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QUALITY INDICATORS OF FRUIT OF PROMISING WALNUT FORMS IN WESTERN TIAN-SHAN REGIONS

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Abstract

Walnut (*Juglans regia* L) is one of the most important trees among the species with high nutritional value in Uzbekistan. Naturally grown nut orchards have a valuable gene pool, among which there are many forms with different bioecological properties. In particular, biodiversity in terms of fruit quality is highly variable within the species. This article outlines the analysis data on quality indicators of walnut fruits in natural and local nut orchards. Among the indicators of fruit quality in the selected forms, the yield of walnut kernels was of high importance as the main indicator, and it was 38,2-63,3 in the selected forms. At the same time, this indicator constituted 54,9% in the forms selected from Gazalkent, 58,0% in the forms selected from Khumsan, and 63,3% in the forms selected from Parkent. According to international indicators, the form with a yield of walnut kernel above 53% is considered promising one, thus, the forms Parkent-2, Gazalkent-1 and Humson-5 are recommended for wide use.

Key words: walnut, perspective forms, fruit mass, length, diameter, mass of walnut, kernel output.

Introduction

Currently, the two most common major species of walnuts are grown – the Persian walnut and the black walnut. The first one originated in Iran, known as the Persian or English walnut. The second one is native to North America. Persian walnuts are grown on a commercial use and many cultivars have been developed since that. China is the world's largest producer of walnut. In 2016-17, the country produced 1060,000 thous.tons of nuts. China accounts for 50% of world nut production being also the largest consumer of nuts in the world. Per capita nut consumption in China increased from just 0,17 kg in 1995 to 1,8 kg in 2016. Walnut consumption per capita in China increased by 24% and by 5,8% on average

worldwide. The United States ranks the second on the production of walnut in the world. One-third of the world's walnut production is accounted for by the country. California state of the US is the largest nut producer in the country. In fact, the state accounts for almost all nut production in the United States. The Sacramento Valley and the San Joaquin region of California are famous for their walnut production. About 4,900 California farmers grow walnuts. In 2016-17, the United States produced 607,810,000 tons of nuts. China and the United States account for three-quarters of global walnut production. Among European countries, the Ukraine, Chile, Turkey and Moldova are the best walnut producing countries [WorldAtlas 2018].

Persian walnut (*Juglans regia* L.) is one of the main nut crops in Iran. Walnut together with pistachio and almond have covered more than 800,000 ha (28.5 %) of Iran's orchards. After pistachio, walnut is the second important nut crop in term of production. In recent years, the demand for establishing walnut orchard has significantly increased. Walnut has a long history of cultivation and use and the country considered as one of the main walnut origin and distribution centers in the world. So, it is possible to find some walnut trees with more than 1000-years old in the traditional orchards. The walnut orchards could classify into the traditional and new orchards. In traditional orchards, walnut is usually cultivated on the borders of other fruit tree orchards. In recent years, new walnut orchards have been established using foreign ('Chandler' and 'Fernor') and Iranian commercial cultivars and superior genotypes. Also, traditional orchards have either been replaced by new ones by top-working. Walnut breeding in Iran is being done by TFRC-HSRI and CEWIT. Germplasm evaluation, hybridization and omics studies are the main walnut breeding strategies. Iran's walnut breeding program initiated in 1983 and led to release of six commercial cultivars including 'Jamal', 'Damavand' (2010), 'Persia', 'Caspian', 'Chaldoran' and 'Alvand' (2019). In addition to cultivar breeding, rootstock program is currently going on, aiming to find appropriate clonal rootstocks [10]

