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ASSESSMENT OF PROMISING LOCAL WALNUT FORMS FOR THE SOUTH AND SOUTH-EAST OF KAZAKHSTAN

Abstract. Currently, Kazakhstan has increased interest in nut crops, especially walnuts, which bring stable yields in the most favorable areas for it. Walnut is a valuable product, and its industrial cultivation in the southern regions of the Republic has a certain perspective.

Biometric observations, accounting for productivity and average weight of the fetus and nucleus, and phenological observations were carried out. The General condition of plants was also assessed.

Selected and studied 3 forms established during the period of expedition research in the Almaty region and two in Turkestan. Observations of promising forms of walnuts in two regions have shown that the previously selected forms show a fairly high adaptive stability and yield stable yields of high enough quality. It should also be noted that the fruiting of 2018 Almaty forms took place after winter drops to -33°C and 10 days of steady cooling at the level of 23-28°C. This allows us to include all three promising forms, Aliyar (Issyk), Enbekshikazakh district, Krivenok from Kyrgyzaulda and from the Seidaliev estate, Karasay district. The largest of them is Aliyar, with an average weight of more than 13 g, a core yield of 51%, and not very strong shell. The seidali form is the least large-fruited and does not meet the requirements for the size of the fruit. The form of Kyrgyzaulda also does not reach 11 g, but it has almost a paper shell and an excellent taste of the core, which can even be attributed to dessert. The unique properties of the Turbat nut from the 19th century continue to surprise. No frost damage and saving in more. more than 100 years of age of physiological activity. This year's yield was higher, while maintaining the size of nuts with an average weight of 13 g. Further work is planned to introduce it to culture in vitro for micro-propagation and prepare documentation for recognition as a breeding achievement of global significance.

Key words: walnut, forms, evaluation, selection, phenology, biometrics.

Introduction. Currently, Kazakhstan has increased interest in nut crops, especially walnuts, which bring stable yields in the most favorable areas for it. Walnut is a valuable product, and its industrial cultivation in the southern regions of the Republic has a certain perspective. This is facilitated by favorable soil and climate conditions, and the availability of free space. The South of Kazakhstan is the most favorable region for walnut production [1]. Kazakh horticulture, including the most favorable environmental conditions of the Turkestan region, focuses, with some exceptions, on one fruit crop, the Apple tree. There are more cost-effective directions in the development of Kazakhstan's horticulture that previously were not given due attention. This is primarily nut farming, which is one of the most profitable and competitive industries [2-4]. Even 5 years ago, nut crops and almost only one walnut were cultivated only as household crops or in windbreaks. And plantation planting began to produce only in recent years and not always successfully. In addition to agrotechnical aspects, there were problems with the adaptability of varieties introduced from abroad. The South and especially the South-East of Kazakhstan are not the zone of ecological optimum for walnut culture, and it is exposed here damaged by low

temperatures in winter and frosts in spring. At the same time, in Moldova, Poland and Ukraine, such temperature drops to 25-28°C, and sometimes even 30°C walnut tolerates almost painlessly. This suggests that its adaptability is reduced not only in winter due to temperature differences accompanied by thaws, but also in summer temperatures and humidity. Walnuts are mainly cultivated in a temperate climate and the favorable environmental factors for them are high humidity of the soil and air not only in summer, but also in autumn. An extremely hot and dry climate can worsen preparations for winter and reduce the level of damaging, critical temperatures. It should be remembered that the walnut has even higher requirements for water supply than the Apple tree [5-8]. Such a global variety as Chandler is subjected to winter damage almost everywhere. At the same time, in the South and South-East of the Republic, highly adaptive forms with a fairly high quality of fruit are found in abundance in woodlands and homesteads. Individual copies are more than 100 years old. In this regard, the search for, accelerated assessment and reproduction of highly adaptive local forms is an urgent task.

Objects and methods. Biometric observations, accounting for productivity and average weight of the fetus and nucleus, and phenological observations were carried out. The General condition of plants was also evaluated [9-12].

