



## WAYS TO INCREASE THE ECONOMIC EFFICIENCY OF HAXON PISTACHIO GROWTH IN THE CONDITIONS OF GLOBAL CLIMATE CHANGE

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**Abstract:** This article provides a detailed analysis of the economic efficiency of Haxon pistachio cultivation. It covers the agricultural importance of the product, cultivation technologies and resources, as well as economic analysis. The high profitability, export potential and opportunities for creating added value of Haxon pistachio cultivation are studied. The socio-economic impact and development prospects in rural areas are also considered. The article provides recommendations on the benefits of Haxon pistachio production and ways to effectively manage resources.

**Keywords:** Haxon pistachio, agriculture, economic efficiency, export potential, processing technologies, rural infrastructure, investments, productivity, irrigation system, added value.

**Introduction.** Haxon pistachio is one of the oldest Walnut crops in the world, and its economic and environmental importance is growing. Contributes to increasing foreign exchange revenue to the country through product exports. Haxon pistachios have been eaten by humans since ancient times. There are a huge number of its species in the world. Haxon pistachios are also considered a symbol of wealth and prosperity in some nations.

To date, many sources have been created about the beneficial properties of pistachios. Medicine, moreover, is recognized by modern medicine that pistachios are an important blessing for health and beauty<sup>1</sup>.

PQ-4424 of August 23, 2019[3] "on additional measures to improve the efficiency of forest use in the Republic", PQ-4960 of January 22, 2021[4] "on measures to promote science and research in the field of Forestry" focus on pistachio.

**Thematic literature analysis.** The first experience of artificial pistachios in Uzbekistan was carried out on the lands around Samarkand. Then I did these works. K. Troscov (1930) continued in the Bobothog Forestry, when 12 different forms of pistachio trees were selected and recommended to be propagated. S.M. The reclamation significance of the Haxon pistachio on the mountain slopes was researched by Ablayev. From this period, research on the transfer of pistachios to the forest-garden form has been carried out by S.M. Ablayev and G.M. The purpose and effectiveness of the transfer of thick cultural forests to the form of plantation, continued by Chernova, is scientifically based<sup>2</sup>

**Research methodology.** This article on ways to improve the economic efficiency of growing Haxon pistachios in Global climate change is an analysis of advanced foreign experiments on improving the efficiency of growing Haxon pistachios using the method of comparative analysis. A systematic analysis has been carried out to improve the efficiency of

the production of khandon pistachios. Based on the analyzes performed, conclusions are made and proposals are formulated through deductive methods.

