban Agriculture

In the 21st century, urban agriculture is associated with both modern urban planning principles, sustainable development, the latest technological innovations and its greatest growth of topicality in history. But urban and agricultural interactions have a much longer development history than urban agricultural tendencies since the 1990s.

Agricultural practices have a long history and it is linked to people's skills not only to harvest the food available in nature, but also to purposefully cultivate and grow it, both plants and livestock. Archaeological evidence indicates that people in various regions of the world (initially Asia and Africa) began to acquire agricultural skills in 10-5 thousand years BC. (Mannion, 1999). And from the Arabian Peninsula agricultural practices were passed on also to European territory (Pinhasi, Fort, & Ammerman, 2005).

As the *skills to grow and store food increased*, and the *demographic population* continued to grow and began to unite in the relatively dense social centres of a certain area, the first cities were formed. Access to food, which provided territorial autonomy and independence from surrounding areas, was a key factor in formation and development of cities.

People have been growing food in urban areas since the first cities for two reasons: 1) most of the original cities were formed and developed around *cultivated agricultural lands*, 2) people *transferred their agricultural knowledge* to nascent cities to feed themselves, their families, and the urban community (Steel, 2013).

This marks the first development stage of urban agriculture – *urban agriculture as a basic principle for urban planning*. Population growth and the

formation and development of cities determined such an understanding of the concept of urban agriculture until the 17th century. During this period, urban agriculture had three principles:

- 1) agriculture is a part of the city and underlies its autonomy and development;
- 2) irrigation systems and technologies adapted to the region and climate are used;
- 3) urban agriculture is the main source of food for the city dwellers.

Food availability was primarily influenced by land fertility, and since cities formation was initially determined by geographical and climatic conditions that would provide relatively densely populated areas with the necessary food. It confirms that urban agriculture is not a new trend in modern world and society but historical, on primary needs based practice and the urban planning aspect. Initially, agricultural challenges in cities were related to two aspects - irrigation, incl. waste water use (Waterford, 2015), and composting of municipal waste for fertilizer (Viljoen, Bohn, & Howe, 2005); and their development was determined by specific interaction between civilization and soil cultivation practices (El-Ramady, Alshaal, & Gaheen, 2019).

Similar tendencies in urban development exist in all regions of the world, and agricultural practices and approaches in ancient cities, as well as their use and importance in urban planning, highlight the specificity of the historical origins of urban agriculture – while today urbanization is most often analysed in terms of its social, economic and political causes, historically, for most of cities, one of the main aspects of urbanization has been the environmental factor and its adaptation to agriculture (Ren *et al.*, 2019).

The ancient cities were formed by mutually independent aspects - their development was based on regional trends, with little impact on a global scale. Such relatively independent urban development has been for a very long time, but the industrial revolution and its origins in the 18th century changed the tendencies of the urbanization process and also the principles of cities development - begun in Europe but with rapid development on a global scale, it shifted the focus of cities and *began to distance cities and agriculture*, entering a new, distinct phase in the development of urban agriculture - a stage of *changing functions* (for a while even levelling).

During the stage of changing functions, agriculture loses its status as a basic urban planning principle and evolves in two different directions, determined by political and economic factors. In the time of the 18th-19th centuries, under the influence of industrialization, the concept of agriculture is separated from the concept of city because the basic agricultural resource, land, is

Table 1

Stages of historical development of urban agriculture

Development stage of urban agriculture	Influencing factors	Period
Urban agriculture – <i>the basic principle for urban planning</i>	- formation of cities - the need for territorial autonomy - population growth	3,5. thous. y. BC-17 th century
Changing functions of urban agriculture	- industrialization - the economic stratification of society - economic migration to cities	18 th -19 th century
	- period in time of World Wars - economic and social depression - insufficiency of resources	First half of 20 th century
The <i>renaissance</i> of urban agriculture	- the concept of sustainable development - science and research activities - technological development - changing the values of society	Second half of 20 th century - now

Source: authors' construction.

used in economically more profitable sectors (industry, production). However, economic migration to cities and economic stratification of society is creating a *new function of urban agriculture* - practiced in small, unused or unusable for industrialization urban areas to provide food for the poorest. With the decreasing tendency of agricultural areas and the development of industrialization and with it associated urbanization, including the aspect of economic migration, agriculture has gained a new and more diverse role in cities (McClintock, 2017).

