

# Urban Horticulture Activity



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## Urban Farming

Erasmus+ KA210-VET - Small-scale  
partnerships in vocational education  
and training



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## Preface

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# Urban Horticulture Guide

## Description

The activity will take place in both countries. The location of the activity will be the urban areas or areas close to urban network. The Orchards already established in these areas will be visited and be used as a paradigm of best practices. In this context the first trainers will be trained in urban Horticulture through natural presence and small videos in YouTube channel, which will be produced for this purpose. In this context a manual of urban Horticulture will be produced for future reference a dissemination taking into account the existing legislation for horticulture in populated areas.

There will be a workshop/seminar in cooperation with universities / entomology Departments so as to facilitate the idea with more scientific background. The trainers will be given an exam at the end of the activity and a certification of completion. The project team in cooperation with certification bodies will examine the possibility to certify the trainers with a recognized certificate as urban horticulture technicians, which will motivate especially young people to continue this activity.

Schools of secondary education will be motivated for this purpose and small seminars will take place to inform the students for the challenge of climate change. The same roadmap will be followed for companies and present the concept not only as climate change action but also as an idea for team working, the same frame used in the USA and Canada. The results of the activity will form an implementation plan which will be disseminated to local authorities as a proposal for action in combination with pocket parks.

## Target group

The main target group will be young professionals in the field of horticulture and high school students as in the photo (17-year-old high school student practicing horticulture around city orchards). This will be the core of the target groups. They will be the trainers. However, they will be facilitated by technicians in horticulture who will transfer their technical experience and skills,

The last group will provide the premises and supervise the Orchards. Citizens will be involved as trainees as well after the initiation of the course providing the place for the orchards and be responsible for them. There will be an assessment of the performance and the acquisition of skills at the end of the activity. The evaluation of potential urban horticulture will be the same time assessment of their trainers. Thus, two groups of trainers will produce initially one

professional and one of the level of technicians. The second will lack the scientific background of the experts; however, they will acquire all the essential skills.

The third group it is expected to be students participating on their environmental education and they will have less natural presence in orchards, but they will participate in distance learning mostly activities. There will be a provision for a small group to participate in natural presence activity and earn their certification of skills.

## Urban Farming

According to the USDA urban agriculture is defined as, “City and suburban agriculture [that] takes the form of backyard, roof-top and balcony gardening, community gardening in vacant lots and parks, roadside urban fringe agriculture and livestock grazing in open space.” Among the types of foods grown are vegetables, mushrooms, medicinal and ornamental plants, and fruit trees. Animal and livestock options in urban agriculture include chickens, fish, goats, and honeybees. The last one (honeybees) is one of the main activities of this Erasmus+ project. While urban agriculture is not defined by U.S. law, the 2018 Farm Bill (Agriculture Improvement Act of 2018, P.L. 115-334) refers to the urban farming demographic as urban, indoor, and other emerging agricultural production (Photo: Beehive, Konstantinos Perdikaris).

## Urban Horticulture

For the EU the concept of urban agriculture is not so clear and legally defined. Lohrberg et al (2018) describes the characteristics of urban agriculture in Europe and its origin, which can be traced back to the Ancient Romans. It deals with trade, industrial production, education, and the presence of legal systems and administration. It is not just food production in a city.

The world today has environmental pollution, climate change, drought; In the social sense, it is faced with problems such as hunger, unemployment and lack of social justice. The environmental and social pressure created by the modern life, in which man constructs himself separately from nature, triggers different problems in individuals. An example of this is what happened during the global epidemic that determined the fate of 2020.

The city is a dynamic concept that has had different meanings in different periods of history. Therefore, it is quite difficult to define it in a general way. Sociologists, historians, urban planners, lawyers, economists, etc. they make different definitions within the framework of their own discipline. Definitions are made using different criteria such as population size, administrative status, and structure of the population, division of labor and specialization, form of organization, differentiation in the field of function, sectoral distribution of labor force, physical texture, and structure of production. Throughout the history of urbanization, population growth has been the main reason for the growth of cities. In the historical process, the population of cities has increased all over the world depending on the changes in the mode of production, and while 9% of the world's population lived in urban areas in the 1900s, this rate increased to 40% in 1980

and 50% in 2000. It is predicted that this rate will increase to 66% in 2025. However, the phenomenon called urban sprawl has emerged mostly in recent years and for other reasons independent of population growth. Many different reasons such as economic development, increasing income, rising living standards, demand for larger living space, increased transportation and communication opportunities, and the loss of attractiveness of the city center are counted among the causes of urban sprawl. The above-mentioned factors cause the continuation of urban sprawl, even in cities with almost no population growth (or little population growth). During the last 200 years, rapid developments in human population and technology have increased human intervention in nature and pressure on the environment to great extents. Although urbanization and industrialization have gathered positive factors that contribute to the economic and social development of the society in cities, the cities that are shaped by human hands and spread towards the surrounding agricultural areas have created a serious pressure on the use of agricultural lands. It is also possible to define this process, which directly affects cities and the agricultural lands surrounding them, as the transformation of natural habitats that provide resources to people into settlements (Orpak, 2021).



A more balanced and holistic development requires that access to resources be equally easy for every citizen residing in each settlement. Accessibility of food as a basic source of life has always been one of the most important factors in determining human settlements.

However, as Rasouli reports, the distance between agricultural land and markets has increased rapidly with the emergence of industrial developments, agribusiness, cheap transportation and



food preservation technologies. Due to the shape of the built environment that exists today, food production systems are no longer included in the urban area (Rasouli, 2012).

This existing rural-urban divide is the main source of many problems we face in the world today. Climate changes, poverty and health problems are some of them. The damage to the natural environment in existing industrial food production systems, the low nutritional quality of agricultural products, and the high energy consumption due to long distances in food transportation lead to criticisms against these systems (Rasouli, 2012). On the one hand, the destruction of agricultural lands due to the pressure of increasing population and rapid urbanization and the increasing food security problem, on the other hand, the need for shelter of the increasing population and the environmental problems caused by this increase; Sustainable urban models and planning approaches have brought issues such as the integration of urban and agriculture, sustainable tall buildings to the focus of discussion of physical planning disciplines (Çarıkçı, 2019).

It is seen that the key concept emerging as the solution of the problems pointed out by the studies carried out in this context is “sustainability”. Although the concept of “sustainability” as a conjunction between human values and economic values has come to the fore in recent years, it has not yet become a permanent approach.

- Population growth of cities and migration to cities,
- the expansion of cities to encompass rural areas,
- inadvertent use of water in addition to the reduction of agricultural areas,
- due to the drying up of water sources,

It is clear that the products that find their place both in the country and in the foreign market will face the danger of extinction in the not too distant future. (Orpak, 2021).

The issue of protection of agricultural lands, which rapidly turn into land with rapid urbanization and urban expansion; Considering that the soil is a limited resource and the anticipated population growth and the danger of hunger in the future, it is of vital importance for the future of humanity (Çarıkçı, 2019).

At this point, there is a contradiction between the conservation of fertile agricultural lands to meet the nutritional needs of the increasing population, and the urban expansion approach and the conversion of agricultural lands into urban lands for residential use in order to meet the housing needs (Çarıkçı, 2019). At the point where the aforementioned contradiction arises, the design of regions consisting of "sustainable" cities with the principle of "more balanced, total development" can be effective in solving problems.



