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**РЕЗУЛЬТАТЫ ПРИВИВКИ ЭКОТИПОВ ФИСТАШКИ, СОБРАННЫХ  
ИЗ РАЗЛИЧНЫХ РЕГИОНОВ УЗБЕКИСТАНА****Эшанкулов Б.И., Кудайназарова Н.К.<sup>1</sup>, Пернеев А.Н.<sup>2</sup>,  
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ФИСТАШКА ЭКОТИПТЕРИН ПРИВИВКАЛООНУН ЖЫЙЫНТЫКТАРЫ****Эшанкулов Б.И., Кудайназарова Н.К.<sup>1</sup>, Пернеев А.Н.<sup>2</sup>,  
Холматова С.Курбонбой кызы<sup>3</sup>**<sup>1</sup>Ўзбекстан Республикасынын Токой чарба илим-изилдөө институту<sup>2</sup>Кыргыз Республикасынын Улуттук илимдер академиясынын Жалал-Абад илимий борбору<sup>3</sup>Фергана мамлекеттик университети**RESULTS OF GRAFTING PISTACHIO ECOTYPES COLLECTED FROM  
VARIOUS REGIONS OF UZBEKISTAN****Eshankulov B.I., Khudaynazarova N.K.<sup>1</sup>, Perneev A.N.<sup>2</sup>,  
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**Аннотация.** Центральная Азия считается родиной фисташки. Это дерево не только выполняет лесомелиоративные функции, но и даёт ценные орехоплоды. Спрос на фисташки на мировом рынке считается высоким. Страны, выращивающие фисташки, проводят ряд научных исследований, направленных на повышение урожайности фисташковых плантаций. Эти исследования в основном посвящены созданию фисташковых плантаций, сокращению периода до вступления культурных фисташковых садов в плодоношение, повышению урожайности и улучшению качества фисташковых орехов.

**Ключевые слова:** фисташка, горы и предгорья, лесомелиоративный, богарный (неорошаемый), засушливый, орехоплодный, прививка, подвой, привой, экотип, генотип, материнское дерево.

**Аннотация.** Борбордук Азия фисташканын мекени деп эсептелет. Бул дарак жөн гана мелиорациялык функцияларды аткарып эле койбостон, баалуу жаңгактарды да берет. Фисташканын дүйнөлүк рыноктогу суроо-талабы жогору деп эсептелет. Фисташка өстүргөн өлкөлөр фисташка плантацияларынын түшүмдүүлүгүн жогорулатууга багытталган бир катар илимий изилдөөлөрдү жүргүзүшүүдө.

Бул изилдөөлөр негизинен фисташка плантацияларын түзүүгө, маданий фисташка бактарынын мөмө берүү мөөнөтүн кыскартууга, түшүмдүүлүктү жогорулатууга жана фисташка жаңгактарынын сапатын жакшыртууга арналган.

**Негизги сөздөр:** фисташка, тоолор жана тоо этектери, токой мелиорациялык, богардык (сугарылбаган), кургакчыл, жаңгактуу, прививка, подвой, привой, экотип, генотип, энелик дарак.

**Abstract.** Central Asia is considered the homeland of the pistachio. This tree not only serves important forest reclamation functions but also produces valuable nuts. The demand for pistachios in the global market is considered high. Countries that cultivate pistachios are conducting a series of scientific studies aimed at increasing the yield of pistachio plantations.

These studies mainly focus on establishing pistachio plantations, reducing the period before cultivated pistachio orchards begin to bear fruit, increasing productivity, and improving the quality of pistachio nuts.

**Key words:** pistachio, mountains and foothills, forest reclamation, rainfed, arid, nut-bearing, grafting, rootstock, scion, ecotype, genotype, mother tree.

**Introduction.** Of the representatives of the pistachio genus in Uzbekistan, only the pistachio (*Pistacia vera* L.) grows. This species is naturally distributed in the mountainous and piedmont regions of Uzbekistan and is valued for its forest-meliorative importance [1]. This species grows in steppe and arid areas where other trees cannot grow, forming sparse forests while producing a valuable nut. At present it naturally grows across all mountainous regions of Uzbekistan, notably in the Surxondaryo, Qashqadaryo, Samarkand, Navoiy, Jizzakh and Tashkent regions, where it performs an excellent forest-meliorative function. These natural pistachio stands are also considered part of Uzbekistan's valuable gene pool [2; 4; 5].

