

Opportunities for organic potato cultivation

Ilkhom Tokhtayev
Feruza Ganiyeva
Bukhara State University

Abstract: This article highlights the main principles of potato cultivation by organic methods, its advantages, and the possibilities of application under the conditions of Uzbekistan. The economic and ecological efficiency of organic farming is discussed.

Keywords: organic farming, potato, agrotechnics, yield, ecology, humus, neem oil

INTRODUCTION

In recent years, potato cultivation has been developing as one of the steadily growing sectors of agriculture in Uzbekistan. Potatoes not only play a significant role in people's daily diet but also contribute to ensuring food security. Therefore, considerable attention has been paid in our country to the development of potato production, the introduction of new agrotechnologies, and the improvement of yields [2,6].

Globally, the demand for organic products has been increasing in recent years. The issue of producing safe and environmentally friendly food has become a pressing global challenge. Excessive use of chemical fertilizers and pesticides has led to soil degradation, environmental pollution, and a decline in product quality [10,11]. Consequently, interest in organic farming, which differs from conventional methods, has been growing steadily [12,13].

Organic methods of potato cultivation not only make it possible to obtain healthy and high-quality yields but also play an essential role in preserving soil fertility, enhancing biodiversity, and ensuring ecological sustainability. This approach involves nourishing the soil naturally, reducing the use of chemical substances, and stabilizing yields in the long term [5].

The purpose of this article is to analyze the advantages, opportunities, and challenges of organic potato cultivation under the conditions of Uzbekistan. In addition, recommendations are proposed for the further expansion of organic farming in the country.

Science-based potato farming, fully compatible with modern requirements, advanced science and scientific achievements, efficient, rational, the use of water and resource-saving innovative technologies, the production of inexpensive, environmentally friendly products in agriculture. Fully meet the needs for food and manufactured goods, dramatically improve the welfare of the population of our country and ranks best among the developed countries of the world [14].

MAIN PART

1. The Concept and Fundamental Principles of Organic Farming

Organic farming is considered one of the most important and promising directions in agricultural production. In this system, chemical fertilizers, pesticides, and genetically modified seeds are not used. Instead, special attention is given to restoring soil fertility naturally, practicing crop rotation, and maintaining biodiversity [5,7].

The primary objective of the organic system is to produce high-quality and environmentally friendly products while protecting human health and the environment. Moreover, this approach increases the population of beneficial soil microorganisms, regulates water and air balance, and contributes to stable yields [8]. At present, organic farming in many countries is being developed



within a special certification system, which increases the market value of the products and creates additional economic opportunities for farmers.

In organic farming, the main focus is on improving soil fertility by natural means, avoiding the use of chemical fertilizers and pesticides, and integrating biological and agrotechnical methods. The following principles are applied in this process:

Soil improvement - the humus content of the soil is increased by applying organic manure, compost, and green manure (siderates). For instance, applying 30-40 tons of organic manure per hectare ensures favorable results (FAO, 2021) [10,11].

Crop rotation - potatoes are not planted in the same place consecutively; instead, they are followed by legumes or crops unrelated to cotton. This helps reduce diseases and pests.

Biological control methods - neem oil, Trichogramma, and entomopathogenic fungi are applied against the Colorado beetle and other pests (IFOAM, 2020)[13].

Mechanical cultivation - manual hoeing, mulching, and inter-row loosening with machinery are used to control weeds.

If these principles are strictly followed, the organic potato yield may reach around 30-35 t/ha, which is slightly lower than that of conventional methods but superior in terms of quality (USDA Organic Report, 2022)[12].

2. Results of Organic Potato Cultivation in the World and in Uzbekistan

In recent years, the area of organic farming worldwide has been steadily expanding. According to the International Federation of Organic Agriculture Movements (IFOAM, 2022)[12], in 2021 the total area of organic agriculture reached 76.4 million hectares, of which more than 60,000 hectares were allocated for organic potato cultivation. European countries, particularly Germany, France, and Poland, are among the leaders in organic potato production. For instance, the average organic potato yield in Germany is about 25-30 t/ha, while in France it ranges between 20-28 t/ha (FAO, 2021)

Studies conducted in the United States have shown that when compost and vermicompost are used instead of mineral fertilizers, organic potato yields reached 18-27 t/ha. However, due to the fact that the market price of organic potatoes is 1.5-2 times higher than that of conventionally grown potatoes, their economic efficiency remains sustainable (USDA Organic Report, 2022)[12].

In Uzbekistan, research on organic potato cultivation has also intensified in recent years. According to Azimov B.J. and Azimov B.B. (2018), the application of semi-decomposed manure and vermicompost in typical gray soils resulted in yields of 25-28 t/ha. Experiments conducted under the conditions of the Zarafshan Valley reported the highest result of 28.6 t/ha, which fully corresponds to international benchmarks [1].