In Central Asia, natural walnut forests are located mainly in mountainous areas. They are in the Western Tian Shan, Chatkal, Qurama, Ugam, Pskom mountain ranges, in the south in the Gissar, Karategin, Darvaz, Vanch and Rushan mountain ranges. Currently, large and small walnut forests are

well preserved in the Western Tian Shan in Fergana, Pskom, Ugam, in the Pamir-Alay mountain system, in the Western Kopet Mountains of Turkmenistan. The walnut groves are mainly located at an altitude of 1000-2000 m above sea level. However, depending on the nature of the land form, the small massive of walnut groves can be found at 800-2000 m. In Tajikistan and Uzbekistan, walnut forests are not as large as in southern Kyrgyzstan. Persian walnut is naturally distributed in Central Asian countries, and has been already cultivated by local people. In the natural and cultivated forests of the walnut, it has produced different forms depending on the fruit shape and size of the fruit. Therefore, they play an important role in the production of varieties as a huge selection area for choosing and breeding valuable forms. For this reason, the walnut gene pool has been the subject of research for many years. As a result of many years of research, fertile, large-fruited forms were obtained by selection [2].

Most of the walnut forests in Tajikistan are located in the basins of the Yah-Suv and Kyzyl-Suv rivers, which flow into Panj. Walnut is naturally found in other river basins, including Varzob and Sardamion, the upper reaches of the Vakhsh, and elsewhere [6].

In Uzbekistan and on the border of South Kazakhstan, walnut forests are located in small areas on the western edge of the Tian Shan, mainly at an altitude of 750-1250 m above sea level, on the slopes and oases of the Pskom and Ugam mountain ranges. Sometimes individual trees grow even at altitudes of 1700 m. The largest forests of walnut are in the Pskom River basin. Natural walnut orchards can be found in the basins of the Aksakata, Nurakota, Topalangdarya, Obizarang rivers [1].

Natural walnut forests in Central Asia perform major reclamations functions, they serve to store and regulate water in the mountains, soaking the soil from leaching. Walnut trees growing on mountain slopes hold the soil firmly with their well-branched root system. Especially, the walnut orchards in the Fergana mountain range and Osh, Jalal-Abad (Kyrgyzstan) regions are of great scientific importance in forest reclamation. It is no exaggeration to call them regulators that conserve and regulate the water resources of the eastern part of the Fergana Valley [4].

Precocious variety of walnut "Ideal" is the fast-growing variety which grows up to 8 m in height, blooms twice a season and yields 2 times. Seedlings begin to bear fruit from the 2nd year, while the grafted ones bear fruit at the first year of grafting [7].

Scientists of the Central Asian Forestry Research Institute have developed such varieties as Durmon-1, Durmon-2, Tashkent-2, Tashkent-3, and Ideal. The fruits of these varieties are characterized by full kernel and taste. In the natural dendroflora of Central Asia, walnut ranks 2nd after maple in terms of size and longevity. In nature, its examples were noted with 900 m² projection of branches [3].

V.S.Shevchenko [5] differentiated more than 12 forms of the nuts, out of them 6 forms (Ak-Terekskiy, Gavinskiy, Sladkiy, Osh, Ostrovershinskiy, Uygur) have been registered to state testing.

Scientists of the Forestry Research Institute have developed basic criteria for selecting valuable forms of walnut. In accordance with this, when choosing fertile

forms of walnut, it is important to consider round-shaped branches, the diameter approximately equal to the height, thick branches, the leaves not damaged, the body of the tree without any rot. It has been also stated there that the crop should not be only in tip of the branches, but also in the side branches [8]

Materials and Methods

The main part of natural walnut orchards in the territory of our Republic is located in the Western Tian Shan region, and the study of the present walnut trees in these areas makes it possible to select forms with different bioecological characteristics. The research was conducted in 2018-2019 in Bostanlyk and Parkent districts of Tashkent region on the basis of route monitoring. Laboratory experiments on the analysis of fruit quality of selected forms were conducted at the department of Forestry of Tashkent State Agrarian University.

Selective evaluation of walnut forms was carried out on the basis of the method "Program and methods of sorting of fruit, berry and nut cultures" developed in 1973 [9].

