

17 Galda, D.E. Urozhajnost' i kachestvo zerna sortov chechevicy v zavisimosti ot opredeleniya norm mineral'nyh udobrenij na chernozeme vyshchelochennom [Tekst] / D.E. Galda // Vestnik APK Staropol'ya. - 2017. - №4 (28). – S. 92-97.

18 Ponomareva, A.T. Fosfornyj rezhim pochvy i fosfornye udobreniya [Tekst]: kniga. / A.T. Ponomareva. - Alma-Ata: Kajnar, 1970. – 204 s.

19 SHpaar, D. Raps i surepica, vyrashchivanie, uborka, ispol'zovanie [Tekst]: kniga / D. SHpaar. - M.: Dlv Agrodelo, 2007. - 320 s.

20 Esaulko, A.N. Vliyanie mineral'nyh udobrenij na agrohimicheskie pokazateli chernozema i produktivnost' chechevicy v usloviyah Stavropol'skogo kraja [Tekst] / A.N. Esaulko // Plodorodie. - 2016. - № 6 (93). - S. 21-23.

ТҮЙІН

Мақалада минералды тыңайтқыштар мен өсу стимуляторын қолданудың жасымық өсімдіктерінің өсуі мен дамуына және өнімділігіне әсері зерттелген. Жасымықтың жоғары тұрақты өнімділігін қамтамасыз ететін тыңайтқыштарды, өсу стимуляторын қолдану жүйесін әзірлеуге бағытталған 2021-2022 жылдары жүргізілген зерттеулердің негізінде мынадай нәтижелер алынды: жасымық егу алдында өнімді ылғал қоры 54,4-75,8 мм құрады, 2022 жылы шектеулі сүрі жер бойынша егілген жасымық дақылдары нитратты азотпен жақсы қамтамасыз етілген және оның мөлшері топырақтың жоғарғы 0-20 см қабатында 21,5-24,1 мг/1000 гр. құрады. Зерттеу жылдарында жасымық себу алдындағы өнімді ылғалдың мөлшері 54,4-75,8 мм құрады, 2021-2022 жж. қазан-мамыр айларында 96,4 мм мөлшерінде түскен жауын-шашынның салдарынан 2022 жылы себу алдында ылғал қоры теңестірілді. 2021-2022 жылдар жағдайында минералды тыңайтқыштарды қатарларға енгізе отырып, алдыңғы егіс дайындаудың әртүрлі әдістері ауыспалы егісте егілген бірінші дақылдың жасымық өнімділігіне әсер етті және тәжірибе нұсқалары бойынша жасымық өнімділігі 8,5-тен 12,3 ц/га-ға дейін құрады. Шектеулі сүрі жер қатарға себу кезінде 20 кг ә.з. дозада аммофос енгізумен бірге, сондай-ақ басқа нұсқалар: шектеулі сүрі жер, бұршақ қоспасы жасымық тұқымын өсу стимуляторы (плантобактерин) өңдеумен жасымықтың өнімділігіне оң әсер етіп, себу кезінде абсолютті бақылау нұсқасынан алынған өнім 9,6 ц/га-ден жоғары 2,7; 2,2; 2,3 ц/га математикалық дәлелденетін өсім алуға мүмкіндік берді.

UDC 634.11, 634.13, 634.21, 634.25, 634.26, 634.22, 634.23, 634.8, 634.71, 634.75

MRNTI 68.35.53

DOI 10.52578/2305-9397-2023-3-2-128-139

Sapakhova Z.B., PhD, the main author, <https://orcid.org/0000-0002-8007-5066>

«Institute of Plant Biology and Biotechnology», Almaty, Timiryazev street 45, 050040, Kazakhstan; Fruit and Vegetable Research Institute, 050060, Gagarin Avenue 238/5, Almaty, Kazakhstan zagipasapakhova@gmail.com

Raissova N. U., Master of Agricultural Sciences, <https://orcid.org/0000-0002-3975-5457>

«Institute of Plant Biology and Biotechnology», Almaty, Timiryazev street 45, 050040, Kazakhstan, nraissova@gmail.com

Daurova A. K., Master of Agricultural Sciences, <https://orcid.org/0000-0001-7949-9112>

«Institute of Plant Biology and Biotechnology», Almaty, Timiryazev street 45, 050040, Kazakhstan, ainashdaurova@gmail.com

Daurov D. L., PhD Doctoral Student, <https://orcid.org/0000-0003-3073-4577>

«Institute of Plant Biology and Biotechnology», Almaty, Timiryazev street 45, 050040, Kazakhstan, «Kazakh National Agrarian Research University», Almaty, Abay Avenue 8, 050010, Kazakhstan dias.daurov@gmail.com

Allah B., PhD, <https://orcid.org/0000-0003-3561-7863>

«Centre of Excellence in Molecular Biology», Punjab University, Lahore, Thokar Niaz Baig, 87 West Canal Bank Road, 37000, Pakistan allahbakhsh@cemb.edu.pk

Zhapar K. K., PhD, <https://orcid.org/0000-0002-9007-9730>

«Institute of Plant Biology and Biotechnology», Almaty, Timiryazev street 45, 050040, Kazakhstan, zhapar.zk@gmail.com

Zhambakin K. Zh., Doctor of Biological Sciences, <https://orcid.org/0000-0001-5243-145X>

«Institute of Plant Biology and Biotechnology», Almaty, Timiryazev street 45, 050040, Kazakhstan, zhambakin@gmail.com

Shamekova M. Kh., PhD, <https://orcid.org/0000-0002-8746-7484>

«Institute of Plant Biology and Biotechnology», Almaty, Timiryazev street 45, 050040, Kazakhstan, shamekov@gmail.com