The objects of study were 3 forms established during the period of expedition research in the Almaty region and two in Turkestan. In addition, the study of 155 promising seed forms from Turkey and a stationary collection of previously selected Saryagash forms in"Saryagash Zher Syyy" LLP will be conducted.

Research conditions. Areas of concentration of promising walnut specimens in the Almaty region are located at altitudes from 700 to 1000 m above sea level in the arid foothill zone and are characterized by a sharply continental climate, low humidity, plenty of sunlight, and a short but rather cold winter.

The transition of air temperature from positive to negative values can occur from the first decade of November, in some years from the second decade of December. Stable snow cover is formed in late November and early December. The duration of the snow period is 85–100 days. The snow cover is uneven its height is on average 20–35 cm. during frequent winter thaws, there is a complete snow cover convergence. The absolute minimum temperature registered on the territory of the experimental farm is -36 °C. A steady transition of air temperature through 0oC in spring occurs at the end of the second and beginning of the third decade of March. The spring period is short 30-50 days, with a sharp increase in temperature and a daily temperature fluctuation. Frosts with snowfall are often observed. Frosts stop in the last decade of April – the first decade of May. The average duration of the frost-free period in this zone is 150–170 days. In spring, the main reserves of soil moisture accumulate due to precipitation (March-may), when almost half of the entire annual rate falls. The maximum temperature recorded in spring is +35 °C. The longest season of the year is summer (120–180 days). The hot period can start from the second decade of April, and continue until the second decade of October. The average temperature is +20+24°C. The amplitude of daily fluctuations in daytime and night temperatures is quite high and is on average more than 20°C. The sum of positive temperatures for the summer period is 3450–3750°C, and the sum of temperatures for the period above 10°C ranges from 3100–3400°C. Relative humidity decreases in early June due to a sharp increase in air temperature and is within the range of 46–48%, with an average annual 55-60%. The amount of precipitation in comparison with spring significantly decreases, 2–3 times, during the summer the monthly precipitation rate may fall for 1 day.

The autumn temperature transition through 15°C begins in the third decade of September - early October, the duration of this period ranges from 30 to 50 days. The amplitude of daily fluctuations in daytime and night temperatures reaches 25–30 °C.

Annual precipitation ranges from 350–420 mm. During the warm period of the year, 120–300 mm of precipitation falls.

The foothill soils are gray-chestnut, mostly medium-loam and dusty. The humus horizon is clearly defined, has a brownish color and a thickness of up to 26-30 cm, contains from 2 to 2.8 % of humus. The content of the main nutrition elements in the soil is as follows: N-6-9mg/100 g, P2O5-2-4mg/100 g, K2O-mg/100 g.

In the upper part of the soil zone, there are richer humus-free mountain chernozems with a humus content of 5-6%.

For the South of Kazakhstan, the most typical are gray-earth soils. They have such a characteristic-the Soil profile of light loamy serozems is characterized by the following morphological features and properties:

According to mechanical analysis, the soil data is medium loam, since the content of particles less than 0.01 mm in the 0-0.25 cm horizon is-30.62-33.76%, in the layer of 25-50 cm-29.78-35.11%. The predominant fraction in the composition of mechanical soil fractions is coarse dust (particles 0.05-0.01 mm) - 37.18 - 43.99% and fine sand (particles 0.25 - 0.01 mm) - 24.66-27.94%.

According to chemical analysis in the upper 0-25 cm horizon, this soil variety contains humus 0.74-0.96%, and in 25-50 cm-0.26-0.40%. The average humus content in the 0-50 cm layer is 0.56%.

According to the analysis of water extraction, the described soils are not salted with easily soluble salts, since the dense residue over the entire soil profile does not exceed 0.056-0.060%.

Care for the plantings consisted of watering during the hot season at the collection site in Saryagash Zher Syyy. In other areas, there was a natural background of water supply. Pesticides and fertilizers were also not used.