The period from the industrial revolution to the First World War redefined the relationship between city and agriculture, creating a lasting idea of the development of urbanization, which is separated from urban agriculture. Changes in the functions of urban agriculture (poverty alleviation, food security for the poorest) led to the development of new concepts - in Germany gardens of poor were created, which were later renamed allotment gardens (Holmer, Drescher, 2005). Similar tendencies in urban gardens were also found in other large cities, but urban agriculture reached a much wider level in the first half of 20th century – during the World Wars -, when in times of economic crisis and depression the food security function was needed by all the urban population. After World War I, urban gardens were called variously in different regions - Victory, Liberty, War gardens (Bentley, 1998). About 40% of fresh food was grown in urban gardens in the United States during World War II, with over 20 million gardens nationwide (Andreatta, 2015). During this period, tendencies created by industrialization about the distinction

between agriculture and cities continue, and urban agriculture does not regain its status as the basic principle of urban planning, but its role is being updated as an important source of food.

In the second half of 20th century, with the development of globalization, national economies and the demands of living standards, the UN identified the issue of sustainable development. The Brundtland Report defines urban agriculture as one of the strategies for sustainable urban development, emphasizing its use in fresher food, landscaping and waste composting (*Report of the World..*, 1987). Although only a few countries in policy-making initially focused on urban agriculture, technological development and social initiatives set the new development stage for the concept of urban agriculture - *the renaissance of urban agriculture*.

While at first the development of cities was directly related to agricultural practices, technologies and knowledge used, then the distinction between concepts of agriculture and urban areas created by the industrial revolution has led to the situation when in the stage of the renaissance of urban agriculture practices, knowledge and nature of agriculture to cities is taken from rural areas (Azunre *et al.*, 2019).

During the stage of the renaissance of urban agriculture, it is practiced on a relatively small scale, using not only land resources in their traditional sense, but all the available space in cities - walls, roofs, balconies etc. The diversification of urban agriculture practices also led to a dynamic shift in the focus of research and science. As a result, the historical development and change of meaning and importance of

the concept of urban agriculture, as well as the modern technological, social and economic capabilities and context of sustainable development, have determined the focus of scientific research on urban agriculture, resulting in a rapid increase in scientific articles and variations in research tendencies.

Tendencies of the Concept of Urban Agriculture in Scientific Articles

The topicality of urban agriculture in the 21st century is influenced by social ideas and their trends, changes in societal values and sustainable development in an attempt to balance urban resource consumption and security (Zvirbule, Dobele, & Auzina, 2019). Questions about the potential impact of urban agriculture on reducing the risks of urbanization have led not only to a variety of social initiatives and dwellers’ focus on urban agriculture practices, but also to a rapid increase in research and articles.

Urban agriculture is most commonly understood in scientific research by four concepts - urban agriculture, urban farming, urban gardening and urban horticulture. Analysing the statistical information about articles in databases (the statistics shown in Table 2 analysed by 1 March 2020) by these keywords, it can be seen that the most commonly used concept in scientific articles is “urban agriculture”, which is used as a basic concept, although the frequency of other concepts’ usage varies. Terms “urban agriculture” and “urban farming” are often used as synonyms, but the relatively less commonly used concept in the context of urban agriculture is “urban gardening”. Some authors associate urban gardening with a non-commercial way of producing food that is directly related to the urban environment (Schram-Bijerk *et al.*, 2018). Research data on urban agriculture in Europe published in 2016, analysing the experiences and practices of London,

Milan and Ljubljana, identifies urban gardening as non-profit activities and practices in Europe, while profit-oriented farming is called urban agriculture using both concepts - “urban agriculture” and “urban farming” (Glavan *et al.*, 2016).

