

Urban Farming and Vegetable Production

Prof. Dr. Lutvija Karic
University of Sarajevo



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The role and importance of arable and vegetable garden production in urban agriculture

- Urban agriculture appears with the establishment of the first cities in Mesopotamia.
- The proximity of food was crucial for the survival of early cities and necessary for any kind of growth and prosperity.
- Today, according to the FAO, about 100 million people are involved in urban agriculture on planet Earth.
- The largest number of urban farmers and professional farms located in Asia.
- In BiH, food production on gardens and gardens has a long tradice and is closely related to the specific elements of urban settlements - houses with garden and wall.

The role and importance of farming and vegetable production in urban agriculture



Why we move production closer to cities?

- Over 50% of the total population lives in cities and it is estimated that by 2030 they will live between 60 and 80%.
- The number of megacities (population 10+ million) will increase. To cater to the City of London, 40% of the UK's total arable land is needed.
- The increase in the total population and the effects of climate change (decreasing yields between 15 and 40%) make it difficult for the food chain to function and put pressure on rural areas.
- Urban agriculture has a social carter, more than 56% of the total poor are located in cities.
- 75% of people have some of the disorders related to the quality and quantity of food: obesity, malnutrition, lack of bio molecules, etc.
- According to the FAO, urban agriculture contributes to reduced urban poverty through providing nutritional food and income, maintaining biodiversity, reducing pollution, enabling the development of sustainable cities, strengthening resilience and reducing the impact of climate change, reducing dependence on international supply chains, developing local economies, etc.

Why we move production closer cities?

- Due to high land prices in urban areas, it is considered that vegetable production is the most cost-effective.
- The reasons for this are: short production cycle, sale of products without processing, high efficiency of water and nutrient utilization, high demand, proximity to the market, etc.
- Cereal production occupies 10 times the total area of cities, while the area under fruit and vegetables is equal to the total area of cities.
- Yield vegetables in urban areas can be up to 50 kg/m², which achieves great economic cost-effectiveness of urban agriculture.
- Farms located near the urban environment and focused on local sales channels, in Germany, are more economically profitable, efficient and have a better market position compared to classic farms.

Standard and specific forms of arable and vegetable production in urban agriculture

- The main characteristics by which different forms of urban agriculture can be classified are:
- types of actors involved,
- location of production,
- types of products,
- size of production and technology,
- types of economic activities and degree of market orientation.
- In general, they can be divided into traditional and innovative production systems.
- Motives can significantly affect the form of production starting from economic (professional-commercial production) to educating (horti-therapy).

Standard and specific forms of arable and vegetable production in urban agriculture



Princess community garden, Berlin



Vertikalna farma, Japan

Types, roles and significance of forms

- *Traditional forms: Gardens, gardens, etc. It is mainly about production for your own needs.*
- *Usually there is a low degree of mechanization with the use of various plant crops.*
- *Community gardens Breeding of different crops involving several people sharing space and resources.*
- *Landscape agriculture Planning landscape elements of urban space with purpose for agriculture Growing on balconies and terraces Similar to farming in gardens and gardens.*

Types, roles and significance of forms

- *Innovative forms:*
- *Aquaponika*
- *The combination of breeding fish with vegetables.*
- *Hydroponic production*
- *Cultivation on organic and inorganic substrates.*
Vertical agriculture
- *Growing at stacked levels in controlled conditions*
- *Green walls*

Not specific forms

- Urban forestry Food production within forest habitats. Street Gardens (Living streets)
- Changing the purpose of public space for mixed use. Guerrilla (Tactical)
- Gardening Production in public areas (e.g. parking).

Not specific forms



Guerrilla gardening

Gardens on the streets



Classic vegetable production systems in urban Agriculture

- Implies the use of soil for cultivation using classical agrotechnical measures and actions.
- Classical production systems are the most common presence when growing on gardens and gardens as well as community gardens.
- Instead of quantity, emphasis is placed on product quality and organic or conventional production is often applied.
- The most significant advantages of these systems are: smaller investments in production, easier adoption of techniques and technologies developed for classical agriculture.
- The most significant disadvantages of these systems are: reduced surface utilization, dependence of production from climatic and other factors.

Classic vegetable production systems in urban Agriculture

Rent-a-field, Germany



Agricultural Range

Hydroponic production systems

- In order to increase yields and/or make better use of urban area, professional farms most often use modern production methods, among which hydroponic production is the most prevalent.
- All forms of hydroponic production are represented.
- In amateur production, various hybrid forms of handwritten production of different degrees of automation appear.
- Professional farms mostly use hydroponic systems with a high degree of automation, which enable traceability and repeatability of the production process.