DETERMINING FRUIT SIZE OF PERSIAN WALNUT

In order to determine the size of the walnut fruit, the measurements on fruits of selected forms were carried out under laboratory conditions. In this case, the fruit size, length, ring and side diameters of the selected forms were evaluated on the base of a 5-point scale. Experimental work was performed on 100 fruit indicators from each form.

Table-1
Evaluation scale for fruit dimension of walnut

№	Fruit size, mm			Points
	Length	Diameter along the ring	Side diameter	
1	Above 41,1	Above 34,1	Above 34,1	5
2	38,1-41,0	32,1-34,0	32,1-34,0	4
3	35,1-38,0	30,1-32,0	30,1-32,0	3
4	32,1-35,0	28,1-30,0	28,1-30,0	2
5	Up to 32,0	Up to 28,0	Up to 28,0	1

DETERMING FRUIT WEIGHT AND KERNEL YIELD OF PERSIAN WALNUT. After dimension determination of Persian walnut fruit in selected forms, measurements were carried out on the scale

to find the weight of 1 piece of walnut and kernel yield rate. Selected forms were evaluated with a 5-point scale on the base of obtained measuring results.

Table-2
The scale for evaluating fruit weight and kernel yield rate of one walnut

groups	Weight of 1 piece of walnut, g	point	groups	Kernel yield, %	point
Too small	6,1-8,0	1	With too much kernel	Above 56,0	5
Small	8,1-10,0	2	With much kernel	53,1-56,0	4
Medium	10,1-12,0	3	With medium kernel	49,1-53,0	3
large	12,1-14,0	4	With less kernel	45,1-49,0	2
Too large	Above 14,1	5	With too less kernel	Lower than 45,1	1

Based on the results obtained, the forms with 4 and 5 points on kernel yield can be recommended to production as promising forms

Results and Discussion

Walnut is naturally widespread in Central Asian countries and has already been cultivated by the local population. In the natural and cultivated forests of the walnut, it has produced different forms depending on the fruit shape and size. Therefore, they play an important role in the production of varieties as a huge selection area for choosing and breeding valuable forms. For this reason, the walnut gene pool

has been the subject of research for many years [7].

At the Uzbek Research Institute of Forestry, many forms of walnut have been selected and studied [5,6].

The selection of promising forms was carried out on the selected forms from the existing walnut orchards in Bostanlyk and Parkent districts of Tashkent region.

As a result of the research, new plus trees were selected from the existing walnut orchards. Among these plus trees, 4 forms (Khumson-1, Khumson-2, Khumson-5, Parkent-2) were selected for evaluation.

