

## BIOMETRIC PARAMETERS OF PISTACHIO SEEDLINGS GROWN ON DIFFERENT SUBSTRATES

Hamzaev Abdushukur Khudoykulovich  
Tashkent State Agrarian University,  
Doctor of Agricultural Sciences, Professor

Inomova Munira Murotjon qizi  
Assistent, Tashkent State Agrarian University

### Abstract

The size of the container and the content of the substrate are important factors for growing quality and standard seedlings in a closed root system (container). The quality of the grown seedling, resistance to diseases and pests depends on the quality of the soil substrate. A rich composition of the substrate for growing plants with a closed root system ensures intensive growth of seedlings. In addition, many factors directly affect the successful growth of plants in the closed root system, including air temperature, irrigation regime, mineral nutrients, soil and relative humidity.

**Keywords:** Pistachio, substrate, germination, biometric, growing season, height, diameter, variant, control, nutrients, seeds, soil.

### Introduction

Handon pistachio product is a valuable and economically profitable product in many countries of the world. The cultivation of pistachios worldwide has increased dramatically in the last 50 years. According to statistics, in 1970, 50,000 tons, 500,000 tons in 2000, and 1 million tons in 2020 were produced in the countries of the world. tons of pistachios were grown.

In many countries of the world, including the USA, Italy, Iran, Spain, Turkey, Syria, Mediterranean and North African countries, many pistachio plantations are being established. To date, there are 410,000 pistachio plantations in Iran, 116,000 in the USA, 366,000 in Turkey, 59,000 in Syria, and 32,000 in China. In order to expand these areas, extensive work is being done to simplify the technology of growing pistachio seedlings. .

Today, large-scale reforms are being carried out in the field of forestry, especially in the field of forestry, in order to increase the productivity of tree and shrub species with nuts, to create new varieties, and to organize their cultural plantations. A number of positive works are being carried out in our upland and dry regions in terms of establishing pistachio plantations, improving the condition of existing cultivated forests and increasing their productivity. Establishing high-yielding pistachio plantations and further increasing the export potential is one of the main problems in the field of forestry today.

Decision of the President of the Republic of Uzbekistan No. PQ-4850 of October 6, 2020 "On Approving the Concept of Development of the Forestry System in the Republic of Uzbekistan until 2030", No. PF-60 of January 28, 2022 "On the Development Strategy of New Uzbekistan for 2022-2026" decree of July 6, 2022 No. PQ-307 "On structural measures for the implementation of the innovative development strategy of the Republic of Uzbekistan in 2022-2026" and a number of other regulatory documents on the introduction of the technology of growing pistachio seedlings grafted in closed containers tasks have been defined, and this research work serves to a certain extent in ensuring the execution of the tasks given above.

### **MATERIAL AND RESEARCH METHODS**

Studies on the preparation of Khandon pistachio seeds for planting S.M. It was carried out based on the method of Ablaev [1977]. Studies on the cultivation of pistachio seedlings in polyethylene bags with a closed root system G.M. Chernova and L.V. It was carried out in the methods developed by Nikolai [2011] and B.I. Eshankulovni's [2018] scientific research conclusions were used. Agrochemical analyzes of soil and plant samples E.V. It was determined based on the methods indicated in Anishkina's manual "Rukovodstvo po khimicheskomu analizu pochv" and "Rukovodstvo k proveteniyu khimicheskikh i agrofizicheskikh analizov pochv pri monitoringe zemel". Mathematical-statistical processing of the obtained research results B.A. Dospekhov's "Metodika polevogo opyta" [1985] and Y.N. Zaitsev's "Metodika biometricheskikh raschyotov" [1973] methods and "Statistic-7" program.

### **RESULTS OF RESEARCH**

The size of the container and the content of the substrate are important factors for growing quality and standard seedlings in a closed root system (container). The quality of the grown seedling, resistance to diseases and pests depends on the quality of the soil substrate. A rich composition of the substrate for growing plants with a closed root system ensures intensive growth of seedlings. In addition, many factors directly affect the successful growing of plants in the closed root system, including air temperature, irrigation regime, mineral nutrients, soil and air relative humidity.

The substrate is a soil mixture consisting of various natural components and various substances. These can be humus, peat, sand, crushed coconut shell, vermiculite, wood waste, clay, etc. [Wikipedia.ru].

Today, countries of the world are widely using peat and vermiculite products instead of soil. The growth and development of pistachio seedlings on different organic vermicompost feeds have been studied scientifically in the conditions of Iran, USA and Turkey. Handon pistachio seedlings were found to have higher performance when grown in 10% vermicompost+soil substrate.