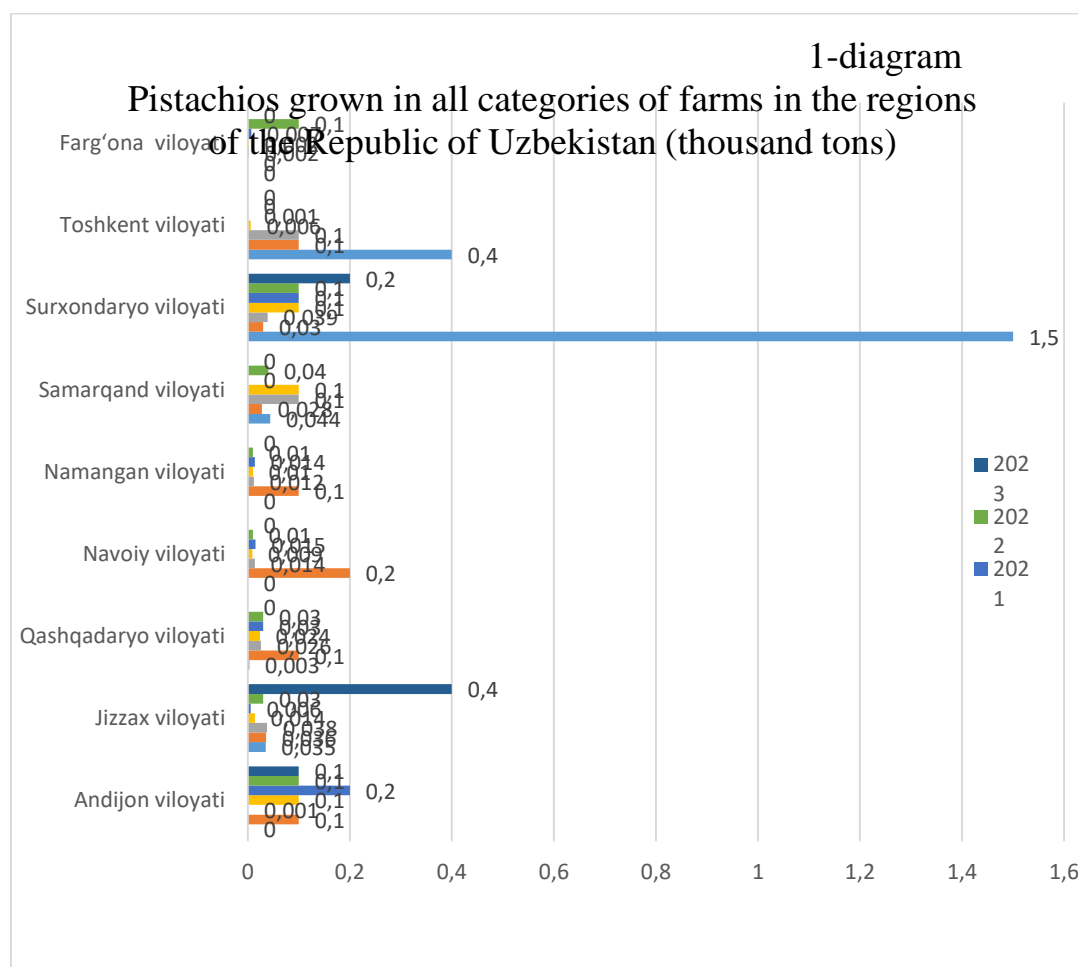
**Analysis and results.** In Iran, Turkey, the United States, and Syria, khandon pistachio is one of the main export products.

Uzbekistan has tremendous potential to compete with these countries. According to statistics in 2023, the demand for piste in the international market is increasing by an average of 4-5% every year.

Asia, Europe and North America are the largest importing regions.

Additional value is created by producing finished products from Khandan pistachios. This creates new jobs for local residents and encourages economic activity.

Productivity can be increased in Uzbekistan by creating new, high-yield varieties of Khandan pistachios. With the help of digital technologies, it allows you to optimize soil and Water Resources, monitor pests. The cultivation of khandon pistachios is in line with the concept of a green economy. It helps to promote sustainable agriculture and ensure environmental safety. The importance of growing Khandan pistachios is multifaceted. It not only brings economic income, but also opens up new prospects in the field of ensuring environmental sustainability, Export Development and agriculture. Therefore, the focus on this sector by the public and private sectors is of great benefit to the country's economy and the environment.



1- diagram As can be seen from the data, the total indicator for the Republic of Uzbekistan increased by 700 tons in 2018, but decreased in 2019 to 300 tons. Although there was a

change in subsequent years, by 2023 it returned to 700 tons. Statistical indicators of the production of pistachios in the regions of the Republic of Uzbekistan by year are given. General observations show that pistachios are not produced in the Republic of Karakalpakstan, Bukhara region, and Syrdarya region, and Surkhandarya region, one of our most advanced regions, recorded the highest figure, producing 1.5 thousand tons in 2017, but decreasing in subsequent years and increasing by another 200 tons by 2023. If we take into account annual changes, for example, if we take the Jizzakh region, in 2019, 380 kilograms of pistachio were harvested. By 2022, 300 kilograms of pistachio were harvested, but by 2023 this figure had increased to 400 tons. If we take the Andijan region from the data in this diagram, in 2017, the Khandon pistachio seedlings did not bear fruit. Since 2018, the yield has increased significantly, for example, 100 tons of pistachio were harvested. By 2021, the yield of the region, which had also increased, had increased to 200 tons. In subsequent years, the yield has decreased significantly, and 100 tons of pistachios have not been harvested. As can be seen from the republic's data, we need to develop additional strategies and improve production through rational use of resources to achieve sustainable development of indicators.

