

THE NECESSITY OF INNOVATIONS FOR THE SUSTAINABLE DEVELOPMENT OF INTENSIVE HORTICULTURE

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Abstract: This article analyzes the importance, advantages, and disadvantages of innovations for the sustainable development of intensive horticulture. It also highlights the need for modern technologies in ensuring food security and resource efficiency. The article provides scientific proposals and recommendations for addressing key issues in improving the economic efficiency of intensive horticulture through innovative technologies.

Keywords: Horticulture, fruit farming, intensive horticulture, innovation, food security, agricultural sector.

INTRODUCTION

The sustainable development of intensive horticulture in our country is carried out through the introduction of modern technologies and innovations. Today, global agricultural challenges, particularly food security and limited resources, demand new approaches in the development of intensive horticulture. Applying innovative technologies in plant cultivation not only increases productivity but also helps preserve ecosystems and utilize natural resources efficiently.

Companies like John Deere and agronomists play a crucial role in implementing these methods.¹ Innovations in intensive horticulture ensure high-quality crop production, combat pests, optimize irrigation systems, and enhance agrotechnical measures. These processes aim to improve the efficiency of crops, land, and water resources. Furthermore, innovative solutions offer opportunities to modernize agrotechnical practices, ensure ecological sustainability, and increase economic efficiency.

Intensive horticulture is a branch of agriculture aimed at maximizing crop yields based on modern agricultural technologies and innovations. This direction involves the application of scientific advancements in plant care, the use of high-quality seeds, effective fertilizers, and advanced irrigation systems. In today's context, increasing food supplies and crop yields are of paramount importance, making innovations in intensive horticulture critically significant.

The rapid global population growth and limited natural resources necessitate further development of intensive horticultural methods. Scientific research and the introduction of new technologies in plant care are key to ensuring high-quality crop production. Innovations help improve agro-technological processes, increase resistance to plant diseases, and ensure the efficient use of resources.

In addition, the principles of sustainable development play an essential role in maintaining ecological balance and protecting biodiversity in intensive horticulture. This article will explore the

¹ <https://www.deere.com/en/index.html>

necessity and importance of innovations in the sustainable development of intensive horticulture. The discussion will cover the impact of modern technologies, advanced practices, and strategies.

LITERATURE REVIEW AND METHODOLOGY

The term "sustainable development" began to be widely used in public, political, and scientific circles after the United Nations Conference on Environment and Development (UNCED), held at the state and government leaders' level in Rio de Janeiro in June 1992.² The outcome of this conference was the adoption of the international document known as "Agenda 21," which presented an official strategy for transitioning the global economy toward sustainable development.

Utilizing global experiences in sustainable horticulture development helps improve national agriculture, while promoting sustainability and rational resource use through innovative approaches.

Table 1

Global Experiences in Sustainable Intensive Horticulture Development³

Country	Advantages	Description
Israel	High Productivity	High-quality crop production with minimal water resources using smart irrigation systems
Netherlands	Efficient Resource Utilization	Energy and water savings through greenhouse horticulture and innovative approaches
Sweden	Ecological Sustainability	Development of intensive horticulture through agroecological methods and organic farming
USA	Economic Efficiency	Cost reduction and profitability increase through innovative technologies
China	Food Security	Ensuring food security by producing large-scale crops in intensive horticulture
Brazil	Social Development	Ensuring food security by producing large-scale crops in intensive horticulture
Japan	Experience Sharing	Sharing advanced technologies and experiences internationally

The table shows the experiences of countries around the world regarding the advantages of intensive horticulture and how it is being implemented in agriculture. These experiences are crucial for the development of intensive horticulture.

Intensive horticulture plays a significant role not only in ensuring economic growth but also in enhancing food security and maintaining ecological sustainability. The global increase in population and the expansion of urban areas significantly raise the demand for food. In this regard, intensive horticulture is essential in meeting this demand through innovative technologies and advanced agronomic practices.

The development of new intensive orchards takes place in suitable soil and climatic conditions, where the compatibility of varieties and rootstocks yields high returns. Techniques such as enriching the tree trunk with rootstocks, free-form maintenance, and shaping the trees contribute to their establishment.

² Кудашкин Алексей Сергеевич. Организация садоводства в условиях экологически чистой зоны Республики Алтай : диссертация ... кандидата экономических наук : 08.00.05 / Кудашкин Алексей Сергеевич; [Место защиты: Новосибир. гос. аграр. ун-т].- Барнаул, 2008.- 220 с.: ил. РГБ ОД, 61 08-8/1697

³ Prepared by the author

One of the most effective methods for accelerating modern horticulture is the cultivation of fruit trees on dwarf rootstocks, particularly those grown with enriched trunk methods. Such orchards not only allow trees to bear fruit more quickly but also lead to increased productivity, higher quality of fruit, and more efficient harvesting.

As a result of applying advanced agro-technical measures in modern intensive orchards, the susceptibility of fruits to diseases has been completely eliminated. Productivity is 1.5 to 1.7 times higher than in previous intensive orchards, and the quality of the fruit is also significantly improved.