Thanaa Sh.M.M. and other scientists have studied the effect of planting time on the germination and growth of pistachio seeds. According to the results of the research, the

seeds of the "Ashoury" pistachio variety were planted in the first day of March, and the maximum germination of the seedlings was recorded. In this case, rapid growth and development of seedlings was determined in the conditions of sandy soil-peat-vermiculite (2:1:1 ratio) substrate [Thanaa Sh.M. Mahmoud, E. K. Nabila, M. S. Abou Rayya, R. A. Eisa. 2019].

In the forest farms of our country, the first studies on the cultivation of spruce seedlings in containers filled with soils of different composition were carried out by V. M. Sakhatsky in the 80-90s.

According to the analysis of the studied literature on the cultivation of Khandan pistachio seedlings, in the conditions of Uzbekistan, insufficient scientific research has been conducted on the cultivation of Khandan pistachio seedlings on different types of soil substrates.

In this regard, during our research, it was planned to conduct research on the cultivation of pistachio seedlings in containers filled with different soil substrate mixtures.

In accordance with the plan, special attention was paid to the composition of the soil substrate placed in containers for the purpose of growing pistachio seedlings with a closed root system. Because the soil substrate placed in the containers significantly affects the germination, growth and development of pistachio seedlings.

During the experiment, various options were tested for growing pistachio seedlings intensively. In particular, in option 1, 100% soil (control), option 2 with 60% soil, 30% rotted manure and 10% river sand, and option 3 with a mixture of 80% soil and 20% coconut peat were used.



**Figure 1. The process of preparing soil substrates to be placed in containers and putting them in polyethylene bags**

Two types of substrate were prepared using soil, rotted manure, river sand, and coconut peat for the experiment. Soil, rotted manure, coconut peat were sieved and mixed separately according to the options. Soil substrates were placed in 20x40 cm containers with a closed root system (polyethylene bags), and the filled containers were placed in trenches.

Field experiments were conducted in 3 variants and 3 replications. A total of 216 plants were sown from 24 plants in each replication, and 2 pistachio seedlings died during the growing season.

Germinated pistachio seeds were planted in containers with a closed root system placed in a trench. Before planting, pistachio seeds were stratified, for this (02.02.2019) the seeds were soaked in warm water for a day. Preparation of pistachio seeds for planting in research S.M. It was done based on the method developed by Ablaev.

**Table 1 Humus and nutrient content of substrates with different composition**

S/n	Options	Hummus (amount of humus) %	N-NO <sub>3</sub> (nitrogen) mg/kg	P <sub>2</sub> O <sub>5</sub> (phosphorus) mg/kg	K <sub>2</sub> O (potassium) mg/kg
March (before planting seeds)					
1.	100% soil (control)	1,234	48,8	32,6	208
2.	60% soil 30% rotted manure 10% river sand	3,656	53,4	58,8	334
3.	80% soil 20% coconut peat	4,124	57,8	46,5	306
June (in season)					
1	100% soil (control)	0,856	31,2	23,0	200
2.	60% soil 30% rotted manure 10% river sand	2,345	47,6	47,2	308
3.	80% soil 20% coconut peat	3,234	50,8	43,0	287
September (end of season)					
1.	100% soil	0,689	24,5	17,0	189
2.	60% soil 30% rotted manure 10% river sand	1,234	33,2	33,4	256
3.	80% soil 20% coconut peat	2,899	42,5	39,5	263

In the third decade of February, the seeds were transplanted to room conditions with an air temperature of 220C-250C, and when the root length of the seeds was 0.2-1.0 cm, they were planted in containers at a depth of 2 cm.

To prepare the soil for analysis, the above-mentioned soils were first thoroughly dried, and then crushed into large pieces. Rubber hammers were used in the process of crushing the pieces so as not to affect the structural condition of the soil. The homogenized soil samples were ground in mortars and passed through 0.25 mm, 0.50 mm, 0.75 mm, 1.0 mm sieves.

Sifted soil samples were sent for analysis in previously prepared paper bags based on the size of the sieves. The results of the analysis are presented in Table 1

The samples taken in order to determine the nutritional composition of the substrates were analyzed in the "Soil Science and Agrochemistry" laboratory of the Institute of Soil Science and Agrochemical Research.