Results and discussion. In 2019, the study of promising forms and varieties was continued in order to further adapt them to the conditions of the South and South - East of Kazakhstan. Selected and studied 3 forms established during the period of expedition research in the Almaty region and two in Turkestan. In addition, the study of 155 promising seed forms from Turkey and a stationary collection of previously selected Saryagash forms in "Saryagash Zher Syyy" LLP will be conducted. Observations of the dynamics of development of the selected forms and varieties showed that there were no significant changes in the onset of individual development in control plants compared to the previous year. the beginning of vegetation, determined by the beginning of growth of shoots, was also delayed by about two weeks, and flowering by 7-8 days compared to the Apple tree (table 1). There are also differences in phenology in the two zones we study, the South and South-East. In the South, due to the significantly greater heat supply of the region, the phenological phases of the development of the walnut plant take place about 1 month earlier.

Biometric observations were also continued during the current year. There was a slight increase in age trees and a more significant increase in young trees (table 2).

For example, in the studied Turkish forms, the increase in the rate of infertility reached 10-13%. The same trend was observed in relation to the diameter of the stem and the size of the crown projection.

It should also be noted Almaty from the estate of Krivenok, p Kyrgauldy. It did not have enough 2 g to reach the standard size by European standards, but this form was distinguished by the most easily cracked shell, almost like the representatives of the paper group of varieties. The fruits of this form also had a better taste compared to all the studied forms. In 2019, a new form was installed in the village of Almaly. It is characterized by large fruits with a not very strong shell and a good taste of the fruit. It is also distinguished by the lateral type of fruiting. According to the Turkish forms, you can already make preliminary conclusions in accordance with their speed and large-scale fruitfulness. Their fruiting began at 4 years, all of them are relatively large-fruited. No winter damage was noted on them. The most interesting are 3 forms. One for their productivity, and two for the large size. The same expedition work to study the genetic resources of walnuts was carried out in other regions of southern Kazakhstan [13].

It should also be noted that the high level of fruit damage in 2019 at the stationary collection in "Saryagash Zher Syyy" LLP reached 10-15% of the fruitworm.

Observations of promising forms of walnuts in two regions have shown that the previously selected forms show a fairly high adaptive stability and yield stable yields of high enough quality. It should also be noted that the fruiting of 2018 Almaty forms took place after winter drops to-33°C and 10 days of steady cooling at the level of 23-28°C. This allows us to include all three promising forms, Aliyar (Issyk), Enbekshikazakh district, Krivenok from Kyrgyzaulda and from the Seidaliev estate, Karasay district. The largest of them is Aliyar, with an average weight of more than 13 g, a core yield of 51%, and not very strong shell. The seidali form is the least large-fruited and does not meet the requirements for the size of the fruit. The form of Kyrgyzaulda also does not reach 11 g, but it has almost a paper shell and an excellent taste of the core, which can even be attributed to dessert.