## HISTORICAL DEVELOPMENT AND DESCRIPTION OF URBAN AGRICULTURE

Urban agriculture is a very new concept and its history dates back to the first cities of history. It is known that Mesopotamia, Chinese, Indian, Inca, Aztec and Mayas from ancient civilizations established agricultural cities in order to meet their nutritional needs, and they did this in the nearest agricultural areas and even in small gardens in front of their houses due to the ease of access.

However, when we examine the concept more specifically and examine it on the scale of urban gardens/urban agriculture, first of all, the city of "Pompeii" in the "Roman period" presents us the best examples, since it is directly involved in the state policy, although the older ones are known.

In practice, the fact that each family has an average of 100 m<sup>2</sup> of agricultural land is proof that urban agriculture was practiced in the Mediterranean basin in the middle Ages (Mozes and Eizenberg, 2018). However, we understood what the concept is telling now, with the emergence of the industrial revolution in cities as a more sought-after and conscious agricultural activity branch. In England, between 1700 and 1800, garden cities were established in London with the aim of "creating an agricultural area in the city against an industrial city, using less concrete, dominating the urban space, preventing rent" (Kılınc, 2020), and it was especially clear that the workers working in the factories in these cities It is known that he built gardens to fight poverty and provide his own food sources. (Özkaya, 2009; Bulut, 2006; Yulu and Kapan, 2019, Kapan and Öztoprak 2020)





Although the city and agriculture are seen as two opposite activity areas, urban and rural activities developed together until the 19th century. With the Industrial Revolution, urban activities began to be defined increasingly through production relations, and the city and agricultural production were gradually separated. The spatial requirements of the industrial city and the high gains from the new economic order made it necessary for the urban area to be shaped by the activities of the said economic order. The city periphery, agricultural production takes place, has rapidly transformed within the framework of the location and employment requirements of industrial activities, and has lost its former function by becoming a part of the growing city. The industrial city did not only break the relationship between the city and agriculture, but also the employment requirement created by industrial activities and agricultural activities in the countryside negatively affected the composition of the workforce. In this period, high rates of population migration from rural to urban areas were ensured not only by the effect of economic change but also by the political processes that followed. With these developments, while the concept of urban poverty has become much more massive, the issues of food safety and security have started to be discussed with different dimensions that have not been discussed before.

The fact that the spatial requirements of the industrial city transformed the cities of that period in such a way that there was no room for any alternative proposals, allowed the development of ideas that required thinking of the city and the countryside together in the field of urban planning (Büyükcivelek, 2021). In this context, the first study to propose a design for solving problems was Ebenezer Howard's "Bahçeşehir" theory. In all of Howard's city proposals, 5/6 of the land is devoted to agricultural activities.

Howard's ideal city emerges in his book "Garden Cities of Tomorrow" published in 1902 and also in the diagrams he drew, according to which Howard generally showed a city consisting of a mixture of city and agriculture as an ideal city (Rasouli, 2012). It is understood that cities designed in this way will especially benefit from the balance of the population in terms of

resources and access to healthy food. However, it is emphasized in studies prepared on the subject that urban agricultural practices will have benefits beyond this. According to Rasouli, urban agriculture is a valuable tool for social equality and economic aspects other than access to healthy food. In general, urban agriculture envisages transferring food production activities from a certain number of existing production facilities to a large number of urban residents. Activities such as the production, processing, sale, cooking and recycling of local food are factors that provide income for families, support social participation and cohesion, and also reveal the cultural aspects of nutrition (Rasouli, 2012).

In the 20th century, it is seen that agriculture reflects the efforts of integration with the city within the framework of different needs and with new forms. Long-term famine conditions, natural disasters, wars, economic crises, epidemics, etc. It is observed that urban agricultural activities increase in periods when it is interrupted by processes such as

In terms of historical development, with the debates on renewable energy, environmental problems and alternative living in the 1970s, urban food production came to the fore; The foundations of urban agriculture, as it is understood today, were laid in the USA with the spread of community gardens in metropolitan areas (Rasouli, 2012). Community gardens, which are still in many cities of America today, enabled the use of abandoned industrial facilities in the city at that time and the efficient use of large empty lands in the city. It has also been used as a solution to the problems created by migration and urban renewal studies (Kanbak, 2018). Support programs implemented by governments have succeeded in taking the community gardening approach to different levels, and the “Urban Gardens Program” initiated by the “US Department of Agriculture” between 1977 and 1996 can be given as an example of programs that provide agricultural and technical support to urban residents. By the mid-1990s, the cities of New York and Philadelphia each housed more than 1,000 urban gardens that provided food and ornamental plants (Rasouli, 2012).

In sustainable (ideal) urban designs; urban agriculture or in other words agriculture in city field is recommended as a solution to many environmental, social and individual problems. If defined on this occasion, urban agriculture; “Agricultural activities in the city and on the periphery of the city include the production, distribution and marketing of food and other related products in the central areas of metropolises. At a broader view, these studies include community food security, neighborhood and neighborhood development, environmental sustainability, land use planning, agri-trade networks and food webs, agricultural land protection, and other related issues” (Rasouli, 2012). Based on this definition, urban agriculture provides an important perspective in the review of the rapid but uneven development of modern society in the context of different dimensions and in the development of a new development model. In a functional sense, urban agriculture is a dynamic process that can exhibit various agricultural activities and many functions together. According to Kanbak; “urban agriculture, which is a necessary part of the urban system in the field of food, economy and ecology; It has an important role in the integration of rural areas, urban peripheries, suburbs and urban areas. In addition to these functions, it also provides opportunities for local development, poverty reduction, food security, maintenance of biological diversity and the reuse of urban waste and wastewater.

According to Türker (2020), urban agriculture is a productive alternative food system that is responsible for the production, marketing and distribution of food products that contribute to the ecological, economic and social systems of the city, aiming at sustainable resource and waste management and the protection of human health. Türker (2020) defines urban agriculture as a productive land use that helps to improve urban poverty and urban food security, increase job

opportunities, reduce air pollution, waste management and increase urban biodiversity, and help create more sustainable and green cities.

The United Nations Development Program defined urban agriculture as:

“Urban agriculture is an industry, produces plants and animals by using soil and water according to the daily needs of consumers, processes, markets and distributes this production, and reuses natural resources and urban wastes by using intensive production methods”. Developing a more succinct definition (Koç 2003), on the other hand, defines urban agriculture as the general name given to agricultural activities carried out within the city limits, emphasizing the adaptability of urban agricultural activities to urban economic and ecological systems.

Urban areas, where more than half of the world's population live and increasingly populated, have responsibilities in producing creative solutions to problems, developing and implementing innovative policies with their human and technical capacities. Changing economic structure, production styles and relations and developing technological opportunities also change the life styles of the city. While the relationship between city and rural needs to be redefined, an area that has come to the fore in this relationship has been urban agriculture. While urban agriculture is seen as an important tool in the search for more livable and sustainable cities, it also offers solutions for many problems in urban settlements. Sustainable cities, smart cities, inclusive cities and renewable / green energy solutions integrated with daily life, efforts to reduce carbon emissions and work on improving the quality of urban life aim to make our cities more environmentally, socially and economically responsible and more livable. With all these discussions, it is not surprising that urban agriculture practices are on the agenda again and are adopted by policy makers. Urban agriculture touches on many debates and problems related to the world and cities, and offers different application areas and solutions for them.



Today, urban agriculture activities continue to develop as an inclusive field of expertise that brings together city planners, agronomists and engineers, sociologists, landscape architects, horticulturalists and logistics specialists who specialize in urban agriculture.