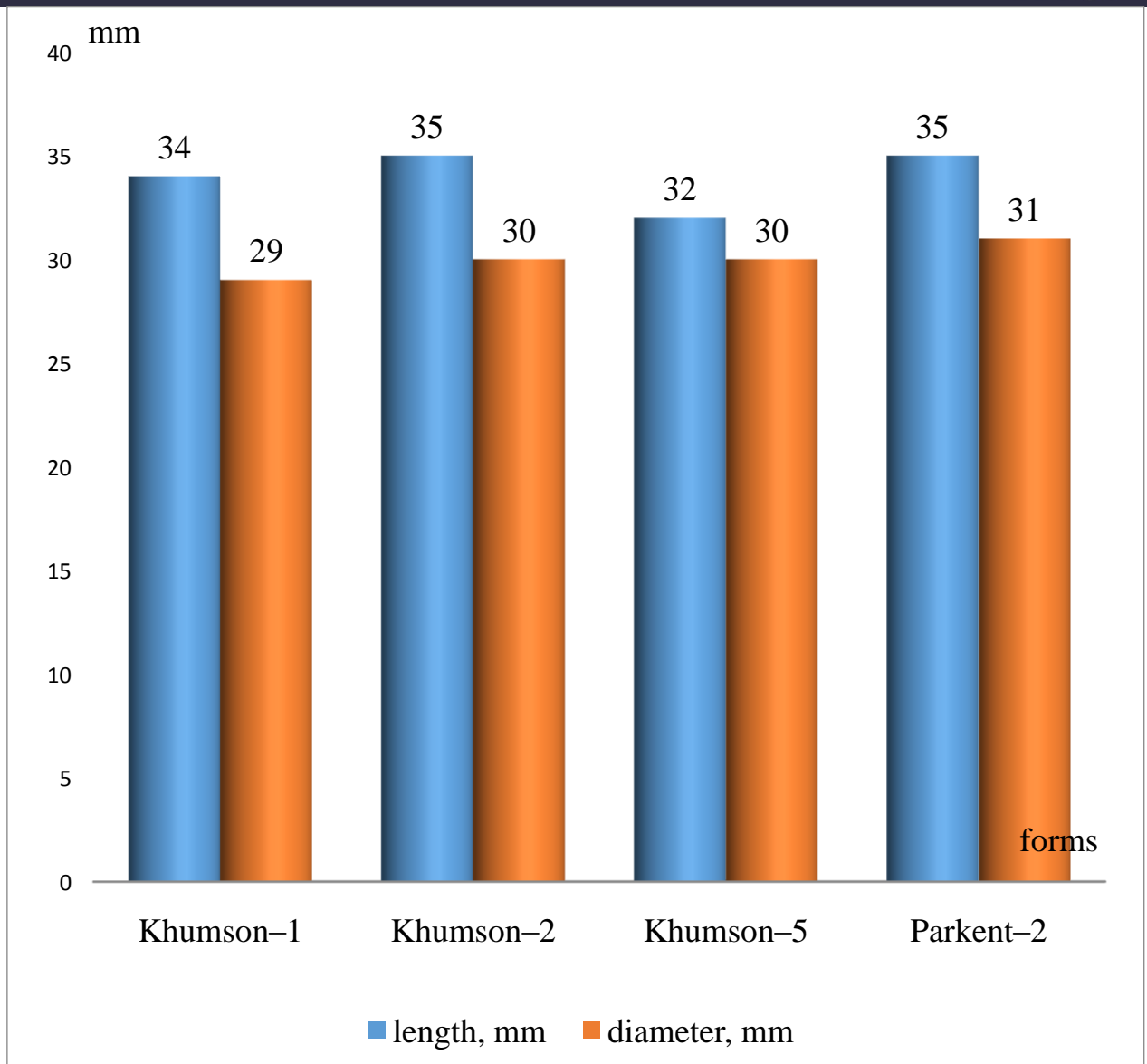


Figure-1. Indicators of length and mean diameter of selected walnut forms, mm

When the fruit sizes of the selected forms were analyzed, their length was 32–35mm, and it was $32 \pm 0,10$ mm (1 point) in the form Khumson-5, $34 \pm 0,12$ mm (2 points) in the form Khumson-1, in the remaining forms (Khumson-5 and Parkent-2) the indicator was $35 \pm 0,06$ mm (3 points). Based on these indicators of the fruits of the selected forms, we can see that they have a round appearance. Indicators of mean diameter of walnut fruit constituted 29–31 mm, particularly, in Khumson-1 form it

was $29 \pm 0,02$ (2 point), in Khumson-2, Khumson-5 forms $30 \pm 0,07$ mm (3 point) and in Parkent-2 form $31 \pm 0,04$ mm (3 point) (fig-1). When the indicators of these forms are compared to the varieties Sadko, Yakisniy-1, Porig, Suzirya, Petlura and Shukhevich [12] grown in the Ukraine (fruit length 35 mm, mean diameter 30 mm) the fruit length and mean diameter of the forms Parkent-2 and Khumson-5 can be noted to be good enough.