According to the results of the analysis, at the beginning of the season, i.e. before planting the seeds, the humus content of the 100% soil in the control variant is 1.23%, the nitrogen content is 48.8 mg/kg, the mobile phosphorus content is 32.6 mg/kg, and the exchangeable potassium content is 208 mg. /kg was found to be. In the second option, i.e., the substrate consisting of a mixture of 60 percent soil, 30 percent rotted manure, and 10 percent river sand contains 3.65% humus, 53.4 mg/kg nitrogen, 58.8 mg/kg mobile phosphorus, and 334 mg exchangeable potassium. /kg, and in the third option, the substrate consisting of 80% soil and 20% coconut peat contains 4.1% humus, 57.8 mg/kg nitrogen, 46.5 mg/kg mobile phosphorus, and 306 mg/kg exchangeable potassium.

These indicators are the basis for ensuring the high content of nutrients in the substrate for the growth of pistachio seeds and the good growth of seedlings.

During vegetation, i.e., when the height of seedlings grown from seeds is 20-25 cm, in the control variant, the content of humus in 100% soil is 0.85%, the amount of nitrogen is 31.2 mg/kg, the amount of mobile phosphorus is 23.0 mg/kg, exchangeable potassium and the amount was determined to be 200 mg/kg. In the second option, i.e. the substrate consisting of a mixture of 60% soil, 30% rotted manure and 10% river sand, the content of humus is 2.34%, nitrogen is 47.6 mg/kg, mobile phosphorus is 47.2 mg/kg, exchangeable potassium is 308 mg. /kg, and in the third option, the substrate consists of 80% soil and 20% coconut peat, the content of humus is 3.23%, the amount of nitrogen is 50.8 mg/kg, the amount of mobile phosphorus is 43.0 mg/kg, and the amount of exchangeable potassium is 287 mg/kg. At 30-35 cm, it was determined that the humus content of 100% soil in the control variant was 0.68%, the nitrogen content was 24.5 mg/kg, the mobile phosphorus content was 17.0 mg/kg, and the exchangeable potassium content was 189 mg/kg. In the second option, i.e., the substrate consisting of a mixture of 60 percent soil, 30 percent rotted manure, and 10 percent river sand contains humus content of 1.23%, nitrogen 33.2 mg/kg, mobile phosphorus 33.4 mg/kg, exchangeable potassium 256 mg. /kg, and in the third option, the substrate consisting of 80% soil and 20% coconut peat contains humus content of 2.89%, nitrogen content of 42.5 mg/kg, mobile phosphorus content of 39.5 mg/kg, exchangeable potassium content of 263 mg/kg was found to be equal to.

During the growing season, seedlings were constantly cared for, mainly to soften the soil, weed, water, weed, and protect against pests and diseases. Biometric parameters of plants were measured during and at the end of the growing season. The obtained data were analyzed mathematically and statistically and compared with the control. It was found from the experiment that the soil substrates had a positive effect on the growth and flowering of the pistachio seedlings.

The reason for this is the presence of a sufficient amount of nutrients in the prepared substrate for the good growth of pistachio seeds and seedlings, and the creation of suitable conditions for their absorption by the plant, i.e. timely watering and timely maintenance. By the end of the growing season, the average biometric parameters of pistachio seedlings were analyzed and presented in Table 2.

**Table 2 Biometric indicators of pistachio seedlings grown on different substrates (2019-2020)**

Options	Statistical analysis indicators						
	Average indicator, cm	$\Sigma$	V	p	n	relative to the control %	The difference between the results of options t
Height, cm							
100% Soil (Control)	22,1 ±0,63	5,3	24,1	2,8	72	100	$t_{3-1} \leq 11,8$
60% soil 30% rotted manure 10% sand	27,6±0,89	7,4	26,9	3,2	70	125	$t_{3-2} \leq 4,1$
80% soil 20% peat	31,7±0,52	4,4	14,0	1,7	72	144	-
Diameter, mm							
100% Soil (Control)	4,7±0,12	1,1	21,5	2,5	72	100	$t_{3-1} \leq 11,0$
60% soil 30% rotted manure 10% sand	5,2±0,13	1,1	21,6	2,6	70	110	$t_{3-2} \leq 7,6$
80% soil 20% peat	6,5±0,11	0,9	13,9	1,6	72	138	-

According to the biometric indicators of pistachio seedlings grown on different substrates, the average height of seedlings in the control option (100% soil) was 22.1 cm, while in the first soil substrate option (60% soil+30% rotted manure+10% sand) 27 ,6 cm, and in the option where the second soil substrate was used (80% soil + 20% coconut peat), the average height of seedlings was -31.7 cm. It was found that the first substrate was 25% higher and the second substrate was 44% higher than the control. When the average diameter of pistachio seedlings was analyzed, it was found that the first substrate was 10% higher than the control, and the second substrate was 38% higher.