**Research method.** Grafting work on pistachio was carried out based on the method proposed by G.M.Chernova (2017) [3].

**Research results.** To preserve the high bio-ecological and yield indicators of the pistachio ecotypes, a method of propagation by grafting was used. For this purpose, grafting experiments were conducted on pistachio trees growing at the Pistachio Scientific-Experimental Station located in Jizzakh region. These pistachio trees were planted in 2009 and are situated at an altitude of 750 meters above sea level. The soil is typical gray (brown) soil and there is no artificial irrigation system. In the experiments, grafting was performed on one-year shoots in three replications, with 10 trees in each replication. Three

scions were grafted onto each tree. The planting scheme for the trees was 6 × 6 m. To prepare the trees for grafting, the main trunk was pruned (in February). In spring, one-year shoots that had grown were grafted in June. Scion grafting was carried out using the "T" budding method.

As grafting rootstocks, ecotypes of pistachio grown at the Pistachio Scientific-Experimental Station in Jizzakh region as well as ecotypes selected from various regions of Uzbekistan - selected for large fruit size and high productivity - were used. The genotypes of the mother trees of the ecotypes chosen as rootstocks at the Pistachio Scientific-Experimental Station in Jizzakh region were healthy, their trunks and crowns well developed - high-performing specimens were selected. All selected forms were large trees, distinguished by high productivity under steppe conditions and by the large size of their fruits. In addition, the mother trees of these selected ecotypes regularly produced yields each year and their yield quality indicators are high, which shows their promise. Phenological observations conducted on the trees showed that all vegetative and generative processes in these trees remained unchanged from year to year. At the same time, the trees showed high tolerance to drought, diseases and pests. The taxonomic characteristics of the mother trees of the pistachio ecotypes selected as rootstocks from the Pistachio Scientific-Experimental Station are presented in Table 1.

**Table 1**  
**Taxonomic characteristics of the mother trees of pistachio ecotypes located at the Pistachio Scientific-Experimental Station (Years 2021–2023)**

| № | Conditional variety name | Age, year | Taxonomic measurements |                    |               | Yield, kg | Weight of 1000 seeds, g | Number of seeds per 1 kg, pcs |
|---|--------------------------|-----------|------------------------|--------------------|---------------|-----------|-------------------------|-------------------------------|
|   |                          |           | Height, m              | Trunk diameter, cm | Crown size, m |           |                         |                               |
| 1 | Galina                   | 31        | 3.0                    | 20                 | 5x5           | 15        | 1012                    | 988.1                         |
| 2 | Chernova                 | 31        | 5.0                    | 35                 | 8x7           | 18        | 905                     | 1105.0                        |
| 3 | JBM-1                    | 31        | 3.0                    | 18                 | 3x3           | 8         | 1224                    | 817.0                         |
| 4 | JBM-2                    | 31        | 3.0                    | 18                 | 3x4           | 9         | 1250                    | 800.0                         |
| 5 | Nargiz-1                 | 31        | 5.5                    | 20                 | 7x6           | 12        | 1336                    | 748.5                         |

From Table 1 it can be seen that all mother trees of the pistachio ecotypes selected as rootstocks were planted in 1990. These pistachio trees were grafted using rootstocks obtained from pistachio trees with high economic traits that grew in various regions of Uzbekistan in 1994–1995, and a collection was established. Among the selected ecotypes, the conditionally

named Chernova and Nargiz-1 trees are taller compared to Galina, JBM-1 and JBM-2. In terms of productivity, Chernova ranks first and Galina second, while the Nargiz-1 ecotype ranks third. Regarding nut (seed) size, the Nargiz-1 ecotype has the largest seeds, with JBM-2 and JBM-1 occupying the next places. The graft-take (success) rates of the promising grafted pistachio forms are presented in Table 2.