## BENEFITS OF URBAN AGRICULTURE

Considering that two-thirds of the world's population and 95 percent of Turkey's population will live in urban areas by 2050, the importance of ensuring food security in addition to livable areas with a high quality of life is indisputably accepted. Urban agriculture, which is the general name of agricultural practices in the city: It is a local system where processes such as production-processing-distribution-consumption-disposal and recycling take place in or around the city.

Urban agricultural activities have many environmental, economic, social and urban benefits. Urban agriculture offers many alternative activity areas that can be used to create an environmentally sustainable food production model. In addition, it can be easily designed with goals such as maintaining food safety and providing access to safe food. In particular, the advantages of agricultural yield increases to be provided by the use of urban technology and resources in terms of food safety seem to be important. It is seen that the realization of urban agricultural activities in cities, which are the focus of food consumption, also helps supply chains to be much more environmentally friendly. The positive developments, which are achieved by the decrease in the ratio of wheeled transportation systems in the total transportation, and which manifest themselves in the form of a decrease in CO2 emissions, attract more and more attention day by day. The transformation of the monocultural and large-scale production style specific to industrial agriculture systems into urban agriculture and multicultural small production mode is also extremely important for the sustainability and development of biodiversity and ecosystem services. From an economic point of view, urban agricultural activities provide many benefits to those who are directly or indirectly related to this activity branch. Urban agricultural activities can contribute directly to the producers by providing a part of their food needs. Since the production of urban agriculture is close to the urban areas where consumption takes place, it enables the supply chains to be shortened and the intermediaries to decrease, thus reducing consumption costs significantly. In addition to all these, as mentioned before, urban agriculture constitutes a new and developing area of economic activity. One of the most remarkable contributions of urban agriculture is realized in the social dimension. The contribution of activities to individual and community health is manifested in access to safe and healthy food, and a decrease in obesity and high blood pressure rates. The effect of being in urban agricultural areas, working in agricultural activities, touching the soil on improving the psychological state of people (horticultural therapy) has been confirmed in many different studies.

The use of urban agricultural activities as an educational tool in order to raise awareness of the society on agricultural production can be seen as a reason why the field of activity is not limited to fields only, but is diversified with school gardens and urban parks. Agricultural activities at the urban level not only bring people together and increase their socialization opportunities, but also help the development of a culture of participation and co-production (Büyükcivelek, 2021).

Considering the concepts of waste, environment and poverty in urban agriculture practices, it becomes obvious that the resources should be recycled without destroying the resources based on these three components. According to Tomar, who developed his thinking from this point of view; Urban agriculture practices also mean maintaining a balanced material flow cycle, which is the most basic rule in nature for the protection of natural resources in industrialized societies. For this, one of the methods to be used for the reuse of both industrial wastes and domestic and agricultural wastes is to produce compost from organic wastes and use the produced compost in



agricultural production (Tomar, 2013). Urban agriculture is also effective in terms of on-site evaluation of this organic fertilizer content, which consists of urban wastes, and thus plays an important role in eliminating environmental problems. Therefore, to be summarized with Rasouli's statements; "Urban agriculture, in addition to meeting the food needs of the society on a local scale, also has an increasing effect in different dimensions such as environmental sustainability, health, nutrition and social interaction. It also supports economic development, social participation, integration and empowerment by providing job opportunities related to food production activities on a local scale" (Rasouli, 2012).

Again, according to Kanbak; "Urban agriculture is in a sense the answer given to the lack of purchasing power of the people living in the city. It has many dimensions from local scale to economic development, poverty reduction, food security, reuse of urban waste, greening of cities and maintaining biodiversity, " (Kanbak, 2018). Therefore, urban agricultural practices; It stands out as an issue that institutions operating on multidimensional, inclusive and sustainable development should pay attention to.

Research conducted by various organizations and organizations such as WHO, FAO, UNICEF and APA in recent years shows that through urban agriculture, by increasing the accessibility of fresh vegetables and fruits, healthy and affordable food can be provided, especially for low-income families and individuals with limited food access. Urban agriculture also creates social awareness through health programs and nutrition awareness practices (Rasouli, 2012). Thus, it becomes possible to resolve the balance, which is tried to be achieved through methods such as direct social assistance, with a more participatory method. In addition, while urban agriculture strengthens the relationships, social participation and social interaction between different ethnicities and age groups with direct marketing strategies and community gardens, it can create positive effects on health and environment issues with the trainings it provides (Rasouli, 2012).

On the other hand, by establishing communication between farmers and consumers through direct marketing methods, it contributes to providing economic security to producers on a social scale. In addition to these, while urban agriculture provides mutual responsibility, trust, sharing, peace and friendship for social development, it also creates an alternative in terms of reuse of empty lands and in this way; It reduces the possibilities that pose a danger to society, such as committing crimes, illegal dumping and fire (Rasouli, 2012).

Finding fresh vegetables in urban areas is often difficult and expensive. However, the increase in urban farming areas allows everyone to have access to fresh and healthy food, regardless of socioeconomic status. When you go to the supermarket, you can observe that the tomatoes are not fully ripe. There is a period of 2-4 days between the harvest of the product and its arrival on the market. This will cause the product to break down prematurely. As a result, the product you buy from the market is not in the most ideal consumption period. In addition, the product does not have to travel 1000 kilometers. This reduces carbon emissions. In this way, less damage is done to the environment and customers consume organic, fresh products. The seller can demand a better price in return for this service.



Urban agriculture often enables idle and empty areas to be utilized and to participate in the economy. There is more green space in the city. The city is both aesthetically beautiful and its air is cleaned. Production can be made by evaluating small areas with methods such as hydroponic, vertical farming and roof farming. Urban agriculture needs small areas, its philosophy is based on this. In addition, infrastructure and installation costs are low.





Many vegetables and fruits rot and spoil before being sold in the market. Urban agriculture largely prevents food from being wasted. Since there is a constant circulation of fresh vegetables, people buy as much product as they can consume in a few days, thus preventing product wastage.

The use of water in urban agriculture is low. Water used once is used several more times. Compared to conventional agriculture, 70% less water is needed. In addition, irrigation in urban agriculture can be made from 100% rainwater with rainwater capture and storage systems.





As urban agricultural areas increase and grow, this will contribute to employment and the economy. Low-income and educated people can have a regular income with minimal investment in urban areas. People show more interest in the products produced in their own cities, and an atmosphere of solidarity within the city is created. Restaurants can reduce their costs by buying fruits and vegetables from the areas in the back neighborhood, not 1000 kilometers away, and thus local artisans can be supported.



According to Kanbak; “A full assessment of the impact of urban agriculture on the economy may not be possible, as most of its production is used for subsistence consumption”. Because the economic benefit is usually related to the market-oriented part of the products. Individual employment, profit from the sale of surplus products, savings in food expenditures are the main dimensions of the economic side of urban agriculture. Activities that create direct economic activity include large-scale enterprises and sometimes small-scale family businesses (farms) operated largely by private investors or producers' associations.

In addition, products include not only plant and animal food production, but also non-food products such as flowers and ornamental plants. In addition, it encourages individual and small-scale entrepreneurship, such as the production of necessary agricultural inputs, processing, packaging, marketing and transportation of food. Local and central governments play an important role in promoting urban agricultural activities, which have a much more pronounced effect on urban society than those living in rural areas. Local production is considered an important factor in urban agriculture, especially in terms of ensuring local development (Kanbak, 2018). Therefore, it is understood that community garden projects, which will be initiated by



policy makers at medium and large scales, will yield positive results in terms of economic sustainability.