Aquaponic



Vertical hydroponic systems

Sky Urban Vertical Farming System



Tower Farms



ZippGrow

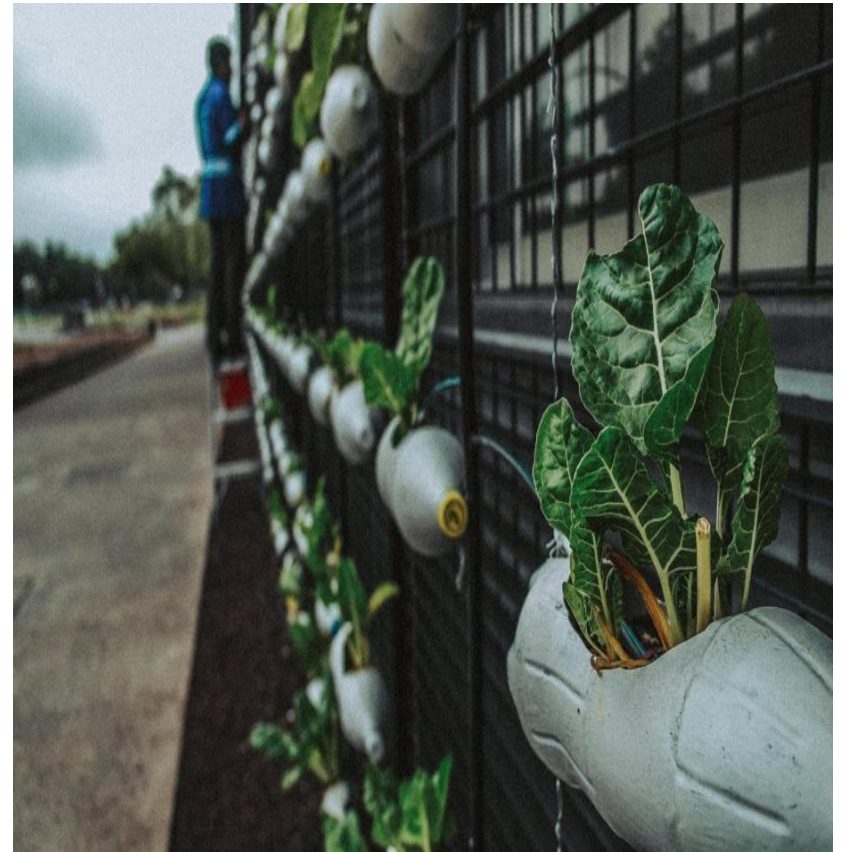


Improvised systems

NFT vertical system
with water pipes



Vertical system with plastic
bottles filled with substrate



Organic production systems

Organic farming is a specific agricultural production system that systematically and comprehensively approaches sustainable survival in general, where factors affecting sustainable development and vulnerability at the physical, economic and socio-cultural level (Eyhorn, 2007) are taken into account.

In urban agriculture, organic vegetable production takes place: On the ground It's like a classic food production system by organic principles and rules.

In pots Growing in ordinary or special pots on balconies, terraces and other surfaces.

As a substrate, rich organic substrates are most often used with the application of organic production preparations such as amino acids.

Breeding in bags on special substrates "Grow bag" Breeding on special substrates intended for specialized production.

they are often sown in advance with a factory-installed irrigation system.

Organic production systems



Growing vegetables in bags



Internal and vertical production systems

The need for space for human activities in urban areas and the impact of global climates are a problem in environmental sustainability, in particular water conservation and green open, public space.

Vertical systems allow for better utilization of space. In vertical production, yields are achieved at least 3-4 times (Utami et al., 2012), up to 100 times (Toyoki Kozai, 2013) higher yields depending on the type of system used.

Building-integrated agriculture (integrated into facilities) is a form of commercial, vertical, urban agriculture.

It is based on the idea of integrated technologically advanced, hydroponic production in and on facilities in order to create synergies and better use of resources.

Plant factories (food factories) is a form of commercial and hobby production. Production is exclusively hydroponic, using artificial light in controlled conditions.

Internal and vertical production systems



Plant factory Japan

Production on substrates

In urban agriculture, and especially in advanced production systems, substrates are often used for cultivation.

The selection of the substrate depends on the selection of the breeding system.

By origin, substrates can be: Organic: natural (peat, compost and vermicompost, etc.) or of industrial origin (jute, hemp, pilotin and tree bark, wool-haired animals, etc.).

Inorganic (stone wool, perlite, vermiculite, sponges, etc.).

Regardless of the origin of the substrate must be inertaneous and stable (it should not be broken down, otapat and should not substantially change the composition of the nutrient solution), clean, must allow for easy swelling of the excess feeding solution and must have a favorable relationship between micro and macro capillaries.