In Andijan region, the Khandon pistachio seedlings did not bear fruit in 2017, and cultivation began in 2018. Since then, an average of 100 tons has been produced. In 2019, the region had a lower yield, and in this year, 1 ton of fruit was produced. According to the diagram, the yield in Surkhandarya region is the same as in 2022, and by 2023, the yield in Andijan region has not changed, taking into account the Khandon pistachio yield grown in all categories of farms. This information was taken from January to the end of December.

**Conclusion and suggestions.** In Iran, Turkey, the USA, and Syria, pistachios are one of the main export products. Uzbekistan has great potential to compete with these countries. According to statistics for 2023, the international market demand for pistachios is increasing by an average of 4-5% annually. Asia, Europe, and North America are the largest importing regions. Added value is created through the production of finished products from pistachios. This creates new jobs for the local population and stimulates economic activity. In Uzbekistan, productivity can be increased by creating new, high-yielding varieties of pistachios. Digital technologies allow for the optimization of soil and water resources, and monitoring of pests. Pistachio cultivation is consistent with the concept of a green economy. It helps to develop sustainable agriculture and ensure environmental safety. The importance of pistachio cultivation is multifaceted. It not only brings economic benefits, but also ensures environmental sustainability, develops exports, and opens up new prospects in the agricultural sector. Therefore, the attention paid to this area by the state and private sectors will bring great benefits to the country's economy and environment.

The effective use of modern agrotechnical methods and resources in the cultivation of pistachios is very important for increasing yields and reducing costs. One of the most important conditions for planting pistachios is the correct selection of the planting area. Pistachios are suitable for subtropical and arid regions. Temperatures above +10°C and warm summers are required. Trees are not resistant to temperatures below -10°C, which makes cultivation in cold regions difficult. Sandy, light and well-drained soils are suitable. Since they are adapted to growth on saline soils, they allow making low-fertility lands economically profitable. The soil pH should be in the range of 6.5–8. Before planting, the area is loosened and weeds are removed. The soil is deeply plowed and enriched with organic fertilizer. High-yielding, disease-resistant and climate-friendly varieties are selected. The seedlings should

have a good root system and be healthy in appearance. The distance between each tree is set at 5-7 meters. This ensures that the trees grow widely and the fruits receive the same amount of sunlight. An average of 200-250 seedlings are planted per hectare. It is carried out in late autumn or early spring, when the soil temperature is above 10°C. Irrigation is one of the main elements in the care of Khandon pistachio trees. The drip irrigation system delivers water directly to the roots of the trees and increases the efficiency of water use. During the growing season (from March to September), the trees are watered 7-8 times. Trees require an average of 5,000-7,000 m<sup>3</sup> of water per season, which is significantly less than other tree crops. In arid regions, it is recommended to use automated irrigation systems to save water. Khandon pistachio trees require regular fertilization and pest control. Nitrogen fertilizers are used in the spring, and phosphorus and potassium fertilizers in the summer. Applying 20-30 kg of organic fertilizer per tree per year increases soil fertility. Regular cleaning of the soil and around the trees is necessary to prevent the growth of weeds. Although the trees are resistant to pests, ecological pesticides and insecticides are used to prevent the spread of diseases.

Khandon pistachio trees usually begin to bear fruit 4-6 years after planting. The trees produce fruit from late August to mid-September. During this period, the pistachios turn a distinctive green color and the bark cracks. The harvest can be harvested manually or mechanically. The mechanized method is carried out by shaking the tree, which increases productivity and saves time.