Table 1-Phenological development of various varieties and forms of walnuts

	Varieties and forms	Tree age	Start of growth of shoots	Beginning of flowering	The appearance of the ovaries	Beginning of maturation (darkening of the exocarp)	Maturation after collection	Defoliation
1	Seydaliev	13	3rd decade of April	End of the 1st decade of may	End of the 2nd decade of may	early October	mid-October	3rd decade of October
		Almaty region, Karasay district, Kargaly village, 997 m. above sea level, Latitude 43010/52 / / N; Longitude 760 50/40/ / E						
2	Krivenok	20	3rd decade of April	End of the 1st decade of may	End of the 2nd decade of may	early October	mid-October	3rd decade of October
		Almaty region, Karasay district, p. Kyrgyzauldy, 888 m. above us, Latitude 43010/28/ / N; Longitude 760 45/ 50//E						
3	Aliyar	28	3rd decade of April	End of the 1st decade of may	End of the 2nd decade of may	early October	mid-October	3rd decade of October
		Almaty region, Enbekshikazakh district, Almaly village, 950 m above sea level.						
3	Ideal	17	End of March-Beginning of April	April 10	End of the 2nd decade of April	end of September	Early-mid November	November 17
4	T- 8/13	5	-	-	-	end of September	-	-
6	T- 6/14	5	-	-	-	end of September	-	-
7	T- 7/2	5	-	-	-	end of September	-	-
8	T- 8/9	5	-	-	-	end of September	-	-
9	Liaohe-1	8	-	-	-	end of September	-	-
10	Rootstock of Liaohe-1	7	-	-	-	end of September	-	-
11	Saryagash - 11/14	≈ 16	-	-	-	end of September	-	-
12	Saryagash - 4/9	≈ 26	-	-	-	end of September	-	-
13	Saryagash - 12	≈ 41	-	-	-	end of September	-	-
14	Saryagash - 22	≈ 36	-	-	-	end of September	-	-
15	Keles - 6	≈ 51	-	-	-	early October	-	-
16	Turbat	≈130	1 decade of April	2 decade of April	beginning of the 3rd decade of April	early October	-	-

Table 2-Biometric observation data

	Varieties and forms	The height of the tree, m		Diameter of the stem, see		Crown diameter, m		The number of fruits on the tree, pieces		Average fruit weight, g/out of the nucleus %		Crop, tree/kg	
		2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
1.	Seydaliev	4,5	4,5	17	17	5,5	5,5	2525	3292	8,1/50	8,2/50	≈21	≈27
2	Krivenok	5,6	5,8	22	23	7,5	7,8	2650	3870	9,0/51	9,3/52	≈24	≈36
3	Aliyar	6	6.2	26	28	7,9	8,1	2830	3383	13.0/51	13,3/51	≈37	≈45
4	Ideal	6,4	6,8	15	17	6	6	710	504	10,2/50	10,5/51	7,2	5,3
5	T- 8/13	2,5	2,9	5,4	5,7	1,8	2,1	85	196	13,3/50	13,2/50	1,2	2,6
6	T- 6/14	2.2	2.5	4,9	5,2	1,6	1,8	75	192	12,7/52	12,5/52	1	2,4
7	T- 7/2	2,4	2.8	4,8	5,1	1,4	1,7	53	200	13.2/51	13/51	0,7	2.6
8	T- 8/9	2,8	3,1	4,6	4,9	1,7	2	33	239	13,5/53	13,8/53	0.5	3,3
9	Liaohe-1	3,2	3,5	11,8	12,2	2,4	2,8	106	247	21,9	22,2/52	2,3	5,5
10	Rootstock of Liaohe-1	3,3	3,7	12,2	13	2,6	3	517	807	7,5/51	7,8/51	3,9	6,3
11	Saryagash - 11/14	5,5	5,7	15	17	5,7	6	1020	806	12,1/52	12,4/53	12,3	10
12	Saryagash - 4/9	11,6	12	47	49	5	5	1230	672	16,6/52	17,1/53	20,4	11,5
13	Saryagash - 12	9,6	10	36	38	7.6	8,2	1330	1174	13,1/51	13.2/51	17,7	15.5
14	Saryagash - 22	8,2	8,5	23	26	5,8	6,1	1238	1094	11,5/50	11,6/50	14,2	12,7
15	Keles - 6	9,6	10	35	38	7,5	8	1767	1533	11,7/51	12/51	18	18,4
16	Turbat	15	15	120	120	20	20	6125	6538	13,3/51	13/51	≈81	≈85

In the study of the forms found in Turkestan region by Shantsevym T. B also have a very promising form. Of great interest is the Chinese, low-growing variety Liaohe-1 with fruits weighing more than 20 g and paper shells. Its disadvantage, noted in plantings of 10-11 years – it is not high enough resistance to bacterial burn in the year of planting. However, this problem was solved by agronomic with special poslepoludennoe mash, which is added to topsin. We also selected 4 promising short term Turkish forms that formed the first fruits for 4 years after planting with a weight of about 13 g They show no signs of winter damage.