3. Analysis of Experimental Results

Field experiments conducted at the training-experimental farm of Bukhara State University, located in the Bukhara district of Bukhara region, demonstrated that the application of organic fertilizers in potato cultivation not only increases yield but also plays an important role in maintaining long-term soil fertility and ensuring the stability of the agroecosystem. In particular, applying 20 t/ha of semi-decomposed manure before plowing and applying vermicompost at a rate of 5-7.5 t/ha three times during the growing season ensured high efficiency[8,9].

Economic efficiency. Calculations showed that in the variant where vermicompost was applied three times at 5 t/ha, the yield was slightly lower, but since the amount of fertilizer used was smaller, production costs were significantly reduced. As a result, this variant was considered the most economically feasible[9].

Ecological efficiency. Since no chemical mineral fertilizers were used in the experiment, the harvested potatoes were ecologically clean and safe for human health. Moreover, organic fertilizers



stimulated the development of beneficial soil microflora and enhanced the natural biological activity of the soil[3,4].

Crop quality. In the variants where organic fertilizers were applied, the average tuber weight, external appearance, and storage capacity were considerably higher. Especially in the variants supplied with vermicompost, tuber quality was markedly improved, with fewer cases of decay and quality loss during storage[8].

Thus, the proper and scientifically based application of organic fertilizers in potato cultivation makes it possible to achieve high yields, obtain economically viable results, ensure ecological sustainability, and produce safe, high-quality products for consumers[9]. Therefore, the application of 20 t/ha of semi-decomposed manure before plowing, combined with three applications of 5-7.5 t/ha vermicompost during the growing season, is recommended as the most effective agrotechnological measure[1,7,8].

Conclusion

The analysis has shown that the effective use of organic fertilizers in potato cultivation not only ensures high yields but also plays a vital role in preserving soil fertility and strengthening ecological balance. Potatoes obtained through organic technologies are superior in quality, safe for consumers, and environmentally sustainable. Furthermore, organic methods are also economically competitive, allowing producers to reduce excessive costs and achieve long-term efficiency.

In conclusion, organic potato cultivation represents one of the most promising directions for strengthening food security, producing healthy products, and promoting sustainable agricultural development in Uzbekistan.

References

1. Azimov, B.J., & Azimov, B.B. (2010). Methodology of conducting experiments in vegetable, melon and potato cultivation [in Uzbek]. Tashkent: UzPITI. 152 p.
2. Mirzaev, M.M., & Nazarov, B. (2005). Agrotechnics of potato cultivation [in Russian]. Tashkent: Fan. 180 p.
3. Rasulov, Sh., & Qodirov, A. (2018). Organic agriculture and soil fertility [in Uzbek]. Tashkent: UzMU Publishing House. 210 p.
4. Abduqodirov, A., & Qodirov, N. (2019). Fundamentals of organic farming [in Uzbek]. Tashkent: Fan va Texnologiya Publishing House. 195 p.
5. Karimov, M. (2020). Modern technologies in agriculture [in Uzbek]. Samarkand: SamSU Publishing House. 220 p.
6. Tojiboyev, Sh. (2018). Potato and vegetable cultivation [in Uzbek]. Tashkent: Uzbekistan Publishing House. 250 p.
7. Rahmatov, I., & Xolmatova, Z. (2021). Ecological agriculture and food security [in Uzbek]. Bukhara: BukhSU Printing Center. 180 p.
8. Khasanov, A., & Yuldashev, Sh. (2021). The effect of biohumus on potato yield [in Uzbek]. *Agro Ilm Journal*, (2), 45-49.
9. Jo'raev, A.A., & Toirov, I.I. (2020). Efficiency of using organic fertilizers in potato cultivation [in Uzbek]. In: Proceedings of the Republican Scientific-Practical Conference "Production and Storage of Agricultural Products". Samarkand, pp. 120-124.
10. FAO. (2007). Organic Agriculture and Food Security. Rome: Food and Agriculture Organization of the United Nations. <https://www.fao.org/4/ah952e/ah952e.pdf>
11. FAO. (2019). Organic Agriculture and Food Security. Rome: Food and Agriculture Organization of the United Nations.



12. IFOAM & FiBL. (2022). The World of Organic Agriculture: Statistics and Emerging Trends. Bonn: Research Institute of Organic Agriculture (FiBL).
13. IFOAM. (2020). Principles of Organic Agriculture. Bonn, Germany.
14. Rustam Yunusov, Feruza Ganieva Amrilloevna, Adhamjon Rustamov Abdixoshim ugli, Tukhtaev Ilkhom Yusuf ugli. Influence Of Planting Methods And Density On Growth, Development And Yield Of Early Potatoes. Texas Journal of Agriculture and Biological Sciences. 2022.32-35p.