The choice of substrate as a medium for cultivation depends on a number of factors such as: climatic factors, equipment type and plant requirements

Cultivation in protected areas

We distinguish 2 concepts of protected spaces in urban Agriculture:
Classic protected spaces on the ground Protected spaces on buildings
(buildings)

Classical protected spaces are represented in peri-urban agriculture and the technique and technology of cultivation is the same as that of rural agriculture.

Protected premises on buildings

They have high investment and current costs and are represented in densely populated environments.

Hydroponic production is the most prevalent and they have a high level of automation.

Cultivation in protected areas



Lufa farms, Kanada



Zoku hotel, Holandija

Growing vegetables

There are no accurate data, global and BiH, on the total sown area under vegetables in urban agriculture.

However, vegetables are one of the most widely grown crops in urban agriculture (cereals, fruits, vegetables).

Some of the reasons for the commercial cultivation of vegetables are: freshness, cheaper production price, high demand, proximity to the market, etc.

The proximity and availability of resources and modern infrastructure as well as reduced pressure of the causative agents of plant diseases and pests in urban environments are just some of the advantages of this type of production over classical, rural agriculture.

This form of production yields higher yields (50 kg/m²) in relation to outdoor production.

However, one of the most significant advantages of this form of production is the use of short sales channels, thereby increasing earnings for manufacturers while saving for customers.

Growing vegetables



In urban agriculture, indigenous, commercially less interesting species and varieties are often used.

Most often they are produced on the ground using less intensive production techniques.

Dortmund

Growing vegetables

In urban agriculture, different species are bred, however, the most abundant are: Leaf vegetable Leafy vegetables are the most abundant vegetable crops in urban agriculture.

Some of the reasons are: sowing/planting density (number of plants per unit area), short vegetation, high demand, etc. often poorly tolerates transportation or quickly loses fresh, is edgy and expensive to transport.

Leafy vegetables are produced in all breeding systems and hydroponic production is the most prevalent.

Growing fruit vegetables Commercial production of fruit vegetables is most prevalent in professional urban farms, in protected heated areas throughout the year, hydroponic.

In peri-urban agriculture, it is produced on larger farms located closer to the city, on the ground or hydroponic.

However, for home needs dwarf varieties and hybrids can be grown pots.

Growing vegetables



Bologna

Very often, mederated gardens are grown for home consumption and excess is sold.

The production of vegetables, herbs and aromatic herbs has become popular with tkz "Farm to table" type restaurants.

In the US, some of the most famous restaurants and hotels have farms within their properties.

This highly cost-effective production has led to the development of various technical and innovative solutions in production.

Diversification and differentiation in urban vegetable gardening

Due to its proximity to the urban environment, diversification has become an important business model in urban agriculture.

some of the most common additional activities are: agritourism education and horti therapy....

Differentiation includes production as well as differentiation in processing and marketing integrating the value added chain.

Some of the forms of differentiation are: breeding exotic species cultivation of traditional species delivery to the home door

Specialization in urban vegetable growing

Specialization implies the cultivation of cultures of high added value.

Most often these are products with high transport costs, freshness and great perish ability.

Urban farmers of urban areas due to the proximity of buyers provide comparative advantages.

Some of the forms of specialization are: production of micro vegetables (microgreens) baby salads freshly cut/partially prepared vegetables.....

Specialization in urban vegetable growing



Greens.ba, Sarajevo.
Production cut vegetables and
spices.



Špinat mladi
1 kofica = 1.50 KM



Dodaj u korpu



Komorač (mikro bilje)
1 kofica = 2.50 KM



Dodaj u korpu

Production and delivery of
vegetables and spices.

Automation of production

The fourth industrial revolution and advances in ICT technology have smart, precision agriculture.

Urban infrastructure (wifi, etc.) enables the rapid penetration of smart agriculture into urban agriculture.

Therefore, it is not surprising that the greatest number of innovations is smart agriculture.

With the help of the Internet of Things (IoT), connected sensors monitor and store details about nutrient levels, temperature, humidity, light and more.

Receiving this data means that farmers or counsels can address many manufacturing gaps that might previously have seemed inevitable Artificial intelligence (AI) provides warnings about the specificity of planting, such as seed depth and location, directs the flow of production and predicts phenomena.

Drones and satellites enable monitoring of a number of production factors including food and protection.

Automation of production



FarmBot



Iron Ox

Innovations in urban agriculture

The steady growth of the number of urban populations, advances in science and technique have led to the penetration of new ideas in urban agriculture.

Most often they are interdisciplinary and include the use of modern technologies such as mobile applications, sensor monitoring of production, etc.

Green technology is one of the fastest growing global trends.

Some of the innovative solutions in urban agriculture can be viewed on crowd funding web addresses: <https://www.indiegogo.com>

Innovations in urban agriculture



Rotofarm



Film farming