According to Kanbak, “urban agriculture is an important step in the creation of sustainable cities that today challenge the loss of green space as a result of faltering economies, climate change, population growth, threats of natural disasters, increasing construction and urbanization trends” (Kanbak, 2018). Increasing agricultural activities in the city and its surroundings, on the one hand, contribute to the beneficial use of rainwater streams and reduce air pollution, on the other hand. It can prevent the reduction of biological diversity, which is one of the most important pillars of the ecological crisis, and ensure the continuation of the species. It also reduces dependence on fossil-based fuels and even electricity, as production requires less transportation and less packaging costs in the context of its proximity to the market (Kanbak, 2018).

In this context, the following point should be emphasized that while insufficient recycling in modern life disrupts the natural balance, domestic wastes can be converted into natural fertilizer material for urban agricultural areas in urban agriculture practices.

In this way, while a threshold is exceeded in terms of waste management and recycling, on the other hand, agricultural productivity can be increased. Thus, while a significant economic savings will be achieved in terms of efficient use of resources, its contribution in terms of waste management will turn into a significant positive environmental impact. In addition, the main reason for climate change and temperature increases, which is one of the topics that are discussed intensively today, is the destruction of green areas and the increase of concrete. In this context, urban agriculture practices will save cities from cold concrete appearances, while at the same time contributing to the provision of climatic balance by increasing the presence of green areas. Therefore, urban agriculture plays an important role in terms of environmental management, from reuse of organic waste and wastewater to reducing the extreme temperature in and around the city (Kanbak, 2018).

In conclusion, with these multidimensional effects, it can be said that the biggest contribution of urban agriculture practices will be towards nature. After all the positive aspects of urban agricultural practices listed above, it should be taken into account that each social practice may involve some risks. In this sense, urban agricultural practices also have some risky aspects. In this context, the risks regarding the cleaning of the products to be produced in terms of content and the reservations about the ownership and ownership of the common agricultural lands to be arranged are the factors that policy makers should consider in the field of urban agricultural practices. The proximity of urban agricultural activities to industry, traffic and other pollutants can be given as an example of these risks. Because soil and water as natural resources used for agricultural activities; industrial wastes and heavy metals, acids etc. they run the risk of contamination with other harmful substances. Producers and consumers may face serious health threats through the consumption of contaminated food if there is a lack of cleaning processes during use of the area (Rasouli, 2012). At this point, the need for policy makers to act with a large-scale planning in the management of urban agricultural areas comes to light.

Another issue that necessitates a large-scale planning is the possibility that the agricultural production to be carried out in the city may adversely affect the urban life with problems such as noise and odor. In addition, restrictions on access to water and insufficient funding are among the issues that can pose serious risks and problems for the success of urban agriculture (Rasouli, 2012). At this point, urban agriculture, as a recommended method for ensuring a sustainable urban life, should have sufficient resources to ensure its own sustainability. First of all, the suitability study of soil and water qualifications and qualities as basic natural resources

for agriculture should be the first steps in investigating the feasibility of urban agricultural practices. In addition to these natural ones, another risk that can be described as social is that it may cause disputes about the use of the land to be farmed in the city. In addition, since urban agricultural practices are open to the public, the danger of theft of food or equipment also poses a potential risk (Rasouli, 2012). As a solution to this; urban agriculture organizations can partner with local security forces and use specific practices in the design of their farm or garden. Investing in insurance is another way to replace stolen or damaged equipment, but there is no substitute for building positive social relationships.

In this sense, inclusion of the society in protection stands out as a more effective method. For example, the unenclosed urban farm gardens of "Walnut Way Environmental Protection", located in the Lindsay Heights neighborhood of Milwaukee, are jointly protected by staff and neighbors who share the crop harvest. Business personnel included in the program implement an open-door policy during the daytime and evening hours, organizing cooking, gardening, yoga classes and evening events; thus, it provides an important example for hybrid application (Rasouli, 2012). This participatory method stands out as an example of good practice as it incorporates the environmental, economic and social aspects of urban agriculture together. The success of urban farming practices, as in traditional rural farming, depends on various factors (Rasouli, 2012). These include climate, weather, light, insects, land and other growing areas, land tenure, healthy and clean soil or other growing environment, water, labor, operating funds, financial and technical support, agricultural knowledge and skills, processing and transport infrastructure, distribution channels, consumer demand, suitable markets. Planners and local governments for the implementations;

- Access to work areas,
- Land use rights and policies,
- Should calculate the financial and technical support opportunities in detail, and in addition, organize the necessary training programs to increase agricultural knowledge and skills,
- They should plan public policies in areas such as production, processing, distribution and transportation infrastructure.



## TYPES OF URBAN AGRICULTURE APPLICATION

The concept of "urban agriculture" has come to the fore again due to the necessity of meeting the need for sufficient safe food, which is of vital importance, which arises with the decrease in agricultural areas due to urbanization and population growth. Types of urban agriculture are within the city and at the periphery of the city, according to their location; According to the production area, indoor spaces, residential gardens, public/community gardens, gardens belonging to public buildings; According to their size, they are classified as residential gardens, public/community gardens, commercial gardens, and urban farms. Urban agriculture is defined as an entrepreneurial activity that provides easy access to low-cost and quality food for people of different income levels. Urban agriculture can be an important part of urban development, while providing recreation opportunities for high-income groups, it can also be a source that provides more nutrients to low-income groups. It means fresher and cheaper food and more green space for the people of the city. A possible solution for urban problems with multifunctional urban agricultural areas, increasing the visual landscape quality with the green areas added to the city, providing cheaper and fresh food with on-site production-marketing, and horticultural therapy (treat with nature) feature that offers recreation opportunities to people and brings them together with nature. (Açıksöz, 2001).

Urban farming can be done in almost all cities. It can be done in parks, gardens, apartment roofs, areas close to places such as restaurants, schools, factory yards, that is, anywhere imaginable. Vertical Farming Although the development of skyscrapers or tall buildings is largely attributed to modern urban planning, it is obvious that technological, social and economic developments are also effective behind this situation (Çarıkçı, 2019). It can be said that the need for housing, which is basically the result of migration from rural to urban, triggers this situation. In recent years, complaints have been made that high-rise buildings do not make themselves and their environment sustainable, and sustainable high-rise design criteria have been developed. Criticisms of tall buildings can be listed as follows (Çarıkçı, 2019).

✓

Creating unhealthy conditions in the city by blocking the sunlight, air and view of the buildings and living things around them,

✓

Bringing traffic and infrastructure burden to the city due to the high number of users,

✓

By changing the wind movements of the area where they are made, causing the formation of strong winds that are disturbing for pedestrians,

✓

High initial investment and usage costs in terms of heating, cooling, ventilation and lighting systems,

✓

High energy consumption,

✓

Negative effects on the health of the people living in them with the artificial living environments they offer, etc.



First of all, vertical garden applications, which are thought to be a method of positive evaluation of the buildings that have gradually risen due to the gradual increase in the urban population and the cities having one or few centers, have come to the fore as a result of the above-mentioned criticisms.



Hanging Gardens of Babylon (Ministry of Education, Agriculture Lesson Material)

Although vertical farming is a method inspired by the Hanging Gardens of Babylon and promoted by future-oriented terms such as "biophilic design", the cost of converting existing buildings limits its spread. In this sense, the realism of the method, which can be applied in a holistic sense with a national acceptance, can be investigated for established cities. It should also be noted that this method is seen as a component of vegetative landscape applications rather than agricultural production. While it may be possible to apply this method despite all its costs in geographies with soil shortages, the necessity and appropriateness of its application in Turkey is controversial. More research should be done on the subject.