**Table 2**  
**Graft success rates of promising grafted forms (2023)**

| № | Conditional variety name | Year(s) grafted | Graft success rate, % | First fruiting           |
|---|--------------------------|-----------------|-----------------------|--------------------------|
| 1 | Galina                   | 2019-2021       | 90                    | showed signs of fruiting |
| 2 | Chernova                 | 2019-2021       | 90                    | -                        |
| 3 | JBM-1                    | 2019-2021       | 70                    | -                        |
| 4 | JBM-2                    | 2019-2021       | 70                    | -                        |
| 9 | Nargiz-1                 | 2019-2021       | 90                    | showed signs of fruiting |

According to Table 2, the grafting results show that the graft-take rates of all forms observed were above 70%. The Galina, Chernova and Nargiz-1 ecotypes showed graft-take rates of 90%. In trees grafted in 2019, initial fruiting signs appeared in 2023 in the Galina and Nargiz-1 forms. It was noted that the nuts on these shoots reproduced the nut characteristics of the mother tree. We considered the lower graft success for JBM-1 and JBM-2 to be related to their biology.

During our experiments, scions were taken from large-fruited and productive trees grown in the Surxondaryo, Qashqadaryo and Fergana regions. Particular attention was paid to the large size of the pistachio nuts of these ecotypes. The main objective of these experiments was to study the grafting success and the degree of genotype retention of the pistachio ecotypes collected from different regions of Uzbekistan after grafting at the Pistachio Scientific-Experimental Station in Jizzakh. The taxonomic characteristics of the mother trees of the selected ecotypes from different regions are given in Table 3.

**Table 3**  
**Taxonomic characteristics of mother trees of pistachio ecotypes growing in different regions**  
**(Years 2021–2023)**

| № | Conditional variety name | Region              | Age, year | Taxonomic measurements |                    |               | Yield, kg | 1000 seeds weight, kg | Seeds per kg, pcs |
|---|--------------------------|---------------------|-----------|------------------------|--------------------|---------------|-----------|-----------------------|-------------------|
|   |                          |                     |           | Height, m              | Trunk diameter, cm | Crown size, m |           |                       |                   |
| 1 | QN (ҚН)-10               | Kashkadarya region  | 9         | 3,0                    | 22                 | 3,4x3,2       | 2,5       | 900                   | 1111              |
| 2 | SS (СС)-12               | Surkhandarya region | 25        | 4,8                    | 34                 | 5,2x5,6       | 30,0      | 900                   | 1111              |
| 4 | FO (ФО)-1                | Fergana region      | 9         | 3,7                    | 24                 | 3,4x3,6       | 2,0       | 900                   | 1111              |

According to Table 3, among several pistachio trees growing in Qashqadaryo region, the conditionally numbered QN-10 tree was selected. In 2021 this tree was 9 years old, 3 m tall, and its average yield was found to be 2.5 kg. From Surxondaryo region the SS-12 tree was selected; this tree was 25 years old with a yield of 30 kg. From Fergana region the FO-1 tree was selected; it was 9 years old with a yield of 2.0 kg. The com-

mon feature of all selected trees is the weight of their nuts (seeds): on average there were 1111 seeds per 1 kg and the weight of 1000 seeds was 900 g. It was noted that the shapes of all nuts varied. The scions taken from these trees were grafted in June at the Pistachio Scientific-Experimental Station in Jizzakh under the same conditions described above. The grafting results are reported in Table 4.

**Table 4**  
**Graft success rates of promising grafted varieties (2023)**

| № | Conditional variety name | Grafting year | Graft success rate, % | First fruiting |
|---|--------------------------|---------------|-----------------------|----------------|
| 1 | QN (ҚН)-10               | 2019-2021     | 100                   | -              |
| 2 | SS (СС)-12               | 2019-2021     | 100                   | -              |
| 3 | FO (ФО)-1                | 2019-2021     | 70                    | -              |

According to Table 4, the grafting results for the conditionally numbered QN-10 and SS-12 ecotypes showed 100% graft-take, while for FO-1 this indicator was 70%. The full graft survival of QN-10 and SS-12 can be explained mainly by the relatively harsher conditions in the region where they grew compared to the conditions at the Pistachio Scientific-Experimental Station in Jizzakh, meaning these scions encountered relatively better conditions after being brought to the station.

**Conclusion.** The experiments at the Pistachio Scientific-Experimental Station in Jizzakh region showed that, when grafting pistachio scions taken from ecotypes grown at the station and from ecotypes brought from various regions of Uzbekistan, specific results can be achieved depending on the biology and growth conditions of the trees as well as on the skill of the grafter. Based on these experiments, it is recommended to graft and cultivate newly identified high-yielding pistachio ecotypes with high fruit quality in several regions of Uzbekistan and to carry out scientific trials.

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