At the end of the growing season, samples were taken and analyzed to determine if pistachio seedlings were absorbing nutrients from the substrate.

### DISCUSSION OF THE RESULTS

According to the analysis of samples of soil substrates, it was found that the content of humus and mobile nitrogen has decreased significantly. It was found that the pistachio sprouts absorbed nutrients during the period of vigorous growth. Also, in our second

substrate (80% soil+20% coconut peat) warrant, it was found that the plants absorbed humus and nutrients very well.

According to literature sources, the addition of various natural components to the soil composition serves to increase the mechanical composition and porosity of the soil. As a result, the state of aeration in the soil and the activity of microorganisms increase sharply. Because it makes it easier and faster to absorb nutrients through plant roots.

## CONCLUSION

Based on the above experimental results, it can be said that the optimal substrate for growing pistachio seedlings in containers with a closed root system is 80% soil + 20% coconut peat. Coconut peat in the soil substrate served to improve the mechanical composition of the soil and had a positive effect on the growth and development of pistachio seedlings.

## REFERENCES

1. Hamzayev, A. Kh, et al. "Study on cultivation of pistachio (*Pistacia vera* L.) seedlings in containers." *IOP Conference Series: Earth and Environmental Science*. Vol. 614. No. 1. IOP Publishing, 2020.
2. Худайназарова, Наргиза Худаяровна. "ЁПИҚ ИЛДИЗ ТИЗИМИДА (КОНТЕЙНЕР) ЕТИШТИРИЛАДИГАН ПИСТА НИҲОЛЛАРИНИНГ РИВОЖЛАНИШИГА "КОРНЕВИН" СТИМУЛЯТОРИНИНГ ТАЪСИРИ." *Science and innovation Special Issue* (2022): 580-584
3. Ubaydullaev, Farhod, et al. "Irrigation regime Influence on the growth and seedlings development of common fake chestnut (*Aesculus hippocastanum* L.) and Japanese safflower (*Sophora japonica* L.) in the highways landscaping." *E3S Web of Conferences*. Vol. 264. EDP Sciences, 2021.
4. Убайдуллаев, Ф. Б. "Влияние стимуляторов на рост сеянцев конского каштана." *Актуальные проблемы современной науки* 3 (2018): 115-119.
5. Убайдуллаев, Фарход Бахтияруллаевич, and Фарход Джураевич Хайтов. "АВТОМОБИЛЬ ЙЎЛЛАРИ ВА ШАҲАР КЎЧАЛАРИДАГИ САЙИЛГОҲ ХУДУДИНИНГ ТОШКЕНТ ВОҲАСИ УЧУН БАЛАНСИ ВА ЯШИЛ ЭКИНЗОРЛАРИГА ТАВСИЯ ЭТИЛАЁТГАН МАНЗАРАЛИ ЎСИМЛИК ТУРЛАРИ." *Dbiology*: 95.
6. Bakhtiyarullaevich, Ubaidullaev Farkhod, and Majidov Abdulaziz Norqobilovich. "Vegetative propagation of black mulberry (*Morus, nigra* L) recommended for landscaping roads and city streets." *Texas Journal of Agriculture and Biological Sciences* 12 (2023): 37-40.
7. Bakhtiyarullaevich, Ubaydullaev Farkhod, Xaitov Farhod Djuraevich, and Ubaydullayev Abbosjon Azimjon Ogli. "TOSHKENT SHAHAR MIRZO ULUG'BEK TUMANIIDAGI DAHALARNI KO'KALAMZORLASHTIRISHDA DARAXTLARNING SANITAR GIGIENIK VA XUSUSIYATLARI." *Conferencea* (2023): 149-153.