THE AREA OF FRUIT AND BERRY GROWING IN KAZAKHSTAN

ANNOTATION

A program of vineyard and orchard restoration is in progress in Kazakhstan. The government subsidizes a part of the reconstruction costs and the new areas of perennial plantations, but, despite this, the gardens and vineyards in the regions are hardly growing. The subsidy is introduced to support local nursery farming, perennial nurseries of fruit and berry crops and grapes are subsidized by partial (50%) reimbursement of the planting material production costs. However, across Kazakhstan, the average fruit and berry plantation area for 2012-2020 is 58 740.4 hectares. The area of apple plantation is the largest (32616.9 ha), followed by grape – 14 530.1 ha, apricot – 3 598.5 ha, pear - 2061.1 ha, cherry – 1 575.2 ha, plum – 1 334.7 ha, raspberry – 1 259.4 ha, strawberry – 9 16.1 ha and peach – 578.4 ha. The topic of domestic agrarian science support to the industry deserves special attention, also in terms of training of qualified specialists, who are the key players in the field of fruit and berry production, without which it is impossible to bring the yield of fruit and berry crops to world standards. Resolving this issue would allow Kazakhstan to increase fruit production fivefold, even with the existing area of orchards. Implementation of the inspection and certification system would ensure transparency and objectivity in the cultivation of planting material for fruit crops, which will create grounds for the significant growth of investment in seed production and planting material development of fruit and berry crops.

Ключевые слова: площадь, яблоня, груша, абрикос, персик, вишня, слива, виноград, малина, земляника.

Key words: area, apple, pear, apricot, peach, cherry, plum, grape, raspberry, strawberry.

Introduction. Nowadays, the rate of fruit-growing industry development and the existing assortment in Kazakhstan do not fully meet the modern intensification requirements. The import share of fruit products is steadily increasing, this trend can lead the country to import dependence. At the same time, the imported products do not always meet the quality requirements, storage terms, and health safety [1, 2, 3].

World fruit growing. The range of world fruit growing covers a wide belt in both hemispheres - in the temperate, subtropical, and tropical zones from 60°N to 60°S. The temperate and subtropical zones of the Northern Hemisphere are the richest in the diversity of cultivated crops. In the world of fruit crops and berries, there are about 200 fruit, berry, and nut crops, of which about 100 (in number of thousands of varieties) as industrial ones. The most widespread cultivars: apple, olive, date palm, banana, mango, etc. In some countries of the world, the area of fruit and berry crops reaches (thousand hectares): China – 2 700, USA – 1 600, India – 913, Argentina – 541, Yugoslavia – 435, Brazil – 419, Japan – 328, Italy – 425, Poland – 286, France – 208. In the USA, Argentina, and European countries small orchards prevail (up to 10-20 ha, rarely 100 ha or more). Most countries grow a limited number of varieties of each fruit cultivar. For example, in the USA there are six varieties of apple trees (Delicious, Mekintosh, Jonathan, Winesep, Golden Delicious, and Rombuchy), yielding about 80% of commercial production [4].

In the 70-80's of the last century, the area of fruit and berry crops in Kazakhstan was about 100 thousand hectares, and vineyards - were about 30 thousand hectares. Under favorable weather

conditions, 450-550 thousand tons of fruits, berries, and grapes were yielded in these areas. Plantation area decreased by 3 times, and gross production decreased by 4-5 times during the crisis years of the 1990s. Over the last few years, thanks to state assistance such as subsidies in private farms, joint stock companies, and cooperatives, the restoration of orchards and vineyards has begun, and the annual gross production has reached 250,000-300,000 tons [5, 6].

President K. Tokayev in his message to the people of Kazakhstan on September 1, 2021, noted that it is necessary to provide the country with basic foodstuffs. As the Ministry of Agriculture reports, Kazakhstan covers 100% of its production for 12 products; for 11 products it covers 80% and for 6 products, including apples, there is import dependence. One of the priorities of agricultural sector development in the country is the production of fruit. Today, the import of fruits accounts for 70%. Over the past 5 years, there has been an average annual import of 1.7 million tons of fruits and berries into the country [7].

The production of pome and stone fruits in the southeast of Kazakhstan has an industrial significance. Favorable soil and climatic conditions of Zailiyskiy and Dzhugarskiy Alatau conditioned wide distribution of orchards of apple, pear, apricot, plum, and other fruit species on a total area of over 20 thousand hectares. However, a significant reduction in orchards and gross fruit production decline in the region has been noted in the last 10-15 years. The main reasons for this are the physical deterioration of industrial orchards, obsolete assortment, fragmentation of plantations, long-term shortage of planting material, machinery, irrigation water, fertilizers, plant protection products, and planting weaknesses to adverse environmental conditions. The average yield of plantations does not exceed 40-50 c/ha, and in the Almaty region 18-20 c/ha. The share of intensive plantations remains low - not more than 3 thousand hectares or 6%, instead of the recommended 35-40% [8].

Intensification is the only way to develop the industry. International experience shows that in countries with developed industrial fruit-growing industries, producers strive to intensify plantations by crowding plantings order from 2-4 thousand trees/ha to 40 thousand trees/ha with the use of light-permeable compact crowns and early commercial fruiting. Orchards' size is from 5-7 to 20-25 hectares. These farms are widespread in the south-eastern foothill zone of the country and will be able to meet the demand of the market for one or another fruit product in a very short time. According to our calculations, at least 500 private and peasant farms can be established in this region. Currently, due to the change in the farming status and patterns, there is a task to develop fruit-growing technologies for small farms adapted to the local climatic and economic conditions. The existing orchards need to be reconstructed [9, 10, 11].