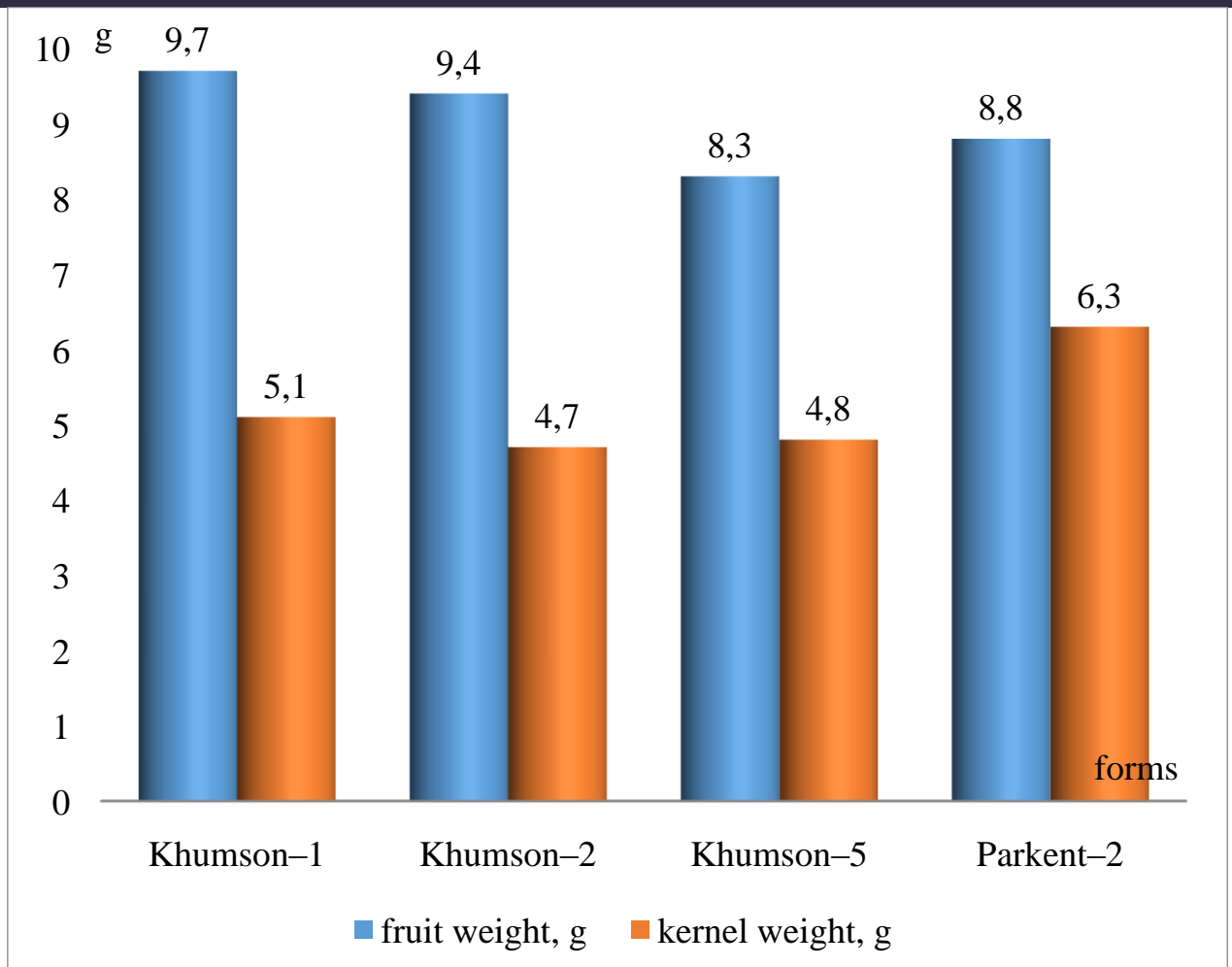


Figure-2. The weight of 1 piece of walnut and its kernel in the selected forms, g

When the fruit weight of selected forms was analyzed, Khumson-1 and Khumson-2 forms performed higher indicators on this regard compared to other forms (fruit weight 9,4-9,7 gr). Their fruit weight indicators were noted to be 1,1-1,17 times higher than other selected forms. Selected forms Khumson-5 and Parkent-2

had the lowest indicators by their fruit weight, 8,3-8,8 gr. It means their selection point is equal to 2 point. By kernel weight, the indicators of the forms made 4,7-6,3 gr. If the nut weight of the varieties grown in the Ukraine made 11,01 g, and kernel weight 5,4 g, the kernel yield of selected forms are found out to be better enough.

