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## **URBAN FARMING AND VERTICAL FARMS: PROSPECTS FOR AGRICULTURAL PRODUCTION IN CITIES**

Urban agriculture is the cultivation, processing and distribution of food within urban and suburban areas. One of the most promising forms of urban agriculture is vertical farming, a multi-level structure that allows plants to be grown in a controlled environment.

The growing urban population (more than 68% of the world's population is expected to live in urban areas by 2050, according to the UN, 2019) and the shortage of arable land are driving the search for innovative agricultural technologies to ensure food security within urban areas.

Modern urban agriculture is based on the use of high-tech methods, they are: *hydroponics* - growing without soil, in a water solution with mineral fertilisers; *aeroponics* - spraying a nutrient solution directly onto roots suspended in the air; *Controlled Environment Agriculture* (CEA) - the use of LED lighting, temperature, humidity and CO<sub>2</sub> sensors to optimise growth conditions; *integrated nutrition systems* - a combination of aquaculture and crop production (aquaponics). These technologies ensure high water and resource efficiency: for example, vertical farms consume up to 95% less water than traditional agriculture (Despommier, 2020).

The development of urban agriculture has a number of strategic benefits for the food systems of the future. In the context of global warming, urbanisation, water scarcity and the growing demand for fresh food, growing food directly in cities can address a number of social, economic and environmental challenges.

One of the key advantages of urban agricultural production is the efficient use of limited urban space. In particular, vertical farms, roofs, basements, building walls

or even shipping containers can be transformed into agricultural production facilities. This is especially important in densely populated megacities, where every square metre of land is at a premium (Specht, K., et al., 2014).

The other key advantages of urban agricultural production we have highlighted in the Tab. 1.

Table 1. Key Advantages of Urban Agriculture

<b>Advantage</b>	<b>Description</b>
Efficient use of space	Cultivation possible in multistory buildings, rooftops, basements, containers.
Reduced logistics costs	Proximity to consumers minimizes transport, storage, and refrigeration needs.
Lower CO <sub>2</sub> emissions	Less transportation means fewer greenhouse gas emissions.
Efficient water use	Up to 95% water savings through hydroponic and recirculating systems.
Year-round production	Controlled environment enables continuous cultivation regardless of season.
High crop yields	Up to 10–30 times more produce per m <sup>2</sup> than traditional farming.
No pesticides	Enclosed systems eliminate the need for chemical pest control.
Improved food security	Local production reduces reliance on global supply chains, especially in crisis.
Creation of new jobs	Emerging sectors create employment in agri-tech, logistics, and engineering.
Educational and social impact	Urban farms support community learning and social integration initiatives.

Thus, urban agriculture is not just an innovative form of cultivation, but a systematic approach to building sustainable food systems in the future. Its benefits are in line with the requirements of the UN Sustainable Development Goals (SDGs), in particular Goal 2: “End hunger”, Goal 11: “Sustainable urban development”, and Goal 13: “Combat climate change”.

However, research shows that with the increasing efficiency of LED technology and the development of renewable energy sources, vertical farming is becoming increasingly competitive (Benke & Tomkins, 2017).

For Ukraine, urban agriculture can be of strategic importance in the context of:

post-war urban reconstruction; limited access to arable land due to military operations; growing demand for safe food among the urban population.

Pilot projects are possible at universities, IT clusters, and industrial parks.

## **REFERENCES**

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## **ВИКОРИСТАННЯ ВІДНОВЛЮВАНИХ ДЖЕРЕЛ ЕНЕРГІЇ У СИСТЕМАХ ЗРОШЕННЯ ПЛОДОВИХ КІСТОЧКОВИХ КУЛЬТУР ЯК ВІДПОВІДЬ НА ВИКЛИКИ ЕНЕРГЕТИЧНОЇ КРИЗИ ТА ЗМІНИ КЛІМАТУ В УКРАЇНІ**

Галузь садівництва є однією з провідних для економіки України, забезпечуючи населення результатами сільськогосподарського виробництва та маючи значний потенціал експорту [2]. В умовах глобальних кліматичних змін, що проявляються у зростанні посушливості та нерівномірним розподілом опадів, отримання сталих врожаїв плодів, а зокрема кісточкових культур, стає майже неможливим без використання зрошення [6]. Ця потреба лише посилюється з плином часу. Водночас, повномасштабна війна спричинила значні руйнування енергетичної інфраструктури України, що викликало дефіцит та нестабільність у електропостачанні [1]. Дана ситуація ставить під загрозу роботу залежних від