Vertical farming is the work of growing plants by placing them on top of each other rather than in a large area. Vertical agriculture, which helps to obtain more efficiency from small areas by placing objects such as shelves and pallets on top of each other, exactly overlaps with urban agriculture. Vertical farming can be done in almost any field. (abandoned factories, subway tunnels, etc.) Examples of this are areas where temperature-humidity is controlled, along with other urban farming methods such as aquaponics and hydroponics. With vertical farming, an area of 100 square meters can be transformed into 500 square meters of land through vertical positioning. Buying 5 units of product from 1 unit can also be one of the features that make vertical agriculture attractive.







**Flowing Water Culture Mechanisms (Hydroponic and Aquaponic Systems)** The hydroponic system is a soilless farming practice in which plants develop by acquiring nutrients from liquid solutions. In the system, in which the roots of the plants are placed in nutrient solutions, the conversion of the liquid solution and the monitoring of the required nutrient requirement are ensured (Jeff, 2016a). Thus, the substances needed by the plant are supplied to the plant roots in a water-based mechanism. By establishing this mechanism in open environments; other needs of the plant can be provided from the sun, as well as with artificial lighting indoors. The aquaponic system is the system obtained by taking the first one a step further by including fish in the hydroponic system. In this system, while the fish produce wastes with high nutritional value for the plants, the water of the aquarium remains livable for the fish at all times, since the plant roots also act as a filter for the water reaching them (Jeff, 2016a). Thus, natural wastes are used in the development of plants and included in the natural production process, in addition, soil is saved as a resource. As a result, flowing aquaculture mechanisms can ensure the continuity of agricultural production, especially in urban areas with soil and water shortages, and can also be the beginning of a new production model within the farm fishery sector.





Hydroponics is the name given to the method of growing plants without soil. The water contains substances that feed the plant and natural fertilizers. These fertilizers allow the root of the plant to regenerate and grow. Substances such as gravel and pearl stone can also be added to the water to physically support the root of the plant. Since water can be used repeatedly in hydroponics, water savings are achieved. Soilless agriculture can be an alternative method in areas where the soil is unsuitable and unproductive.





Aquapony is actually one of the methods of raising fish. It provides a mutual relationship between the fish and the plant. Fish produce ammonia after the food they eat. The beneficial bacteria in the water convert ammonia into useful nutrients for the plant.

Plants take up these nutrients. In other words, fish excrement acts as fertilizer for plants. Since the water in the system is subject to continuous circulation, this process works continuously. Sea bream is one of the most commonly grown fish species in aquaponics. Plants such as lettuce, arugula, parsley, tomatoes, cucumbers, peppers can be easily grown in aquaponics.

Farming can be done in an open field that is not suitable for cultivation, or even in cargo containers if better protection from pests is desired. The container can be easily transported to the desired location. Light and temperature control can be done better inside the container. This ensures that more efficiency is obtained from the unit area. In this method, vertical farming technique can also be applied by shelving the inside of the container. Plants such as mushrooms and greens are often grown in containers. These products do not take up much space and their profitability rates are higher than other plants.





If the living building has a large terrace and communal area, or if you live in a house with a large balcony, farming can be done on the terrace, on the roof, on the balcony. Vertical farming can be done on terraces as well as classical farming with soil. However, the soil carried to the roof of the building can create serious weight. For this, it is essential to make sure that the building structure is suitable. After carrying the required amount of soil to the terrace, any desired plant can be grown.







One of the most ideal products for urban agriculture is mushrooms. Inoculated fungi cover the entire bag after the incubation period. By making holes in the plastic container, air is provided and the mushrooms begin to "patter". When growing mushrooms, the growing area must be clean and uncontaminated. Again, the temperature and humidity of the mushroom growing area must be at the most optimal level. If the humidity is too low, the fungal roots dry up. If there is too much moisture, the roots will rot. For this reason, fans and air conditioning systems must be used to regulate the air flow.





This method is also known as sprouting vegetables. It is possible to grow all kinds of potted plants with this method. In this method, the harvest time is very short. In other words, it is possible to grow a plant that normally grows in 90 days with this method in 15 days. Although micro plants are very small, they are extremely nutritious. For this reason, people who pay attention to their health prefer these plants as salad material. In addition, chefs make frequent use of microgreens when decorating dishes. It is essential to pay attention to factors such as light, heat, humidity to get more yield from microgreens that can be grown even in a single room or container.



With the right urban farming techniques, it is possible to make enough money from an average sized garden. If the home garden is of average size and sitting idle, plants can be grown in the garden. Since the area is small, it would be more accurate to grow plants with high sales prices.





In order to do urban agriculture, there is no requirement for the city to have a certain population ratio. There is no general rule about where to do urban agriculture in the city. Backyards, patios, abandoned fields and structures are suitable for urban farming. In some cities, private lands have been allocated for people to farm.

Due to the legal regulations, it is very difficult to keep chickens, sheep and cows in the city. However, it is easier and ideal to grow vegetables-fruits-fish-mushrooms. In this respect, it would be more logical to start with mushrooms and microgreens. It is also very easy to grow vegetables such as spinach, parsley, arugula, pepper, cucumber.





Cultivating products that are not easily found in urban agriculture provides a competitive advantage. That is, it is important to carefully select the vegetables to be grown. It is important to sell the selected product at good prices and to conduct market research on this subject. For the urban agriculturist, it is vital to market the products grown and to make the environment. People are sensitive to organic and locally produced products. Good advertising, establishing relationships with restaurants and markets in the city and trying to sell products to them can be profitable.



The roof garden at the InterContinental New York Barclay Hotel, where beekeeping is also practiced, is one of the earliest examples of urban agriculture. Honey produced by Midtown bees is used in the hotel's kitchen.





City Farm, a Chicago nonprofit, sells fresh produce during the summer and fall and offers community-supported farming shares to city residents.

City Farm produces 25,000 kilos of tomatoes, carrots, beets, arugula and medicinal plants annually. The farm provides economic opportunity and attracts volunteers and visitors. Many of the restaurants in the area get their ingredients from City Farm.



Wheelchair; 2 American entrepreneurs broke new ground in the world by filling the back of a vehicle with soil and planting tomatoes in it. These two friends moved the wheelhouse from one neighborhood to the next to give city kids a chance to get their hands dirty and to show them what food looks like on the ground.



Curtis Stone is a social media phenomenon famous for urban farming. It has introduced itself in the field of urban agriculture with informative and entertaining video content. Curtis Stone, who is a farmer in Kelowna, Canada, is known as an important person who should be followed by anyone interested in urban agriculture.





Operating in London, FARM is a company that provides consultancy services on many issues such as terrace farming, aquaponic fish farming, container farming. FARM: It has been continuing its activities since 2010 to instill urban agriculture awareness in the people of London.



In Tokyo, an employee is able to harvest vegetables grown in the office. The company called Pasona Group has created cultivation areas to be intertwined with nature, to encourage and improve the working environment. During lunch breaks, employees can deal with vegetables and fruits.





Research shows that urban agriculture appears to be the future of sustainable agriculture. Thanks to urban agriculture, many empty spaces such as gardens, roofs, terraces and balconies will be transformed into gardens.