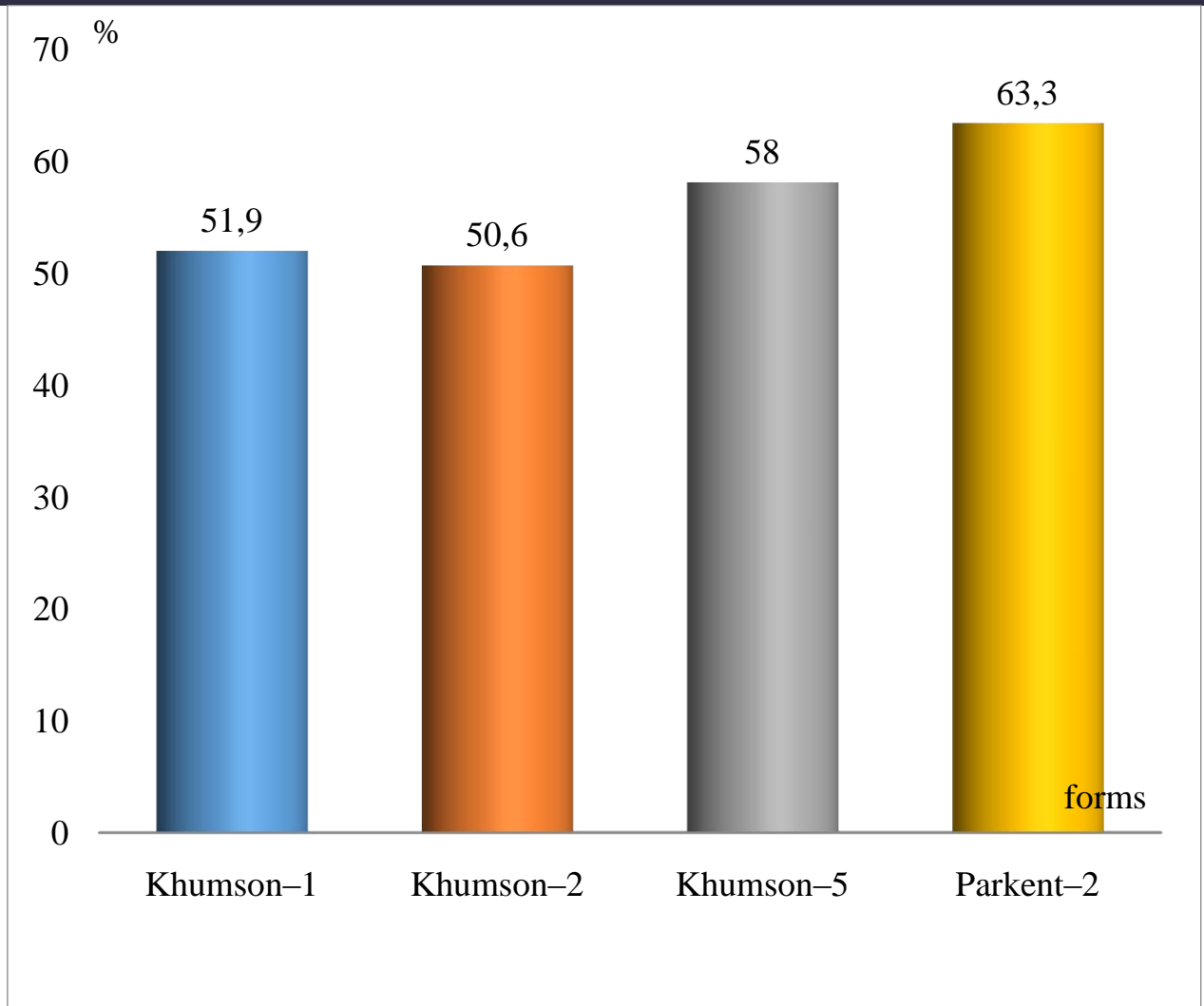


Figure-3. Kernel yield rate of Persian walnut selected forms, %

Due to the high biodiversity in walnut orchards, it is necessary to study and then to select promising forms. One of the main indicators in the selection of nut forms is the yielding rate of walnut kernels. In terms of the yield of walnut kernels, it is very important to choose forms with a value higher than 56,0%. When analyzing all the selected forms indicators by kernel, the indicators of the selected forms from the Tashkent oasis ranged from 58,0% to 63,3%. The forms being grown in Tashkent oasis Khumson-5 and Parkent-2 showed $58,0 \pm 1,40$ and $63,3 \pm 1,53$ results by kernel yield. Considering that the rate of varieties in the Ukraine in terms of kernel yield is

49%, these forms (Khumson-5 and Parkent-2) can be studied as a promising form due to the high kernel yield rate (56,0 and above).

Conclusion

Biodiversity is very high in natural nut forests of our republic, and it is very important to choose the most valuable forms among them. Like in other species, the selection of promising forms of walnut requires an assessment of the yield of walnut kernels. In this regard, Khumson-5 ($58,0 \pm 1,40$) and Parkent-2 ($63,3 \pm 1,53$) forms with 5 point indicator (56,0% and above) can be recommended to production as a promising form.

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References

1. Азимов И.А., Гиязов С.Н., Шамсиев К.Ш. Морфолого – биохимическая характеристика перепективных форм орехоплодовых в Узбекистане //Материалы Республиканской школы семинара молодых ученых и специалистов по проблемам повышения эффективности сельскохозяйственного производства в свете решений июльского (1978 г) Пленума, Ташкент 1979.-С.38-47.