The unique properties of the Turbat nut from the 19th century continue to surprise. No frost damage and saving in more. more than 100 years of age of physiological activity. This year's yield was higher, while maintaining the size of nuts with an average weight of 13 g. Further work is planned to introduce it to culture in vitro for micro-propagation, which we have worked out [14] and prepare documentation for recognizing it as a breeding achievement of global significance.

Conclusion. The prospects for the use of local forms of high-quality fruits for their accelerated micro-propagation and plantation cultivation in the conditions of the Almaty and Turkestan regions have been established. Of most interest are the form A. and Krivenok for South-East Akim to the South. In the South, the Liaohe-1 variety is also promising if preventive measures are taken to combat bacteriosis in the post-planting period. A comprehensive assessment of the four perishable Turkish forms should be continued. It is also necessary to carry out targeted introduction of complex resistant varieties with lateral fruiting type from abroad.

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ҚАЗАҚСТАННЫҢ ОҢТҮСТІК ЖӘНЕ ОҢТҮСТІК-ШЫҒЫСЫНДАҒЫ ГРЕК ЖАҢҒАҒЫНЫҢ ЖЕРГІЛІКТІ ПЕРСПЕКТИВТІ ФОРМАЛАРЫН БАҒАЛАУ

Аннотация. Қазіргі уақытта Қазақстанда жаңғақ дақылына, соның ішінде қолайлы аймақта тұрақты өнім беретін грек жаңғағына қызығушылық артуда. Грек жаңғағы өте бағалы тағамдық өнім, оны республикамыздың оңтүстік өңірлерінде өнеркәсіптік деңгейде өсіру өте перспективті болып саналады. Аталған өңір өсіруге қолайлы топырақ-климат жағдайы мен бос танаптық аймақ болып есептеледі. Қазақстанның оңтүстігі – грек жаңғағын өсіруге айтарлықтай қолайлы аймақ. Түркістан облысы көп жыл бойы негізінен тек алма дақылын өсіруге бағытталған. Қазастанның бақ шаруашылығын дамытуда бұрын жақсы көңіл бөлінбеген айтарлықтай экономикалық тиімді бағыт – жаңғақ шаруашылығы. Ол бірінші кезеңде табысты және бәсекеге қабілетті сала болып саналады. Грек жаңғағы негізінен қоңыржай аймақта өсетін дақыл болғандықтан, ол үшін қоршаған ортаның жаз және көктем айындағы топырық және ауа ылғалдылығы қолайлы болып есептеледі. Өте ыстық және құрғақ климат өсімдіктің қысқа дайындығын төмендетіп, аязда зақымдайды. Есте сақтайтын жағдай, грек жаңғағының алма ағашына қарағанда ылғалға деген талабы өте жоғары. Әлемге танымал сорт Чандлер, барлық жерлерде қыста зақымданған. Сонымен бірге республиканың оңтүстік және оңтүстік шығысында орман алқабында және үй аймағында жоғары бейімделген, жемісі айтарлықтай сапалы формалар кездеседі. 100 жылдан асқан жеке түрлер де кездеседі. Осыған байланысты бейімділігі жоғары жергілікті формаларды іздеп, жылдам бағалап және көбейту маңызды тапсырма болып саналады.

Биометриялық бақылау, өнім есептеу және жеміс пен ішкі ядронының орташа салмағы, фенологиялық бақылау жұмыстары жүргізілді.

Зерттеу нысаны болып Алматы және Түркістан облыстарына жүргізілген экспедициялық зерттеу жұмыстары кезінде анықталған грек жаңғағының 3 формасы алынды. Одан басқа «Сарағаш жер сыйы» ЖШС стационарлық коллекциясынан сұрыпталған Сарағаш формалары мен Түркиядан әкелінген 155 тұқымдық перспективалық формалар зерттелді.