The United Nations Food and Agriculture Organization also uses the concept “urban agriculture” to describe agricultural practices and their potential in the urban environment - in 1996, the FAO published a report entitled “The State of Food and Agriculture” which not only identifies the potential and importance of urban agriculture for sustainable development and urbanization, but also problems of urban agricultural research of that time and aspects that need to be improved, the main problem emphasizing that research needs to develop and use a common definition, that usage in case analysis would allow to quantify the extent and development tendencies of urban agricultural practices (World review. Urban..., 1996). Establishing a united, more precise definition of urban agriculture would also allow more specific its development initiatives and directions and the role in urban planning (Sanye-Mengual *et al.*, 2016). Most studies on urban agriculture are based on case studies, where the definitions used vary depending on the local context and the purposes of the study, which is why quantifying and comparing data globally is cumbersome (Thebo, Drechse, & Lambin, 2014).

Research and conceptualization of urban agriculture have evolved rapidly since 1996, but the UN’s definition of urban agriculture still includes a very broad understanding, allowing for variations according to the focus of the study. Analysing the role of FAO in urban agriculture, it is defined in its broadest sense as the cultivation of plants and crops and livestock (including poultry) in urban areas or,

Table 2

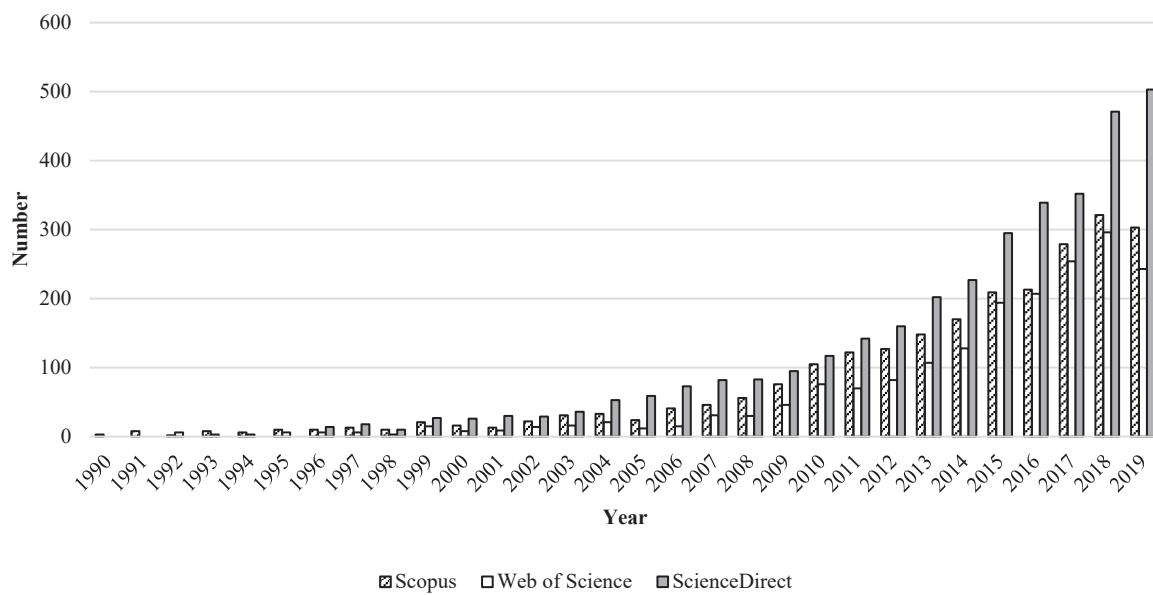
Number of articles in databases for keywords directly related to urban agriculture