The harvested products are dried and stored in cold storage. The moisture level should not exceed 5-7%. Automate irrigation using sensors that measure soil moisture. Monitor the spread of pests using drones. Increase productivity by creating new varieties and making trees more resistant to pests. The introduction of special machinery and technologies for harvesting reduces labor costs.

Resources for the cultivation of Handon pistachios are managed economically. It allows the use of saline and infertile lands for agricultural purposes. Reducing water consumption through the use of modern technologies in irrigation. The introduction of equipment and mechanization optimizes labor and increases productivity. The cultivation of Handon pistachios requires modern agrotechnical approaches. By introducing innovations in all processes, from field preparation to crop storage, it is possible to increase productivity and profit, as well as effectively use resources. This contributes to the sustainable development of agriculture.

Pistachio cultivation is a highly profitable type of activity in the agricultural sector. This section describes in detail the main indicators of economic analysis, profit and cost analysis, export potential, opportunities for creating added value and development prospects of the sector. Land preparation (plowing, leveling): an average of 150–200 US dollars per hectare. Seedling cost: an average of 3–5 US dollars per seedling, with 200–250 seedlings planted per hectare. The total cost of seedlings is 600–1,250 US dollars. Planting, installation of an irrigation system and other initial work: 500–800 US dollars per hectare. Irrigation and fertilization: 300–400 US dollars per season. Pest control: an average of 150–200 US dollars. Labor costs: \$250–500 during the harvest period. Total investment costs in the first year are around \$1,500–2,500 per hectare. In subsequent years, costs are only related to maintenance and harvesting, which is \$500–1,000 per year. Handon pistachio trees begin to bear fruit 4–6 years after planting. Full productivity occurs after 7–8 years. Each tree can produce 8–10 kg of



pistachios per year. With 200–250 trees per hectare, the total yield is 2–2.5 tons. Handon pistachios are sold at a price of \$8–10/kg in the domestic market and \$12–15/kg in the international market. An average yield of 2 tons per hectare is obtained, which allows for an annual income of 16,000–30,000 USD. Taking into account the costs of cultivation, the net profit from the income can reach 12,000–20,000 USD per hectare. Handon pistachio is one of the products in high demand in the international market. In 2023, the global export volume of Handon pistachio amounted to 5 billion USD. Iran, Turkey and the USA are the leading exporters, while China, India and the European Union are major importers. The climatic conditions and soil fertility of Uzbekistan are suitable for growing Handon pistachios. Therefore, the country can become a new player in the international market. Export volumes can be increased by processing and packaging pistachio products in accordance with international standards. Exporting one ton of pistachios provides the country with an average of 12,000–15,000 USD in foreign exchange earnings. Added value is created by integrating Handon pistachio production with industrial sectors. The production of pistachio oil, sweets (chocolate, ice cream) and other products add value to the product. Pistachio shells are used in the production of fuel, fertilizer or construction materials. The state is creating many opportunities to increase the economic efficiency of Handon pistachio cultivation. These include subsidies for land preparation and installation of irrigation systems, as well as tax incentives and credit systems for agricultural machinery.

Pistachio cultivation is one of the highly profitable and promising sectors of agriculture. This crop is adapted to soil and climatic conditions and is in great demand in the domestic and foreign markets as an environmentally friendly product. By using the right cultivation technologies and introducing modern innovations, it is possible to increase productivity and reduce costs.

Economic analysis shows that investments in pistachio cultivation pay off in the short term and bring high returns. This not only improves the financial situation of farmers, but also creates new jobs in rural areas and contributes to the development of local infrastructure.

To develop pistachio cultivation, it is necessary to implement state support programs, scientific research, and the creation of agroclusters. The comprehensive development of this sector will serve to diversify Uzbekistan's agricultural exports and increase their competitiveness.

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