2. Бутков Е.А. Рекомендации по выращиванию плантации грецкого ореха по садовому типу в Узбекистане Ташкент 2009.-25 с.
3. Журавская А.Ф. Разнообразие мутаций грецкого ореха (*Juglans regia* L) Таджикистана и их селекционное значение //Материалы Республиканской школы семинара молодых ученых и специалистов по проблемам повышения эффективности сельскохозяйственного производства в свете решений июльского (1978 г) Пленума, Ташкент 1979. С 84-88
4. Колов О.В. Орех грецкий (*Juglans regia* L.) //Выявление и оценка видового и внутривидового биоразнообразия лесных пород. Ташкент 2002 С.-46.
5. Шевченко В.С. Отбор и размножение орехоплодовых в южной Киргизии. Автореф. дисс. на соис. уч. ст. канд. с.-х. наук Ташкент 1970-22 с.
6. Холдоров У.Х. Создание плантации ореха грецкого в горных районах Таджикистана – Лесное хозяйство 1982. №2 С 32-34.
7. Калмыков С.С. Биология цветения и урожайность грецкого ореха//Материалы совещания по развитию ореховодства 23-28. 09.1968. г.Джалал-Абад. -Кыргызстан, 1970.- С.154-158.
8. Шамсиев К.Ш., Александровский Е.С., Бутков Е.А. и др. Рекомендации по выращиванию плантаций ореха грецкого и фисташки в Узбекистане. Ташкент, 1983.
9. Щепотьев Ф.Л. и др. Программа и методика селекции и сортоизучения орехоплодовых культур. Воронеж, 1976. - 77с.
10. Hassani D. et al. Situation and recent trends on cultivation and breeding of Persian walnut in Iran //ScientiaHorticulturae. – 2020. – Т. 270. – С. 109369.doi:10.1016/j.scienta.2020.109369
11. WorldAtlas.<https://www.worldatlas.com/articles/the-top-walnut-producing-countries-in-the-world.html>
12. L.S. Shugin 2018 <http://www.сад-элита.com/walnut>