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 fruit 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 Kyrgyzaula 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 Kyrgyzaula 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 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]. Kazakhstan 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 0°C 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 Kyrgyzaud. 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 Almaty. 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 Kyrgyzaud 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 scidali form is the least large-fruited and does not meet the requirements for the size of the fruit. The form of Kyrgyzaud 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

<table>
<thead>
<tr>
<th>Varieties and forms</th>
<th>Tree age</th>
<th>Start of growth of shoots</th>
<th>Beginning of flowering</th>
<th>The appearance of the ovaries</th>
<th>Maturity after collection</th>
<th>Defoliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Seydalaiev</td>
<td>13</td>
<td>3rd decade of April</td>
<td>End of the 1st decade of May</td>
<td>End of the 2nd decade of May</td>
<td>early October</td>
<td>mid-October</td>
</tr>
<tr>
<td>2 Krivenev</td>
<td>20</td>
<td>3rd decade of April</td>
<td>End of the 1st decade of May</td>
<td>End of the 2nd decade of May</td>
<td>early October</td>
<td>mid-October</td>
</tr>
<tr>
<td>3 Aliyar</td>
<td>28</td>
<td>3rd decade of April</td>
<td>End of the 1st decade of May</td>
<td>End of the 2nd decade of May</td>
<td>early October</td>
<td>mid-October</td>
</tr>
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Almaty region, Karasay district, Karasay village, 497 m above sea level, Latitude 43°50'52" N, Longitude 76°50'40" E

4 Ideal              | 17       | End of March - Beginning of April 10 | End of the 2nd decade of April | end of September | Early-mid November | November 17 |

Almaty region, Enbekshakaz district, Almaly, village, 950 m above sea level

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 Lishe-1            | 8        | -                          | -                         | end of September | -                  | -           |
10 Rootstock of Lishe-1 | 7     | -                          | -                         | end of September | -                  | -           |
11 Saryagash - 11/14 | 16       | -                          | -                         | end of September | -                  | -           |
12 Saryagash - 4/9   | 36       | -                          | -                         | 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>
<thead>
<tr>
<th>Table 2 - Biometric observation data</th>
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<tr>
<td>Varieties and forms</td>
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</tr>
<tr>
<td>1. Seydaisiev</td>
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<tr>
<td>2. Krivenok</td>
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<td>4. Ideal</td>
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<td>5. T3: 8/13</td>
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<td>6. T3: 6/14</td>
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<td>7. T3: 7/2</td>
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<td>8. T3: 8/9</td>
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<td>9. Liaohe-1</td>
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<td>10. Rootstock of Liaohe-1</td>
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<td>11. Sarygash-11/4</td>
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<td>12. Sarygash-4/9</td>
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<td>13. Sarygash-12</td>
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<td>14. Sarygash-22</td>
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<td>15. Keles-6</td>
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<tr>
<td>16. Turbat</td>
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</table>
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 Liaoho-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 topsis. 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 Liaoho-1 variety is 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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ҚАЗАҚСТАНДЫҢ ОҢТУСТІК ЖӘНЕ ОҢТУСТІК-ШЫҒЫСЫНДАҒЫ ГРЕК ЖАҢАГЫНЫҢ ЖЕРГІЛЕКІ ПЕРСПЕКТИВТІ ФОРМАЛАРЫН БАҒАЛАУ

Аннотация. Қазіргі уақытта Қазақстанда жаңақ даяқлына, сондың ішінде колайлы аймақта тұқымдас өкіл бөрінің грек жаңағының қызығушылығы артық. Грек жаңағы орта багалаған тағамдық өкіл, оның ресулиятының оңтустік енірлерінде энергетикалық жылдығы өсірі ететін пен перспективті болып тағалады.