Community gardening seems to be an application method on a scale that local policy-making institutions can include in city or regional plans. Community gardening is basically the design that envisages sites consisting of buildings constructed around a central garden that includes a vineyard, cultivated and planted land, and a livestock farm. These are classified as small-scale applications covering around a hundred houses, medium-sized applications designed for 100 to 1,000 homes, and large-scale applications enclosing more than 1,000 homes (Jeff, 2016b). In this sense, it is considered that community gardens will create production-oriented areas that can be used in the designs of neighborhoods to be established especially in the peripheries of cities. In today's world where migration from village to city is intense, this method, which focuses on production instead of unplanned squatting due to livelihood problems, will reduce social problems such as involvement in crime, in addition to the added value it will create. To begin with, community gardens have been produced as a solution to the problems caused by migration and unsuccessful urban renewal works, enabling the evaluation of abandoned industrial facilities in urban areas, the efficient use of large empty lands in the city (Rasouli, 2012). In this respect, community gardening emerges as an appropriate method in the efficient use of empty spaces between existing living spaces, beyond the newly designed neighborhoods.

In this sense, the method expressed as "horticultural therapy" in the foreign literature seems to point to the possible benefits of these gardens, which appeal to the society, for individuals. Devita Davison, a community garden farmer from Detroit, says, "These aren't just patches of land where we grow tomatoes and carrots. In addition to healthy food, we built a social bond" (Keskin and Yıldırım, 2020). We briefly summarize; all the above-mentioned are benefits of community gardens.





Example applications

## GOOD PRACTICES IN TURKEY AND IN THE WORLD

In the USA, Lynchburg Grows (Lynchburg, Virginia), Kansas City Community Farm (Kansas City, Kansas), Earthworks Urban Farm (Detroit), Green Youth Farm (Chicago), Red Hook Community Urban Farm (New York), Growing Power (Milwaukee) ) and Hollygrove Market and Farm (New Orleans) are among the successful examples of emerging hybrid urban agriculture (Rasouli, 2012). In this sense, the USA, which is understood to have succeeded in blending commercial and non-commercial applications, seems to have succeeded in spreading the applications to different areas of the country as a result of early experimentation. “Aurora” by “Denver Urban Gardens” and “DeLaney Community Farm” projects located in Colorado, which can be shown as examples of good practice in the USA in this sense, for low-income and other residents in the region provide access to fresh fruit and vegetables, as well as provide Nutrition Training. It also provides educational opportunities. These training programs cover a wide curriculum on topics such as growing, preparing, cooking and sharing within the food production and consumption process (Rasouli, 2012). Thus, it is understood that in the regions where the practices are carried out, employment-oriented courses are also provided in business lines such as gardening and cookery, as well as the opportunity to access healthy food. Canada is one of the countries where urban gardening is done intensively. As Ayman stated; In 2000, tens of tons of fruits and vegetables were produced in Montreal with the joint efforts of approximately 11,000 residents. While half of these products are working in the gardens; the rest was used in the kitchens of schools, hospitals and local organizations. When we look at European countries, urban agricultural practices should be considered together with healthy eating culture. In this context, Italy is leading the "slow food" movement developed against the concept of "fast food" today. “Slow food” as a comprehensive concept of nutrition; It encourages concepts such as raising, cooking and eating for families, communities and the world (Yılmaz, 2015).

Sustainable agriculture trends are growing in France and Germany, and these developments also include urban agriculture. This is because communities want to be able to meet their own

nutritional needs. In Denmark's developed "co-housing" programs, it is aimed that communities can provide their own food production. There is a highly developed consumer-supported urban agriculture movement in Switzerland (Yılmaz, 2015). Therefore, it is seen that urban agriculture practices are given importance in every corner of Europe, regardless of development differences. According to Yılmaz, the Netherlands has a long history on urban agriculture, apart from the other European countries listed above.

Urban agriculture in Girona, Spain, started as a social-based project rather than an economic one, but over time it has evolved into an alternative economy for those living in the city. Especially during the 2008 economic crisis, these areas became a trend in Spain. As a matter of fact, whenever a crisis broke out, all societies found the solution by trying to eliminate food shortages by producing in the existing fields next to them. In Girona, the support of the local government has a large share. The municipality bought about half of the houses in the area by renting from private ownership. When people apply to the municipality and meet the necessary conditions, they can become the owner of the parcel. Here, the person can consume the product he has planted in his garden (Hazar, 2016).

In line with the examples experienced in all these countries, it is seen that the history of urban agriculture is very old and it is made for various purposes in many countries. Urban agriculture has been the answer to different needs, from healing gardens to employment, from reducing the effect of the heat island to medical use. Urban agriculture rates are increasing every year with rapid population growth and accompanying food supply. The percentage of urban families engaged in agriculture in large cities increased dramatically in the 1980s and 1990s in the importance of urban agriculture worldwide. (Smit, Nasr, & Ratta, 2001; Lee Smith & Vd. 1985, Kapan and Öztoprak 2020.)

Urban agriculture, which is actively carried out in the world metropolises, is also needed by the cities of today's Turkey. Since Turkey is a country that receives refugees to a degree that will change its production and consumption balances and the population density is higher than expected, especially in recent years, solutions are sought and policies are formed in all types of economy. While creating these policies, it should not be forgotten how important agricultural production is and that it should be directed to urban agriculture. According to the United Nations reports, it is obvious that access to food will gain more and more importance in cities with large populations, as the urban population will increase rapidly around the world (Kapan and Öztoprak 2020).

When it comes to urban agriculture in Turkey, most of us first think of bostans, which date back to ancient times. From the Byzantine to the Ottomans, from the Ottomans to the present day, the bostans that continue to exist along the walls of Istanbul and in various areas; With its urban agricultural activities, it has become the first center of local production for Istanbul. When we look at the historical process, different agricultural methods are applied in each garden and agricultural area in Istanbul, and the product they specialize in has also differed. For example, Arnavutköy is famous for its cherries, Çengelköy for its cucumbers, and Yedikule Gardens for its lettuce (Kanbak, 2016). Yedikule Gardens, whose history dates back 1500 years, is an example of urban agricultural lands from the Ottoman and Byzantine periods (Sezen, 2018). Until the 17th century, the existing agricultural lands in Istanbul could feed the city, but then the population of the city of Istanbul increased and the agricultural lands in the city gradually disappeared. "Langa Bostans (Mustafa Kahraman, 2018)" living in this situation under a street name, has met the food needs of Istanbul until it was opened for construction in the 1950s (Şirin, 2018), which has a 700-year history in Istanbul, Kuzguncuk Orchard. It is known that it continues to exist as an environment where urban people socialize (Sezen, 2018). Over time, due to various reasons



(such as the world wars), the area of the bostans has gradually decreased and it has faced the danger of becoming a road with the threats that have recently come to the agenda.