Kazakhstan is implementing a program of vineyard and orchard restoration. The state subsidizes part of the reconstruction costs and the establishment of new areas of perennial plantations, but despite this, the area of orchards and vineyards in the regions is hardly growing. This was reported by the Committee on Land Management of the Ministry of Agriculture in its 2020 report on land use [12].

According to land balance data as of November 1, 2020, 147,6 thousand hectares of perennial plantations, including 99,6 thousand hectares of orchards, 15,9 thousand hectares of vineyards, and 32,1 thousand hectares of other plantations are registered in the Republic of Kazakhstan. Last year, the total area of perennial plantations in the country increased by 0.7 thousand hectares. Changes were recorded as a result of updating of areas or land use transformation. Last year in Almaty and North Kazakhstan regions the areas of perennial plantations increased by 0.5 thousand hectares, and in the Turkestan region - by 0.3 thousand hectares. At the same time in Zhambyl region plantation areas decreased by 0.2 thousand hectares and in Nur-Sultan - by 0.3 thousand hectares [13].

The objective of this research is to determine the status and future of fruit and berry plantations in the Republic of Kazakhstan.

Materials and methods. The main approaches applied in the research are the comparative analysis of the area of fruit and berry growing in Kazakhstan from 2010 to 2020 using data from Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics [14, 15, 16, 17, 18, 19, 20].

The data obtained were processed using accepted analytical and statistical methods. All results obtained during the research are reliable and reproducible.

Research results. The apple tree plantation area. The average area of apple plantations in Kazakhstan for 2012-2020 is 32 616.9 hectares. The area of apple plantations across the country increased from 30 281.6 ha to 35 713.2 ha between 2012 and 2020. The leader in terms of area is

Turkestan region, the average area is 14 116.5 ha. The apple tree area increased by 3 464.8 ha from 2013 to 2016, but decreased slightly in 2016, then gradually increased again and reached 15 858.3 ha, which is 986.4 ha more than in 2017.

The average apple tree plantation area in Almaty region for the years 2012-2020 is 13 077.4 hectares. The area of plantations in the Almaty region increases between 2015 and 2020. The area of apple plantations in Zhambyl oblast on the contrary decreases every year, for example from 2013 to 2018 was 3 227.3; 3 061.2; 3 016.3; 2 957.6; 2 567.1 and 2 493.5 ha, respectively. Listed above three regions are the main regions to produce apple plantations. East Kazakhstan region, Shymkent city, and West Kazakhstan region are the second group by apple tree cultivation and are 577.2; 472.6; 320.0, respectively. Atyrau region, Kostanay region, and Akmola region are the third group in the ranking (258.0; 237.1; 221.2; 210.5 ha, respectively). North-Kazakhstan region [21], Almaty city, and Karaganda region cultivate apple trees in an area of 198.2; 164.8, and 100.6 ha, respectively. Regions with poor apple cultivation are Aktobe region, Pavlodar region, Astana city, and Mangystau region, with plantations of 59.0; 25.9; 18.0, and 14.3 ha, respectively (figure 1).

Area of apple plantations in KZ (ha), 2012-2020

	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average for 2012-2020
Republic of Kazakhstan	30281.6	30290.3	30352.1	31645.2	32463.4	32955.4	34680.4	35170.6	35713.2	32616.9
Turkestan region	12057.3	11465.1	12217.1	14392.9	14929.9	14871.9	15486.7	15768.9	15858.3	14116.5
Almaty region	12474.0	13099.3	12716.9	11717.4	12246.5	13113.2	14056.5	14080.7	14192.5	13077.4
Zhambyl region	3174.4	3227.3	3061.2	3016.3	2957.6	2567.1	2493.5	2648.6	2601.8	2860.9
East Kazakhstan region	591.0	672.6	620.3	617.5	571.6	561.2	523.9	521.1	515.5	577.2
Shymkent	0.0	0.0	0.0	0.0	0.0	0.0	507.4	469.0	441.3	472.6
West Kazakhstan region	332.7	334.5	326.5	333.7	310.7	316.5	142.0	195.1	588.5	320.0
Kyzylorda region	355.9	281.1	203.2	262.3	181.6	239.2	245.4	268.8	284.9	258.0
Atyrau region	174.4	188.0	174.5	269.8	261.8	266.8	263.7	258.8	275.8	237.1
Kostanay region	200.6	197.2	208.5	209.3	242.7	241.3	233.5	229.6	227.8	221.2
Akmola region	324.7	225.8	210.5	209.9	194.2	200.7	183.7	174.7	170.4	210.5
North Kazakhstan region	200.1	210.6	200.2	197.9	196.7	189.3	196.3	196.3	196.3	198.2
Almaty	152.2	152.1	183.0	189.2	174.3	174.3	152.6	152.6	152.6	164.8
Karaganda region	95.5	95.6	97.6	103.0	104.1	103.4	102.4	101.5	101.9	100.6
Aktobe region	58.3	56.9	56.9	61.7	63.4	59.9	60.0	57.6	56.7	59.0
Pavlodar region	44.2	40.2	31.6	31.5	14.6	20.9	15.1	14.4	20.6	25.9
Nur-Sultan	40.4	37.8	35.5	26.8	5.5	5.1	3.9	4.4	2.8	18.0
Mangystau region	5.8	6.4	8.7	6.8	8.0	24.7	14.0	28.6	25.5	14.3

Source: <https://talda.stat.gov.kz/> 2022 • Created with Datawrapper

Figure1 – The area of apple plantations in Kazakhstan, ha (data from 2012 to 2020)