Database	“urban agriculture”		“urban farming”		“urban gardening”		“urban horticulture”	
	number of articles	first article, year	number of articles	first article, year	number of articles	first article, year	number of articles	first article, year
<i>EBSCO*</i>	11 758	1989	3 365	1987	1 288	1991	1 872	1988
<i>ScienceDirect**</i>	3 890	1996	591	1995	363	1991	212	1996
<i>Scopus</i>	2 533	1978	423	1984	234	1985	167	1985
<i>Web of Science</i>	1 937	1992	328	1995	199	1993	142	1995
<i>Wiley Online Library**</i>	1 039	1914	214	1972	176	1980	258	1981

* - statistics from entries in academic journals

** - statistics from entries in journal

Source: authors’ construction based on EBSCO, ScienceDirect, Scopus, Web of Science, Wiley Online Library data analysis



Source: authors' construction based on Scopus, Web of Science, ScienceDirect data analysis

Figure 1. Number of publications by keywords “urban agriculture” in databases 1990-2019.

by extending urban agriculture to the context of peri-urban agriculture, near urban borders (FAO’s role in..., [n.d.]).

Theoretical review studies on urban agriculture are often analysed in the broader sense of the concept, thus forming its own approach to factor classification. Specifying the UN’s definition of 1996, urban agriculture is identified by the use of small urban areas (open spaces, gardens, border areas, balconies, containers) for growing crops and small livestock (Poulsen *et al.*, 2015). Some definitions emphasize not only the cultivation of any food on land available in urban areas, but also the indoor cultivation of food (Azunre *et al.*, 2019), thus expanding the scope for practice analysis, relatively distancing from the problem of open land availability in urban areas.

Since the concept of “urban agriculture” is more widely used in scientific research, it is also used in this article for statistical analysis of scientific articles. Scopus and Web of Science databases and some information from ScienceDirect and EBSCO were used to obtain data on the number of articles; the increase in the number of articles was analyzed for the period from 1990 to 2019. The ScienceDirect database was launched in 1997 and the oldest available article by keywords “urban agriculture” is from 1996, while the Scopus database contains information from 1978, but until 1994 the number of publications per year ranges from 1 -8, while in the period 1994-2002 from 10-30, with a tendency to increase. The growing tendency is also significantly influenced by the first major studies of the benefits of

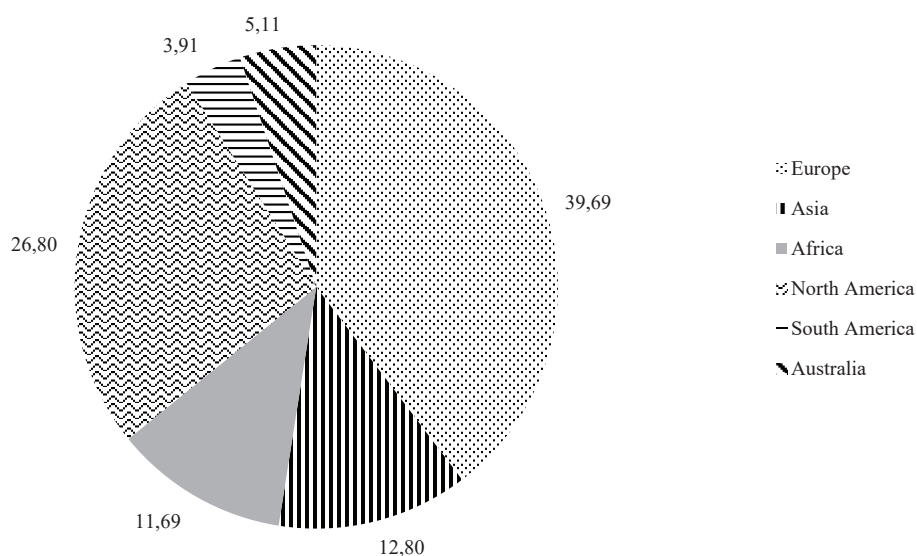
urban agriculture that emerged in the 1980s (Poulsen *et al.*, 2015).