Yedikule Gardens located on the Castle Walls



Historical Grand Vizier Bayram Pasha Garden, one of the Suriçi Gardens between Yedikule Gate and Belgrade Gate



View of the garden from Piyale Pasha Mosque, Piyale Pasha Mosque orchard

In Turkey, especially since the 1950s, the urbanization process has shown a rapid increase. With this effect, agricultural areas in the city centers were occupied and agricultural lands were pushed to non-agricultural use. Thus, new agricultural areas were tried to be gained by opening the forests that are already land (Özdemir and Kardoğan, 1996). Cities that developed after agriculture ceased to be the main sector and were replaced by another economic activity, gradually expanded horizontally to the detriment of agricultural areas. Cities that expand and grow as they move away from the center generally push agricultural areas out of the city (Dinç, 2020). With the gradual increase in industrial activities in Istanbul, many problems such as excessive population growth, unplanned urbanization and pushing agricultural areas out of the city came along (B. Akova, 2012). Inevitably, with the overpopulation of Istanbul, agricultural areas have almost disappeared, while industrial facilities have been established in the agricultural lands in its vicinity and fertile lands have been destroyed. In the second half of the 20th century, the effects of urbanization in Istanbul were very heavy compared to many other settlements. Istanbul has undergone a rapid spatial transformation in terms of economic, demographic and cultural aspects. This change has started to develop especially against agricultural areas (Bayar, 2018). Today, urban agriculture is still an important source of income in the neighborhoods of the districts in the north of Istanbul. In the villages of Sarıyer (Gümüşdere), Beykoz and Çatalca (Kızılcaali), greenhouse farming, animal husbandry, floristry, etc. produced and used for domestic consumption. In addition, it is seen that agricultural production is carried out in Istanbul, but the amount of production is insufficient for domestic consumption.





A view of the city with open and covered agricultural areas from Aydos hill, Istanbul



Sariyer Gumusdere Gardens

The orchard, which is one of the green areas of Istanbul and has been preserved in Kuzguncuk District for 700 years and continues to produce, is protected by the Kuzguncuklular Structural and Formative Framework of Urban Agriculture Association in Turkey and the residents of the neighborhood. This area, formerly known as İlya Garden, is used for agricultural production and also serves as a social gathering area. With the initiative of the architects from Kuzguncuk, an alternative project for the garden was developed, preserving its current use, and dreams such as children's workshops, resting areas, walking trails were established, and various alternatives related to this area were developed with the permaculture design and shared with the locals. On certain days of the year, festivals and production days are held in the garden (Sayan, H. S., 2014).

Yedikule Gardens in Istanbul and Meram Vineyards in Konya can be counted among these sources of inspiration. Beyond these orchards and vineyards, which are designed for the production of vegetables and fruits in the cities, today there is the possibility of growing medicinal and aromatic plants in the city as another form of application. Plants used as raw materials in the fields of pharmacology and cosmetics are in a position to be the locomotive of a developing economic sector in our country. In the Western Mediterranean Region, especially in Isparta, medicinal and aromatic plant production, which started with rose, has been continued with lavender in recent years. The production areas of plants such as sage and fennel are also increasing. In another region of Turkey, in Kocaeli, it has been observed that the Metropolitan Municipality has planted medicinal and aromatic plants in a wide area that can be considered in the city periphery with the "Medical Aromatic Plants Project (TABIP)".

It is one of the characteristics of urban agriculture that the healing properties of the soil are used on the groups that need the most help in the society. It is seen that this effect is applied especially in prisons. In Turkey, especially in Metris Penitentiary Institution and Foça Open Penitentiary Institutions, convicts are prominent among the institutions that benefit from the healing effect of soil by engaging in agriculture. Trying to rehabilitate convicts by farming and reintegrate them into society is one of the most prominent features of this and other prisons. In addition, while the convicts work on the land and relax, they can also make a living with the income obtained from agricultural activities and have economic returns.

Another purpose of urban agriculture is the use of these agricultural areas for healing/medical purposes. The first medicinal garden of Turkey is the Garden of Medicinal Plants located in Istanbul Zeytinburnu. The main objectives of this medicinal garden are to study plants, to help the public to recognize these plants and to cultivate medicinal plants. At the same time, he produced various products (ointment, cream, perfume, cologne, soap, oil) that we use in our daily life in this garden, which also includes a laboratory. This garden, which is open to public visits, provides an opportunity for people to meet with nature, with its easy accessibility and is another example of an urban agricultural area.





Zeytinburnu Medicinal Plants Garden



While green roof applications, which are included in urban agriculture activities, come to the fore in the field of landscape in our country, they are one of the important application areas of urban agriculture abroad. Green roofs, which have many examples in the world, are applications that remind people of nature in the most crowded places of the city, while reducing the CO2 rate and making them breathe in real terms. It is possible to gain the soil lost as construction area throughout Istanbul by using it on the roof. Although green roof applications (Bahadır, 2010) are not common in our country due to insufficient budget allocation and deficiencies in environmental policies, there are examples. It is usually seen on shopping mall terraces with roofs covering large areas. As an example of green roof applications; Zorlu Center AVM (Having the title of Europe's largest green roof project with its green roof of 72 thousand m2, where different plant species are grown) Kanyon AVM (It offers green space to those working in the region where the central business areas are located, especially during busy working hours, and also with greenery covering a large area, It alleviates the urban heat island effect, which is further increased by the skyscrapers in the region, and contributes to air quality (Bahadır, 2010).

Akmerkez AVM (home to about 100 kinds of plants on the roof of Akmerkez. Both medicinal plants and edible seeds are grown. Along with the triangular terrace on the roof, it also offers a recreational area to those who come here).





Examples of Green Roof applications (various shopping malls in Istanbul)



Examples of green roof application

Roofs, like the conceptual transformation of agriculture, are in change in ecological and conceptual terms. While the roof is a generally unused area, it is currently undergoing a transformation that can be used as an activity and living space (Tohum, 2011).

The “Soilless Agriculture Research and Application Greenhouse” project, which was initiated in 2017 with the cooperation of Yıldız Technical University and Istanbul Metropolitan Municipality, was converted into a soilless agricultural field by restoring the unused greenhouse area in the Davutpaşa Campus of the university. This modern greenhouse is very important as it is the first example of soilless agricultural areas in Turkey in the metropolis.



“Soilless Agriculture Research and Application Greenhouse” established with the cooperation of IMM and YTU

One of the main and essential elements of the purpose of urban agriculture is gardening activities and the execution of agricultural production. In Istanbul, the products grown in gardens, orchards and greenhouses provide both a small part of the food needs of the people of the city and economic gain to the people who make it. Istanbul is a greenhouse and similar place, very suitable for agricultural production in terms of climate and environment. Especially in the districts with less population in the northern parts of both sides of the city, greenhouse cultivation, daily vegetable production and greenhouse activities are common. These agricultural areas are mostly family-run type and plastic cover material is preferred as material. Plastic greenhouse material is preferred because it is economically cheap, but the yield is to that extent.





A view from inside the greenhouse in Gümüşdere

Despite the significant developments in agriculture, there are some problems in front of the development of this sector, which is vital for the country, and countries need to solve these problems in order to be among the developed agricultural countries (Timor et al. 2018). To give an example, Beykoz, which is one of the districts where agricultural production is made and has problems in Istanbul, is located between Paşabahçe and Anadolu Kavağı. In Beykoz, which stands out with its nature and greenery, approximately 20 villages make their living from agricultural production (agriculture, stockbreeding and fishing) (Özer, 2012). Various studies are carried out to increase and encourage agriculture in Istanbul. With the Agriculture Workshop held in Beykoz at the beginning of 2020, many issues about agriculture were discussed in Beykoz, the central candidate of urban agriculture (Kapan and Öztoprak 2020).

The small-scale City Gardens of Nilüfer Municipality, which was built in Nilüfer district of Ürünlü neighborhood, the construction of which started in 2015, was completed by the end of 2015 and opened on April 14, 2016. In this area, each of which is divided into 64 m<sup>2</sup> parcels, the most important goals of this project are to bring together the citizens of the city with agricultural production, to experiment with natural and ecological farming methods and to produce local seeds. In the area where vegetables, grains, legumes or medicinal aromatic plants were tested, it was also possible to offer alternative products to the local farmers. The 5,000 m<sup>2</sup> production area of the city orchards built on an area of approximately 6.5 decares is divided into 67 parcels. In these plots, variety trials, mainly on vegetables, and local seed production are carried out, as well as practices with Nilüfer Municipality neighborhood committees, Environment-Agriculture communities, kindergarten and primary schools, university students, and the disabled. In 2017, Medicinal Aromatic Plants parcels were created in the bostan and 2 Beehives were placed. Approximately 15,000 seedlings were grown in two seedling greenhouses, one-third of them were planted in the garden, and two-thirds were distributed to the public. Activities in the city's orchards continue in summer and winter.