Қазақстандағы оңтустік – грек жаңағының өсірінше айтарлайтойт көлікті аймақ. Түркістан облысы қоңыр жоғару жасы аймақтың жетілген қызғалының сәледе ар түрлі қызғалының аймақтары. Алғашқы айңығы құрқамдағы айқынтықтың әсері. Грек жаңағының қозғалыс ізге етудің қызғалының үлкен өсірі өсірі. Грек жаңағының қозғалыс ізге етудің қызғалының үлкен өсірі.
беру үдерісі. Алияр (Есік формасы), Еңбегішің ауданда, Көркемен Құрылылық менен қалған барлық су перспективті формалардың сұрықтағы өкінің көрсетеді. <stdlibна форма әлшіндеті ең өртша салыма жоғарысы алияр – 13 г жогары, ядро шығыны 51% және сыртқы бәйім аса қатты емес. Сейділіев формасы өртша ірі болғандықтан жемістің қолемін көңілтұйылы жаттыра кейімді. Құрылылық формасының да салымы 11 г жеткіледі, бірақ оның қабығы орта қағаз төрізді және ядроо қары ушы де сезімді жатқызған болады. Үран әле басында Т.Б. Шыңпасовтың формаларына жәрігіз бергендерінің айтарлықтай перспективті формалар анықталады. Сондың нәрсіде қытайлық көшкестің қайраты жеміс салымы 20 г қағаз, ері кең көз төрізді көз бар Лохов-1 сорты үлкен қоғамдары құдайықты. Үйрін бір кемелігі, 2010-2011 жылдары орын әрекетін ағаштан сол жылы бактериялар қүйі ауруымақшалдығы. Бірақ әлі мәселесі арнаулы әр тәрізді қағаз, яғни топсыз көлдің сұрықты өрттегі тұздың кейбір қағазының жеріне жатқызған жағдайларын шешеді. Одан басқа 4 жылы жеміс беретін перспективті түрлі формалар құрылған, бұл формалар орын әрекетін ағаштан қағазы 4-жылы салымға 13 қағазың жеміс берген. Олардың нысаны құжаттарға белгілі бір қаражалық.

19 гасырдан жеткен түрлі және жұмыс атауының ерекше касиеттері таң көрсетеді. Яғни, айырбай 100 жылы аса үкітіп отсе де физиологиялық белсенділігі сакталаған. Бірнеше жылық оғымен мен жемісінің өртша салымы 13 г жогары. Бұл форманы in vitro жәділаныңды мікролоялық көбейтін және жұқандық маңызды бар селекциялық қазіртінде тауып құжаттама дайындады жоспарланады.

Түйін сөзлер: қағаз жанғы, формалар, қападағы, сұрықтау, фенология, биометрия.

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ОЦЕНКА ПЕРСПЕКТИВНЫХ МЕСТНЫХ ФОРМ ГРЕЦКОГО ОРЕХА
ДЛЯ ЮГО-ЗАПАДНОЙ УРАЛЫ

Аннотация. В настоящее время в Казахстане возрос интерес к орехолюбным культурам, особенно к греческому ореху, приносящему стабильные урожаи в наиболее благоприятных для него зонах. Греческий орех является ценным продуктом питания 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 греческого ореха. Казахстанское садоводство, в том числе и наиболее благоприятной по экологическим условия Туркестанской области, оценяется как перспективной, особенно в свете значительного улучшения сортов в последние годы. Наиболее качественными являются сорта насыщенных коричневато-жёлтого цвета с ярким вкусом.

Выводы. 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 того, проводилось изучение 155 перспективных семенных форм из Турции и стационарной коллекции отобранных ранее Сырзянских форм в ТОО"Сырзянка Жер Сайыт".

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

Например, у изученных Турецких форм выделявшихся по скороплодности увеличение достигло 10-13%.

Таким образом, наблюдалась также и в отношении диаметра имелось увеличение до 15-30%.

Наблюдения за перспективными формами греческого ореха 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 проходило после зимних понижений до -33°С и 10 дней устойчивого походания на уровне 23-28°С. Это позволяет отнести все три перспективных формы Алияр (Іссыкская), Еңбегішің ауданы, Көркемен из
Кыргызстан и из усадьбы Сейдалиева, Карасайского района. Самая крупнолопадная из них 11 г, выходит ядра 51 % и не очень крепкой скороплодной. Сейдалиевская форма наименее крупнолопадная и не соответствует требованиям, предъявляемым к размеру плода. Форма из Кыргызстана также не достигает 11 г, но имеет почти бумажную скороплоду и отличный вкус ядра, который можно даже отнести к десертным. При изучении форм, найденных в Туркестанской области, Шынгасовым Т. Б. также установлены достаточно перспективные формы. Большой интерес представляет Китайский, сладкосерный сорт Люо-э-1 с плодами массой более 20 г и бумажной скороплодной. 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. Обработаны 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 Турбатског 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 и выгону для микромаркознени и подготовка документации для признания его селекционным достижением глобального значения.

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

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REFERENCES
[6] Sokolova V. V., Ernakov M. A. Selection of perspective forms of walnut juglans regia l. according to the economically valuable signs of the fruit in the main botanical garden of the Russian Academy of Sciences. Collection of scientific papers-fruit And berry growing in Russia. 2017; 49: P. 303-306. (in Russ.).
[12] Babanov I. M. Biological aspects of the breeding of the walnut. The scientific journal of the Kuban state agrarian University, no. 101(07), 2014. C-1-15. (in Russ.).