Биыл биометриялық бақылаулар жалғастырылды. Үлкен ағаштың баяу және жас ағаштың өскендігі анықталды.

Мысалға, ерте жетілуі арқылы ерекшеленетін зерттелген Түрік формаларының өсімі 10-13% артты. Осындай өсім бағананың диаметрі мен тәждің көлемінен байқалды.

Екі аймақтағы перспективті формаларға жүргізілген зерттеулер бұрын таңдалған формалардың бейімдел-гіштігі жоғары және сапалы, тұрақты өнім беретіндігін анықтады. Тағы бір айта кететін жағдай, 2018 жылғы қысқы -33 °С және 10 күн бойы 23-28 °С тұрақты аяздан кейін алматылық формалардың жеміс

беру үдерісі. Алияр (Есік формасы), Еңбешіқазақ ауданы, Кривенок Қырғауылдыдан және Сейдалиев аумағынан Қарасай ауданынан алынған барлық үш перспективті формалардың суыққа төзімді екенін көрсетеді. Осы формалардың ішіндегі ең орташа салмағы жоғарысы алияр – 13 г жоғары, ядро шығымы 51% және сыртқы қабығы аса қатты емес. Сейдалиев формасы орташа ірі болғандықтан жемістің көлеміне қойылатын таптарға сай келмеді. Қырғауылды формасының да салмағы 11 г жетпеді, бірақ оның қабығы өте жұқа қағаз тәрізді және ядросы дәмді әрі десерттік топқа жатқызуға болады. Түркістан облысында Т.Б. Шынтасовтың формаларға жүргізген зерттеулерінен айтарлықтай перспективті формалар анықталды. Соның ішінде қытайлық кішкентай жеміс салмағы 20 г асатын және қағаз тәрізді қабығы бар Ляохэ-1 сорты үлкен қызығушылық тудыруда. Оның бір кемшілігі, 2010-2011 жылдары отырғызылған ағаштардың сол жылы бактериялық күйік ауыруына шалдығуы. Бірақ бұл мәселе арнайы агротехникалық шара, яғни топсин қосылған сұйықтықпен ортырғызғаннан кейін суару арқылы шешілді. Одан басқа 4 жылдам жеміс беретін перспективті түрік формалары іріктелді, бұл формалар отырғызғаннан кейін 4-жылы салмағы 13 асатын жеміс берген. Олардан қысқы зақымдану белгілері байқалмады.

19 ғасырдан жеткен турбат грек жаңғағының ерекше қасиеттері таң қалдыруда. Яғни, аязда зақымданбайды және 100 жылдан аса уақыт өтсе де физиологиялық белсенділігі сақталған. Биылғы жылдық өнімі мен жемісінің орташа салмағы 13 г жоғары. Бұл форманы in vitro жағдайында микроклонды көбейтіп және жаһандық маңызы бар селекциялық жетістік ретінде тану үшін құжаттама дайындау жоспарлануда.

Түйін сөздер: грек жаңғағы, формалар, бағалау, сұрыптау, фенология, биометрия.

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ОЦЕНКА ПЕРСПЕКТИВНЫЕ МЕСТНЫХ ФОРМ ГРЕЦКОГО ОРЕХА ДЛЯ ЮГА И ЮГО-ВОСТОКА КАЗАХСТАНА