## Nilüfer City Gardens

In the Çiğli district of İZMİR, the municipality has implemented the first phase of the 'City Gardens' project in order to support low-income families with vegetables and fruits. The first implementation of the 'City Gardens' project, developed by Çiğli Municipality Agricultural Services Directorate, was started in Ahmet Efendi District. Weeds were cleared on 100 square meters of empty land, and seeds were planted after soil and fertilization. It is aimed to share the products obtained from the land, whose maintenance and irrigation works are carried out by the municipality teams, with low-income families living in the same neighborhood.





In the study named "Çankaya Healthy City Projects 2014-2019", which includes urban agriculture initiatives carried out by Çankaya Municipality, there is an example of "Mutlukent Neighborhood Garden and City Agriculture Hobby House" with a healthy city theme. In the Kent Agriculture Hobby House, which has been established, informative theoretical and practical trainings are provided for people living in the area on issues such as growing agricultural products and gardening (Çankaya Municipality, 2019).

Çiğdemim Mahalle Orchard This orchard, which was implemented as an urban agriculture practice, is located in Çiğdem Mahallesi, Çankaya District of Ankara. Çiğdemim Association set out to produce its own natural products in the neighborhood with the contribution and support of the Permankara group. In this project, started to work in 2012;

- To show that organic, natural product cultivation in the countryside can also be done in the city center,
- To raise awareness in the society on this issue,
- To share basic information about natural product cultivation, to gain skills, to help children and young people gain product cultivation habits,

It is aimed to introduce plant species (Kayasü and Durmaz, 2021)



Çiğdemim Neighborhood Garden

## CONCLUSION AND RECOMMENDATIONS

Urban agricultural areas are also areas that allow recreational activities and socialization. It has been observed that during the epidemic period, it has positive effects on the physical and mental health of the urban people who have the opportunity to meet with nature in production landscapes such as urban agricultural areas.

Reasons such as industry, traffic and high population density in urban areas cause water, soil and air pollution. One of the biggest challenges for urban agriculture is ensuring food security in these polluted environments. Because there is a risk of contamination of soil, water and air to be used in agricultural activities with heavy metals (cadmium, chromium, zinc, copper, nickel, mercury, manganese, selenium, arsenic, etc.) and pathological organisms. In addition, urban agriculture has risks due to animal diseases, post-harvest pollution from food processing and marketing. In this sense, in the report published by the Food and Agriculture Organization (FAO), suggestions were made to reduce the negative effects of urban agriculture on health and environment. In summary, it was emphasized that measures (health risks and related management practices, zoning, farmer training on quality control of irrigation water and products) should be taken to reduce the health and environmental risks of urban agriculture.

Planning and design for urban agriculture can be summarized as a result that can be produced in countless types in relation to the creativity of the designer and applicability. Therefore, there is no standard design to be developed for urban agriculture, nor a single result to translate into a template. Factors such as the size of the area where urban agriculture will be made, its location, soil characteristics, and the climatic conditions of the region should be examined, and the type of product, irrigation technique to be used, and fertilization applications should be decided.

It is recommended that plant species suitable for local conditions be grown in season and under hygienic conditions by reaching local seeds without using chemicals. Before starting urban agriculture, it is recommended to get support from experts for healthy food production, taking into account the sustainability of natural resources such as soil and water, to investigate good agricultural practices suitable for the climatic conditions of the area to be evaluated within the scope of urban agriculture, and to carry out agricultural production with a climate-sensitive approach, taking into account climate change.

Considering climate change, natural resource consumption and environmental threats, which are a global problem, there is concern for the future of new generations. Today, traditional urban agricultural practices may be insufficient in solving problems. For this reason, innovations are needed to build a more livable future and to offer social and economic opportunities in addition to this. Innovative urban farming practices, including open-air farms, vertical farming, roof gardens, greenhouses, interior design, are on the agenda. Innovative applications in urban agriculture; It has advantages such as safe harvest, low energy use, low labor cost, low water use, low transportation cost, wide product range, maximum product yield and increase in growing area. ZFarming approach; It covers many innovative forms such as roof gardens, greenhouses in roof gardens, renewable green walls, indoor farms, vertical greenhouses (productive facades) and all kinds of food production related to urban production. Urban agriculture, which is a multifunctional activity and land use, is often excluded from urban policies.



Urban agriculture is a subject whose importance has not been fully understood in the world and in our country, and its deficiency has been identified in academic studies. In fact, it started with the beginning of agriculture, but from time to time, depending on the environment and conditions, it has come to light again today and its importance has been understood. It has been observed that urban agriculture has come to the forefront by people, especially in the years when they were in epidemic, war and economic difficulties. It has been determined that urban agriculture, which can be shaped according to the development profile of the countries and the expectations of the people, is made in seven types for certain purposes in certain countries as a result of the information obtained.

In general, we see an increase in urban agricultural practices since the 1900s. The most obvious reason for this is the increasing need for food with the increasing population and the decreasing lands inversely. As the city gets crowded, empty spaces are decreasing. The important thing is to evaluate the available space in large populated cities and add it to urban agricultural land. In our country;

1. To socialize and spend time,
2. Green roof applications,
3. The healing property of the soil,
4. Medicinal use of gardens (healing),
5. Hydroponic farming practices,

It is seen that it is used and applied in 6 types for the purpose of carrying out horticulture and agricultural production.

Although striking examples can be seen in the world, urban agriculture in Turkey is unfortunately not at the desired level. First of all, financial support should be provided and it should be included in the policies in terms of law and should not be pushed into the background.

In agricultural irrigation, water can be given to the soil by different methods and systems. Today, the importance of using irrigation systems that will not cause less irrigation water, less labor, drainage and salinity problems, and increase yield and quality is increasing day by day.

In recent years, more water and energy savings have been made in the world, especially with the developments in the plastic and machinery industry. Thus, more economical and more effective new irrigation technologies have been developed.

The drip irrigation method in irrigated agriculture in our country has been used intensively in recent years. The most important factor in the rapid spread of the drip irrigation method is the high yield increase in the products taken from the agricultural areas irrigated by the drip irrigation method, as well as the premium payments due to the quality increases, the decrease in the use of fertilizers, the decrease in the use of pesticides due to the reduction in diseases, and most importantly, limited consumption of pesticides. The irrigation water resources are used much less than other methods.

However, there are some negative effects of tap water usage in city farming. Tap water contains chlorine, which can be harmful to plants. Although chlorine is very effective at eliminating harmful pathogens, it can damage plant leaves and cause them to turn yellow. It may also kill helpful microorganisms in the soil that help vegetation to absorb nutrients. Tap water also contains minerals like calcium, sodium, and magnesium, which can build up in the soil and make it difficult for plants to absorb nutrients. Sodium in particular can create problems. Plants absorb

significant amounts of nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, and silicon from soils. Finally, tap water can contain high levels of fluoride, which can damage the roots of plants. For these reasons, it is recommended to harvest rainwater instead and use it for irrigation.

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