Pear plantation area. The area of pear plantations is 2 061.1 ha on average for 2012-2020. Pear plantation area across Kazakhstan decreased from 2012 to 2013 by 122.8 ha, from 2014 to 2016 by 419.1 ha, and from 2017 to 2019 by 35.0 ha. Almaty region is the main region where pear is grown. For the Almaty region from 2012 to 2014, there is a tendency to increase the area by 59.6 ha. Although, from 2015 to 2019 it again decreased by 65.8 ha, and the average area of pear plantations for 2012-2020 is 1 060.7 ha. In the Turkestan region, the area of plantations decreased from 2012 to 2016 by 307.8 ha. From 2017 to 2020 there is a recovery of the area, but by 2020 (588.7 ha) the area did not reach the level in 2012 (722.8 ha). Zhambyl region is the fourth in terms of plantation area in Kazakhstan. The area of pear plantations from 2012 to 2014 increased by 76.1 hectares, and on average for 2012 to 2020 is 231.1 hectares. In Almaty city and the North Kazakhstan region, the area of pear plantations averaged 72.3 and 33.6 hectares, respectively. In Kostanay, Shymkent, West-Kazakhstan, Kyzylorda, East-Kazakhstan, Akmola, and Karaganda regions 26.9; 25.0; 20.8; 19.1; 15.1; 12.6 and 11.1 ha, respectively. The most unfavorable region for pear plantations is Pavlodar region, Astana city, Atyrau region, Aktobe region, and Mangystau region, the average area was 5.8; 4.6; 2.9; 2.0, and 1.8, respectively (figure 2).

Area of pear plantations in KZ (ha), 2012-2020

	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average For 2012-2020
The Republic of Kazakhstan	2358.2	2235.4	2314.0	1976.6	1894.9	1921.7	1907.7	1886.7	2054.7	2061.1
Almaty region	1218.8	1230.2	1278.4	996.5	994.8	967.4	974.8	932.7	951.0	1060.7
Turkestan region	722.8	557.5	534.6	481.3	415.0	442.1	520.8	530.6	588.7	532.6
Zhambyl region	194.9	199.4	271.0	265.2	265.5	292.0	167.0	167.0	257.6	231.1
Almaty	71.6	71.6	71.7	74.7	72.1	72.2	72.2	72.2	72.2	72.3
North Kazakhstan region	11.0	38.7	37.1	37.1	36.9	36.3	34.9	35.0	35.0	33.6
Kostanay region	31.4	30.8	27.0	24.1	25.6	25.9	26.1	26.1	25.5	26.9
Shymkent	0.0	0.0	0.0	0.0	0.0	0.0	31.9	26.7	16.4	25.0
West Kazakhstan region	14.8	13.4	11.6	14.0	18.7	21.3	22.2	35.9	35.0	20.8
Kyzylorda region	30.0	31.5	23.2	26.9	18.4	13.0	9.3	9.3	10.4	19.1
East Kazakhstan region	17.6	16.7	17.4	13.2	12.4	14.0	13.3	15.6	15.6	15.1
Akmola region	14.2	14.3	13.7	13.7	12.4	12.8	11.6	10.7	10.3	12.6
Karaganda region	11.2	11.2	11.7	10.9	11.0	11.0	11.0	11.0	11.0	11.1
Pavlodar region	10.0	10.0	8.7	7.9	2.9	3.2	3.1	2.8	3.4	5.8
Nur-Sultan	6.8	6.7	4.7	5.6	4.7	4.7	3.8	3.3	0.9	4.6
Atyrau region	0.7	1.1	1.2	1.5	1.7	1.8	2.1	2.2	13.6	2.9
Aktobe region	1.7	1.7	2.1	1.9	1.9	1.9	2.0	2.6	2.0	2.0
Mangystau region	0.8	0.8	0.2	0.2	1.1	2.0	1.6	3.2	6.2	1.8

Source: <https://taldau.stat.gov.kz/> 2022 - Created with Datawrapper

Figure 2 – The area of peach plantations in Kazakhstan, ha (data from 2012 to 2020)

Apricot plantation area. The average area of apricot plantations throughout Kazakhstan for 2012-2020 is 3 598.5 hectares. Almaty region is the main region where apricot is grown since environmental and climatic conditions are suitable for apricot cultivation. During the period analyzed, there is a tendency of area growth in the Almaty region in 2020 compared to 2012 by more than 2.6 times. The average apricot plantation area is 17 754.5 hectares. The area of plantations in the Turkestan region sometimes decreased and then increased between 2012 and 2020 with an average of 1 508.6 hectares. The same situation in terms of changes in the area was observed in Zhambyl region. The planted area of apricot from 2012 to 2020 averaged 119.3 hectares. In Kyzylorda region and in Shymkent city the area of plantations was 91.0 and 76.0 hectares, respectively. In the West Kazakhstan region, Almaty, Atyrau, and Mangystau regions averaged 24.3; 19.2; 14.1, and 13.6 hectares, respectively. In Karaganda, East Kazakhstan Kostanay, Aktobe, and Kostanay regions the area of apricot plantations is insignificant and was 6.4; 2.0; 0.6, and 0.1 ha, respectively (figure 3).

Area of apricot plantations in KZ (ha), 2012-2020

	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average For 2012-2020
The Republic of Kazakhstan	3544.1	2969.8	3580.9	3371.3	3359.8	3282.5	3739.6	4193.3	4345.1	3598.5
Almaty region	1067.5	1168.0	1303.1	1363.1	1562.4	1944.2	2189.3	2556.5	2825.4	1775.5
Turkestan region	2146.1	1436.2	2046.1	1754.3	1532.1	1035.7	1194.4	1277.0	1155.6	1508.6
Zhambyl region	128.0	176.7	124.7	106.2	109.1	113.8	104.7	105.2	105.3	119.3
Kyzylorda region	135.0	122.2	45.3	77.0	78.2	99.0	89.7	86.3	85.9	91.0
Shymkent	0.0	0.0	0.0	0.0	0.0	0.0	79.3	74.4	74.2	76.0
West Kazakhstan region	20.7	18.7	17.6	22.9	30.1	29.1	26.8	25.8	27.1	24.3
Almaty	18.6	18.5	18.6	19.7	19.6	19.5	19.5	19.5	19.5	19.2
Atyrau region	18.6	10.1	12.2	12.7	12.5	13.0	13.5	13.7	20.9	14.1
Mangystau region	3.9	6.5	8.1	8.4	9.0	21.3	15.5	26.2	23.2	13.6
Karaganda region	5.7	5.7	5.2	7.1	6.7	6.7	6.7	6.7	6.7	6.4
East Kazakhstan region	0.0	7.2	0.1	0.1	0.0	0.0	0.0	1.2	1.2	2.0
Aktobe region	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.6
Kostanay region	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1