Since its inception in 1997, ScienceDirect has been a prominent leader among databases in terms of the number of articles, with in some periods twice as many articles published as Scopus and the Web of Science, due to the vast diversity of sources in the ScienceDirect database. However, regardless of the number, all databases have a similar tendency - the number of publications is relatively small in the 1990s, but the trend has been increasing since 2000.

Even with the growing interest of academic society in urban agriculture, the primary focus was initially on analysing the practices of the Global South, where urban agriculture plays a major role in food security and poverty reduction. The social practices of urban agriculture and its cultural, economic and social dimensions were researched relatively later (Tornaghi, 2014).

Most of the first studies on urban agriculture related to countries in the Global South, where urban food insecurity and poverty are higher than in the Global North countries. Future tendencies in urbanization and food security also predict higher risks in the Global South – already in 2016 it was predicted that by 2020 in Latin America’s cities 85% of citizens will be from low-income level, and 40-45% in Africa and Asia’s cities (Twelve Organizations Promoting..., 2016).

Scopus and Web of Science data were used to analyse the sciences represented in articles, as ScienceDirect does not have statistics by fields of science and the EBSCO database has a very detailed subdivision. The articles published on the topic of



Source: authors' construction based on Scopus, Web of Science data analysis

Figure 2. Number of publications by keywords “urban agriculture” in databases 1996-2019, %.

urban agriculture are mostly related to environmental sciences (Scopus 26.8%, Web of Science 39.3%), and in Scopus database to agriculture (Scopus 15.0%, Web of Science 5.4%) and social sciences (15.1%, Web of Science - 2.1%), but in the Web of Science to ecology (especially water resources) and geography (Web of Science - 25.2%, Scopus -8.0%).

Analysing regionally by publishing country of articles, data from Scopus and Web of Science databases are available (EBSCO publications by country of article are for the US, China, India, Canada, South Africa and Cuba only, so data were not included in the regional review). The data collection included countries with at least 10 articles in at least one of the two databases between 1996 and 2019.

The largest number of articles (2112) has been published in Europe, with leading countries such as Great Britain (405), Germany (348), Italy (278) and France (270). North America's number is made by articles published in the United States (1076), and fewer in Canada (275), while China (235), India (90) and Japan (81) are the leading countries in Asia.

Africa is a region where a great number of researches have been done, analysing the role of urban agriculture in poverty reduction, thus also highlighting the major tendencies in usage of the concept of urban agriculture in the Global South. Of the articles published in Africa (622), most have been published in South Africa (144), Ghana (103) and Kenya (75). Most of these countries are characterized not only by advanced research, but also by their historical experience in urban agriculture, providing opportunities for research into tendencies based on different practices and economic and social aspects.

The authors' data on article statistics and tendencies used in analysis show that most authors publish studies on the environmental aspects of urban agriculture and in the context of technological innovation and innovative approaches. Articles classified in the technological aspects group are also related to the use of new, environmentally adaptable and efficient technologies. Statistically leading authors (in terms of number of published articles) correspond to the division of scientific fields and directions of articles published in databases. The most cited articles, on the other hand, are related to opportunities for sustainable development, types of urban agriculture and social factors.

Conclusions, Proposals, Recommendations

- 1) There are three distinct stages in the development of the concept of urban agriculture - urban agriculture as the basic principle for urban planning, changing functions of urban agriculture and the renaissance of urban agriculture. Separation of stages is influenced by political, economic and social factors as the role of agriculture and the spread of practices in cities change.
- 2) In the 21st century, tendencies in the concept of urban agriculture are largely influenced by research focus – in science-field classified system articles in environmental sciences, agriculture, social sciences and ecology dominates. Geographically, most articles have been published in Europe (especially the UK, Germany, Italy, France) and North America.

- 3) Further research is possible in the analysis of the concept of urban agriculture by the comparative analysis of the definition aspects according to the scientific fields, geographical regions and the focus of the research.

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