Table 2

Vegetative Grafting Rootstocks in Intensive Horticulture⁴

Dwarf	Low Height	Semi-Dwarf	Vigorous
M-VIII	M-VII	M-II	M-I
M-IX	MM-102	M-III	M-XI
M-26	MM-106	M-IV	M-XIII
	1-48-1	M-V	M-XVI
		MM-104	M-XXV
		MM-111	MM-109
		1-48-46	A-2

According to the table, in intensive horticulture, dwarf, semi-dwarf, and vigorous growth types each have their own unique advantages. When selecting these types, agricultural conditions, the requirements for the crop type, and the goals for production must be considered. Each type is associated with its specific applications and benefits, which are crucial for the development of intensive horticulture.

ANALYSIS AND RESULTS

Another important factor in improving the efficiency of intensive orchards is concentrating them in areas with favorable growth conditions. By leveraging horticultural advancements in these regions, better results can be achieved.

Key factors for ensuring the economic efficiency of intensive horticulture include selecting suitable varieties, applying appropriate care methods, improving soil fertility, enhancing disease and pest control measures, and optimizing mechanization. These approaches not only increase productivity but also enhance the sustainability of horticulture practices.

The necessity of innovations for the sustainable development of intensive horticulture is demonstrated by the following key results:

Table 3

Advantages of Innovations in Intensive Horticulture⁵

Advantages	Achievements
Productivity Increase	Higher yields through new crop varieties and eco-friendly products
Efficient Resource Use	Reduction of water and fertilizer costs, energy efficiency, solar energy use

⁴ Арипов А., Арипов А. Уруғли интенсив мева боғлари. – Тошкент: «Sharq», 2013. – 224 б.

⁵ Prepared by the author

Ecological Sustainability	Soil and water resource protection, development of climate-resistant crops
Economic Benefits	Cost reduction, increased profitability, and improved product quality
Social Development	Education and skill enhancement, job creation through innovations
Food Security	Increased food production and improved product quality
Research and Development	Advancement of innovation and technology implementation in practice

Innovations in intensive horticulture bring benefits across productivity, resource use, ecological sustainability, and social development. These achievements underscore the importance of innovation for sustainable development and global food security.

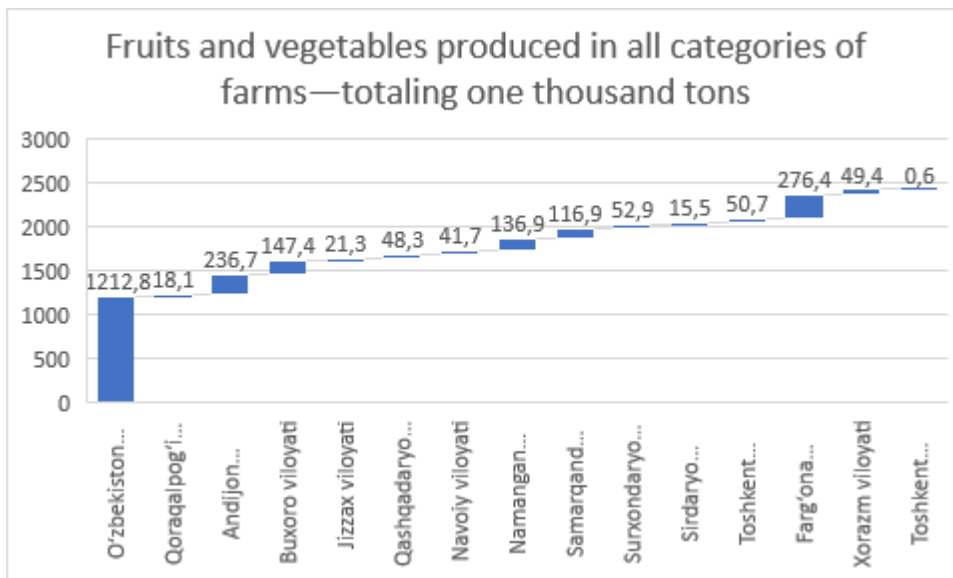


Figure 1. Data from the Statistics Agency under the President of the Republic of Uzbekistan

In 2023, the total production of fruits and vegetables in all categories of farms in Uzbekistan reached 3,121.7 thousand tons. According to the data from the Department of Agricultural and Ecological Statistics, 1,606.6 thousand tons of this yield consisted of annual crops, while 1,212.8 thousand tons were perennials (see Table 4). Compared to the corresponding period in 2022, this represents an increase of 104.1%. During the same periods compared to 2022, an increase of 5.9% was recorded in farms, while dehqan and household gardens experienced a growth of 3.2%. Conversely, a decrease of 4.9% was observed in organizations engaged in agricultural activities.

CONCLUSION AND RECOMMENDATIONS

However, there are certain challenges and barriers in introducing innovations in intensive horticulture. Small farmers face difficulties in adopting new technologies due to financial constraints. There is also a need to enhance the knowledge and skills of rural populations. The education system must adapt to prepare individuals for adopting modern technologies.

Based on these findings, the following actions are proposed for the sustainable development of intensive horticulture:

- Introduction of technological innovations

- Development of new crop varieties
- Promotion of sustainable agricultural practices
- Training and skill development
- Quality control of products

Innovations in intensive horticulture are essential not only for increasing productivity but also for ensuring efficient resource use and ecological sustainability. Through the application of innovative technologies, production costs can be reduced, product quality improved, and market competitiveness enhanced.

The successful implementation of innovations will contribute to improving the well-being of rural populations and creating new jobs. Collaboration between the state, the private sector, and scientific institutions is crucial for the successful adoption of innovations. Sustainable development in agriculture and adaptation to climate change can be achieved through these approaches.

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