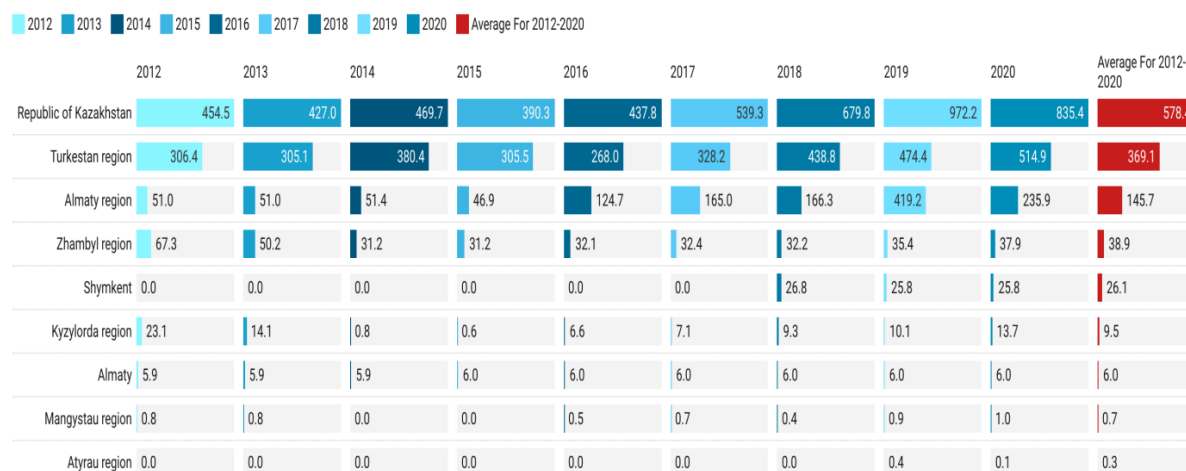
Source: <https://taldau.stat.gov.kz/> 2022 - Created with Datawrapper

Figure3 – The area of apricot plantations in Kazakhstan, ha (data from 2012 to 2020)

Area of peach and nectarine trees. The average area of peach and nectarine plantations for 2012-2020 is 578.4 ha. The area of peach and nectarine plantations in Kazakhstan decreased from 2012 to 2013 by 27.5 ha, and from 2015 to 2019, on the contrary, there was a growth of about 3 times, and in 2019 was 972.2 ha. Although in 2020 decreased by 136.8 hectares compared to 2019. The

turkestan region is the warmest area for peach and nectarines in comparison with other regions of Kazakhstan, and the average area for the analyzed period was 369.1 ha. For 2014, as well as for the period from 2018 to 2020, the area of plantations has greatly increased and amounts to 380.4; 438.8; 474.4, and 514.9 hectares, respectively. In the Almaty region, there was an upward growth trend from 2015 to 2019 (46.9; 124.7; 165.0; 166.3; 419.2 ha). Although by 2020 the area decreased by 183.3 ha compared to 2019. The average for 2012-2020 is 145.7 hectares. In the Zhambyl region and in Shymkent city the average area of plantations is 38.9 and 26.1 hectares, respectively. In Kyzylorda region, Almaty city, Mangystau, and Atyrau regions the area of peach and nectarine plantations in 2012-2020 is on average 9.5; 6.0; 0.7 and 0.3 ha, respectively (figure 4).

Area of peach plantations in KZ (ha), 2012-2020



Source: <https://talda.stat.gov.kz/> 2022. • Created with Datawrapper

Figure4 – The area of pear plantations in Kazakhstan, ha (data from 2012 to 2020)

Plum plantation area. The average area of plum plantations for 2012-2020 is 1 334.7 ha. Plum plantation area in Kazakhstan decreased from 2012 to 2014 by 145.4 ha, and from 2015 to 2019 increased by 965.5 ha. The Turkestan region is the main region where plum is cultivated. For the Turkestan region from 2012 to 2015 there was a decrease in the area from 546.4 to 399.2 hectares, but in 2016 reached 790.2 hectares. From 2017 to 2019 increased from 752.3 ha to 1 155.6 ha. The average plum plantation area for 2012-2020 is 743.2 ha. The area of plantations in the Almaty region increased from 143.4 hectares to 296.6 hectares from 2015 to 2020, twice that in 2015. Zhambyl region is the third in terms of area of plum plantations in Kazakhstan. The average plantation area from 2012 to 2020 is 110.8 hectares. In the East-Kazakhstan region, West-Kazakhstan region, Shymkent and Almaty cities, in Kyzylorda region the area of plum plantations on average for the analyzed period makes 56.4; 55.6; 32.5; 31.1, and 26.2 ha respectively. In Kostanay, Aktobe, North-Kazakhstan, and Karaganda regions the area of plum growing is 15.7 ha, 13.6 ha, 13.1 ha, and 11.2 ha respectively. The most unfavorable region for plum was Akmola, Pavlodar, Atyrau regions, Astana city and Mangystau region, the area of plum plantations averaged 9.1; 6.8; 6.1; 1.3, and 0.3 ha respectively (figure 5).