8. Bakhtiyarullaevich, Ubaidullaev Farkhod, and Ubaydullayev Abbosjon Azimjon OGLi. "SANITARY-HYGIENIC PECULIARITIES OF GREENING OF STREETS AND AUTOMOBILE STATIONS AND NATIONAL POINTS." *Galaxy International Interdisciplinary Research Journal* 11.2 (2023): 53-58.
9. Bakhtiyarullaevich, Ubaidullaev Farkhod, Majidov Abdulaziz Norqobilovich, and Khudaybergenov Sardor Kamaraddinovich. "AGROTECHNICS OF CULTIVATION AND USE OF MULBERRY SEEDLINGS FOR PICTURESQUE LANDSCAPING OF HIGHWAYS." *Galaxy International Interdisciplinary Research Journal* 11.1 (2023): 363-370.
10. Убайдуллаев, Фарход Бахтияруллаевич, and Фарход Джураевич Хаитов. "TYPES OF ORNAMENTAL PLANTS RECOMMENDED FOR BALANCE AND LANDSCAPING OF PARKING AREAS ON HIGHWAYS AND WALKS IN CITY STREETS FOR TASHKENT OASIS." *Science and Innovation* 1.4 (2022): 95-100.
11. Bakhtiyarullaevich, Ubaydullaev Farkhod, et al. "LANDSCAPE COMPOSITIONS BASED ON EVERGREEN SHRUBS IN THE LANDSCAPING OF CITY STREETS." *American Journal of Research in Humanities and Social Sciences* 10 (2023): 40-43.
12. Ubaydullayev, F., and Sh Gaffarov. "Selection of prosperous varieties of rosehips (rosa L.) And their seed productivity in Tashkent oasis, Uzbekistan." *E3S Web of Conferences*. Vol. 258. EDP Sciences, 2021.
13. Khatamovich, Yuldashov Yakubjon, Ubaydullaev Farkhod Bakhtiyarullaevich, and Khatamov Bakhramjon Yakubjanovich. "FEATURES OF PRODUCTIVITY, RIPENING AND GERMINATION OF JUNIPER SEEDS." *American Journal of Pedagogical and Educational Research* 10 (2023): 85-82.
14. Bakhtiyarullaevich, Ubaydullaev Farkhod, Ubaydullayev Abbosjon Azimjon Ogli, and Aripov Xojiakmal Xojiakbarovich. "CHARACTERISTICS OF DECORATIVE AND POISONOUS GAS-RESISTANT TREES FOR THE STREETS OF TASHKENT." *Open Access Repository* 4.02 (2023): 85-94.
15. Ubaydullaev, Farxod, Bakhramjon Khatamov, and Abdulaziz Majidov. "AVTOMOBIL YO'LLARINI KO'KALAMZORLASHTIRISHDA TUT (MORUS, NIGRA L) KO'CHATLARINI PARVARISHLASHDA MINERAL O'G'ITLARNI QO'LLASH VA SUG'ORISH ME'YORLARI." *Евразийский журнал академических исследований* 2.4 (2023): 75-81.
16. Isan ogli, Alisher Kholikov, Kasimkhodjaev Bokhodir Kuchkarovich, and Ubaydullaev Farkhod Bakhtiyarullaevich. "DETERMINING THE INFLUENCE OF CHANGES IN THE QUANTITY, SPEED AND COMPOSITION OF VEHICLES AND HIGHWAYS IN THE CITY AND THE DISTRIBUTION OF TRANSPORT." *American Journal of Pedagogical and Educational Research* 10 (2023): 167-174.
17. Baxtiyarullaevich, Ubaydullaev Farxod, and Abduraximov Muhammadali Muhammadibroxim o'g'li. "Pensilvaniya shumtoli (Fraxinus pennsylvanica Marsh.) tur

- 
- va shakllarining bioekologik xususiyatlari, manzaraviyligi va ko 'chatlarini yetishtirish." *Science Promotion* 1.1 (2023): 32-35.
18. Baxtiyarullaevich, Ubaydullaev Farxod. "CHINORBAGLI ZARANG (Acer platanoides L.) va SEMENOV ZARANGI (Acer semenovii Rgl. Et Herd.) TURLARINING BIOEKOLOGIK XUSUSIYATLARI, MANZARAVIYLIGI VA KO 'CHATLARINI YETISHTIRISH TEXNOLOGIYASI." *Science Promotion* 1.1 (2023): 36-39.
19. Bakhtiyarullaevich, Ubaydullaev Farkhod, Khomidov Jalaldin Oktamkhoja ogli, and Abdurakhimov Muhammadali Muhammadibrokhim ogli. "BIO-ECOLOGICAL CHARACTERISTICS, ORNAMENTAL FEATURES AND TECHNOLOGY OF GROWING SEEDLINGS OF MAPLE (ACER PLATANOIDES L.), MAPLE (ACER SEMENOVII RGL. ET HERD.) AND PENNSYLVANIA ASH (FRAXINUS PENNSYLVANICA MARSH)." *American Journal of Pedagogical and Educational Research* 15 (2023): 173-186.