Аннотация. В настоящее время в Казахстане возрос интерес к орехоплодным культурам, особенно к грецкому ореху, приносящему стабильные урожаи в наиболее благоприятных для него зонах. Грецкий орех является ценным продуктом питание и его промышленное выращивание в южных регионах республики имеет определённую перспективу. Этому способствуют благоприятные почвенно-климатические условия и наличие свободных площадей. Юг Казахстана является наиболее благоприятным регионом для производства грецкого ореха. Казахстанское садоводство, в том числе и наиболее благоприятной по экологическим условиям Туркестанской области, ориентируется, за отдельными исключениями, на одну плодовую культуру – яблоню. Существуют более экономически выгодные направления в развитии казахстанского садоводства, которым раньше не уделялось должного внимания. Это в первую очередь ореховодство, являющееся одной из самых прибыльных и конкурентноспособных отраслей. Грецкий орех – культура в основном умеренного климата и для него благоприятными факторами внешней среды являются высокая влажность почвы и воздуха не только летом, но и осенью. Экстремально жаркий и сухой климат может ухудшить подготовку к зиме и снизить уровень повреждающих, критических температур. Необходимо помнить, что грецкий орех предъявляет даже более высокие требования к влагобеспечению, чем яблоня. Такой глобальный сорт, как Чандлер подвергается зимним повреждениям практически повсеместно. При этом на юг и юго-востоке республики в изобилии встречаются в лесопосадках и приусадебных участках высокоадаптивные формы с достаточно высоким качеством плодов. Отдельным экземплярам более 100 лет. В связи с этим поиск, ускоренная оценка и размножение высокоадаптивных местных форм является актуальной задачей.

Проводились биометрические наблюдения, учет продуктивности и средней массы плода и ядра, фенологические наблюдения. Оценивалось также общее состояние растений.

Объектами изучения были 3 формы установленные в период проведения экспедиционных исследований в Алматинской области и две в Туркестанской. Кроме этого, проводиться изучение 155 перспективных семенных форм из Турции и стационарной коллекции отобранных ранее Сарыагашских форм в ТОО"Сарыагаш Жер Сыйы".

В течение текущего годы были также продолжены биометрические наблюдения. Установлено незначительное увеличение возрастных деревьев и более существенное у молодых.

Например, у изучаемых Турецких форм выделившихся по скороплодности увеличение достигло 10-13%. Таже тенденция наблюдалась и в отношении диаметра штамба величины проекции кроны.

Наблюдения за перспективными формами грецкого орех в двух регионах показали, что отобранные ранее формы проявляют достаточно высокую адаптационную устойчивость и дают стабильные урожаи достаточно высокого качества. Следует также отметить, что плодоношение 2018 года Алматинских форм проходила после зимних понижений до -33 °С и 10 днях устойчивого похолодания на уровне 23-28 °С. Это позволяет отнести все три перспективных формы Алияр (Иссыкская), Енбекшиказахский район, Кривенок из

Кыргаулды и из усадьбы Сейдалиева, Карасайского района. Самая крупноплодная из них Алияр, средней массой более 13 г, выходом ядра 51% и не очень крепкой скорлупой. Сейдалиевская форма наименее крупноплодная и не соответствует требованиям, предъявляемым к размеру плода. Форма из Кыргаулды также не достигает 11 г, но имеет почти бумажную скорлупу и отличный вкус ядра, который можно даже отнести к десертным. При изучении форм, найденных в Туркестанской области, Шынтасовым Т. Б. также установлены достаточно перспективные формы. Большой интерес представляет Китайский, слаборослый сорт Ляохэ-1 с плодами массой более 20 г и бумажной скорлупой. Его недостаток, отмеченный в посадках 10-11 года – это недостаточно высокая устойчивость к бактериальному ожогу в год посадки. Однако эта проблема была решена агротехническим путём с помощью специальной послепосадочной болтушки, в которую добавляется топсин. Отобраны также 4 перспективные скороплодные турецкие формы образовавшие первые плоды на 4 год после посадки с массой порядка 13 г. На них не отмечено признаков зимних повреждений.

Уникальные свойства Турбатского ореха из 19 века продолжают удивлять. Никаких морозобойных повреждений и сохранение в более чем 100-летнем возрасте физиологической активности. Урожайность этого года была выше, при сохранении размеров орехов средней массой 13 г. Планируется дальнейшая работа по введению его в культуру in vitro для микроразмножения и подготовка документации для признания его селекционным достижением глобального значения.

Ключевые слова: грецкий орех, формы, оценка, отбор, фенология, биометрия.

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