Cherry plantation area. The area of cherry plantations in Kazakhstan for 2012-2020 is on average 1 575.2 ha. The area of plantations decreased from 2012 to 2017 by 365.2 ha, and from 2018 to 2020 has gradually increased by 196.8 ha. Turkestan region is the main region of cherry cultivation, for Turkestan region from 2015 to 2017 there is a decrease in the area from 612.4 ha to 394.7 ha, but from 2018 to 2020 increased from 470.9 to 555.4 ha

Area of plum in KZ (ha), 2012-2020

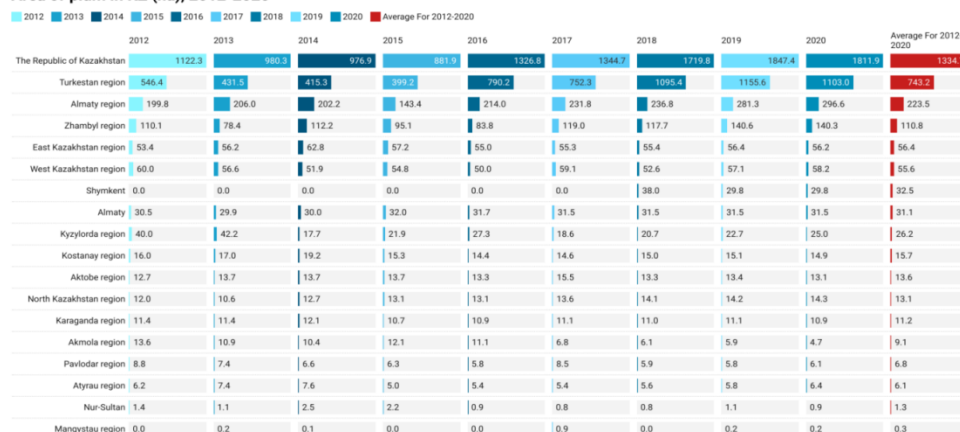
Source: <https://taldau.stat.gov.kz/> 2022 • Created with Datawrapper

Figure 5 – The area of plum plantations in Kazakhstan, ha (data from 2012 to 2020)

The area of plantations in the Almaty region in 2012-2020 is 220.7 hectares on average. In Zhambyl region, the average area of plantations from 2012 to 2020 is 158.4 hectares. From 2017 to 2020 there is an increase in the area from 109.1 ha to 268.5 ha. However, in all regions, there is no area growth trend. In the Karaganda region, Kostanay region, North Kazakhstan region, East Kazakhstan region, West Kazakhstan region, Shymkent city, Kyzylorda region, and Akmola region cherry plantation area averaged 98.4; 98.3; 98.0; 93.8; 89.9; 66.9; 49.4 and 43.1 hectares respectively for the reviewed period. In Aktoobe and Pavlodar regions and in Almaty city there are insignificant amounts of plantations in the areas 19.5; 15.1 and 12.3 ha, respectively. The most unfavorable region both for plum and cherry plantations were Atyrau region, Astana city, and Mangystau region and on average was 7.5; 6.2, and 0.2 ha respectively (figure 6).

Area of cherry plantations in KZ (ha), 2012-2020

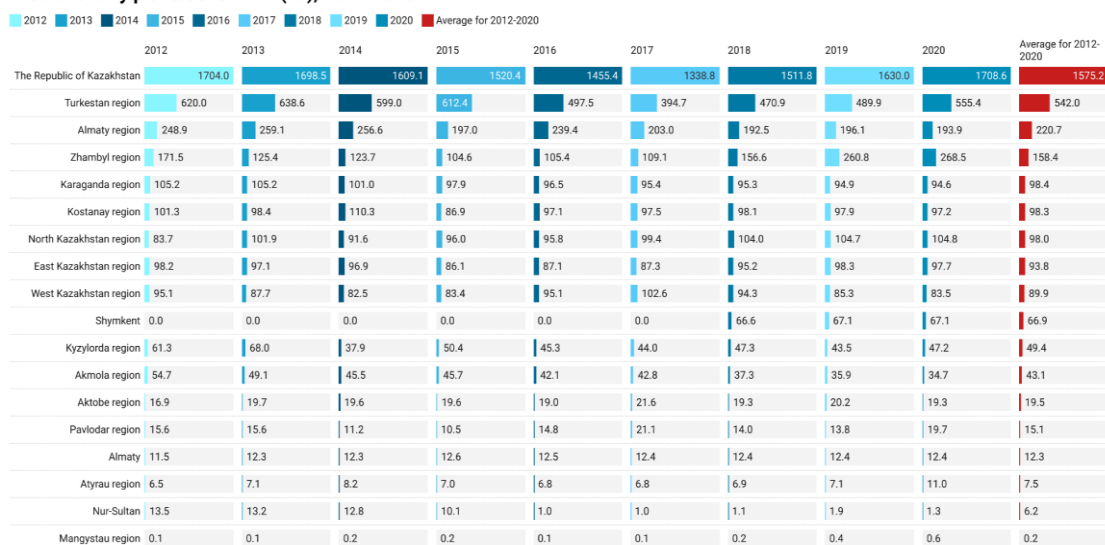
Source: <https://taldau.stat.gov.kz/> 2022 • Created with Datawrapper

Figure 6 – The area of cherry plantations in Kazakhstan, ha (data from 2012 to 2020)

Grape plantation area. The area of grape plantations in Kazakhstan for 2012-2020 is 14 530.1 ha on average. Turkestan region is the main area for grape cultivation; the share of this region compared to all other regions of Kazakhstan is 65.5%. From 2013 to 2020, there has been a steady increase in area from 8 797.9 hectares to 10 157.6 hectares and averaged 9 534.2 from 2012 to 2020. The area of grape plantations of the Almaty region averaged 4 319.9 ha for 2012-2020. In the Zhambyl region is 333.5 ha for the same period. A slight increase in area is observed between 2017 and 2020. However, there is no growth tendency of the grapes area in all regions, except Turkestan. The area in Shymkent

city averages 274.5 hectares. In Kyzylorda and East-Kazakhstan regions the grape plantations area for the reviewed period is on average 76.0 and 65.6 ha, respectively. This indicator in Almaty city, Karaganda, West-Kazakhstan, Aktobe, and Atyrau region was 30.2; 23.4; 18.3; 13.5, and 11.2, respectively. In Kostanay, Mangystau, Pavlodar, Akmola regions, and Astana city the area of grape plantations was 8.7; 2.5; 1.7; 0.1, and 0.1 ha, respectively (figure 7).

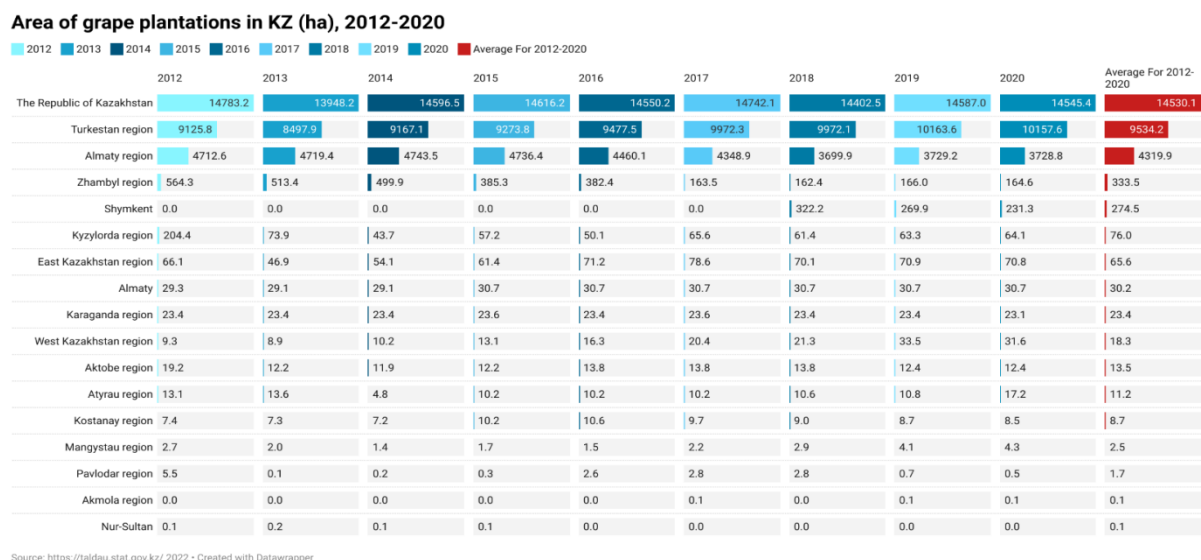


Figure7 – The area of grape plantations in Kazakhstan, ha (data from 2012 to 2020)

Area of raspberry plantations. The average area of raspberry plantations throughout Kazakhstan for 2012-2020 is 1 259.4 hectares. Almaty region is the main region of raspberry cultivation, because of natural and climatic conditions suitable for growing raspberry. A stable level of plantation area is observed in the Almaty region for the observed period, and the average area of raspberry plantations is 266.1 hectares. The plantation area in Turkestan, Akmola, East-Kazakhstan, and Karaganda regions was 146.1; 142.9; 136.7, and 113.4 hectares respectively. In North-Kazakhstan, Aktobe, Kostanay, Zhambyl, West-Kazakhstan regions, Almaty city, and Pavlodar region the area of raspberry plantations on average for the period of 2012 - 2020 was 99.9; 87.0; 74.3; 54.6; 47.6; 43.8 and 31.6 ha respectively. In Shymkent and Astana cities, in Kyzylorda, Atyrau, and Mangystau regions averaged 12.9; 9.7; 1.5; 0.5, and 0.1 ha, respectively (figure 8).

Strawberry plantation area. The area of strawberry plantations throughout Kazakhstan for 2012-2020 is on average 916.1 hectares. Turkestan, Almaty, Karaganda, and East-Kazakhstan regions are the main locations for strawberry growing, although it occupies insignificant area compared to other fruit and berry crops (176.6; 137.0; 134.2 and 106.5 ha, respectively).

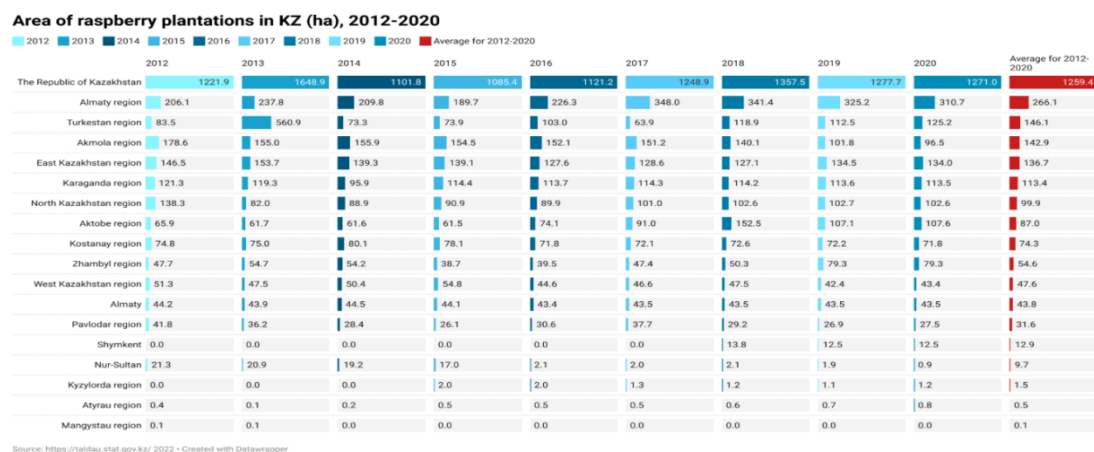


Figure8 – The area of raspberry plantations in Kazakhstan, ha (data from 2012 to 2020)

In West Kazakhstan, Kostanay, Aktobe, North Kazakhstan, and Zhambyl regions the average area of strawberries growing from 2012 to 2020 is 69.9; 60.4; 52.7; 48.7, and 47.7 hectares, respectively. In Akmola, Pavlodar regions, Shymkent city, Atyrau region, Astana and Almaty cities, Kyzylorda region and Mangystau region in average is 28.8; 21.4; 17.9; 11.8; 7.8; 5.3; 2.0 and 0.1 ha respectively (figure 9).

Area of strawberry plantations in KZ (ha), 2012-2020

	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average for 2012-2020
The Republic of Kazakhstan	949.3	1226.8	852.9	876.4	845.8	977.6	798.5	846.5	870.9	916.1
Turkistan region	212.1	492.7	134.5	158.8	161.0	81.6	97.3	131.3	120.3	176.6
Almaty region	129.9	138.5	157.7	131.8	129.1	128.7	126.0	128.0	163.4	137.0
Karaganda region	111.5	112.5	95.4	116.0	116.3	314.2	113.9	113.8	114.2	134.2
East Kazakhstan region	123.5	112.0	110.5	113.4	103.5	101.2	97.3	98.5	98.3	106.5
West Kazakhstan region	70.9	71.0	73.9	75.1	67.4	68.3	69.9	66.1	66.7	69.9
Kostanay region	60.7	61.4	58.4	61.2	61.4	62.0	60.1	59.4	59.4	60.4
Aktobe region	40.6	54.2	53.9	53.8	56.3	52.9	54.0	54.3	54.1	52.7
North Kazakhstan region	54.3	59.1	45.0	50.0	50.6	44.9	44.5	44.5	45.6	48.7
Zhambyl region	41.0	36.9	36.8	32.0	31.5	50.5	50.1	75.3	75.2	47.7
Akmola region	40.0	27.3	27.8	28.7	30.9	31.4	27.0	24.2	21.5	28.8
Pavlodar region	34.7	28.7	26.6	22.5	16.6	21.0	15.4	14.0	13.4	21.4
Shymkent	0.0	0.0	0.0	0.0	0.0	0.0	21.5	15.3	16.8	17.9
Atyrau region	8.2	10.7	10.9	11.6	12.3	12.3	13.1	13.3	13.5	11.8
Nur-Sultan	16.7	16.5	16.1	14.0	1.4	1.5	1.2	1.4	1.1	7.8
Almaty	5.0	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Kyzylorda region	0.0	0.0	0.0	2.2	2.0	1.9	2.0	1.9	2.0	2.0
Mangystau region	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1

Source: <https://stat.gov.kz/> 2022 - Created with Datawrapper

Figure 9 – The area of strawberry plantations in Kazakhstan, ha (data from 2012 to 2020)

Conclusions. Overall, across Kazakhstan, the area of fruit and berry plantations averaged 58740.4 hectares for 2012-2020. The largest area is apple plantations (32616.9 ha), followed by grape - 14530.1 ha, apricot - 3598.5 ha, pear - 2061.1 ha, cherry - 1575.2 ha, plum - 1334.7 ha, raspberry - 1259.4 ha, strawberry - 916.1 ha and peach - 578.4 ha. The subsidies are granted to support domestic nursery production of perennial plantations of fruit crops and grapes in Kazakhstan through partial (50%) reimbursement of the cost of planting material production. The goals of implementing perennial planting activities are to stimulate the development of plantations in order to ensure the people with fresh products and the processing industry with raw materials, as well as to create conditions for the expansion of vineyards and gardening. At the same time, there are factors that still restrain the development of gardening in Kazakhstan. These are both financial difficulties, represented by a lack of turnover capital, and technological ones. In particular, business is experiencing a labor shortage - from agronomists to qualified tree pruners. In this regard, it is necessary to raise the level of competence of agrarians, encourage them to introduce advanced technologies for growing orchards, as well as develop national nurseries for the production of domestic seedlings. Particular attention should be paid to the support of domestic agrarian science, including the training of qualified specialists, which is necessary to bring the yield of fruit and berry crops closer to world standards. The solution to this issue would allow Kazakhstan to increase fruit production by five times, even with the existing orchard area. Implementation of the inspection and certification system will ensure transparency and objectivity in the production of planting material for fruit crops, which would provide conditions for the significant growth of investment in seed production and development of seeds and planting material export. The authors of this paper are implementing a program on the introduction of a system of inspection and certification of planting material of fruit crops based on the model of the Kingdom of the Netherlands. The program is focused on solving the problem of planting material quality control of fruit, berry, and nut crops produced in Kazakhstan, as well as imported ones.

Funding. This research was funded by the Science Committee of the Ministry of Agriculture of the Republic of Kazakhstan (Grant No. BR10765038).

СПИСОК ЛИТЕРАТУРЫ

1 Джангалиев, А.Д. Дикie плодовые растения Казахстана [Текст] / А.Д. Джангалиев [и др.] // Алматы: КазгосИНТИ, 2001. – 135 с.

- 2 Джангалиев, А.Д. Уникальное и глобальное значение генофонда яблоневых лесов Казахстана [Текст] / А.Д. Джангалиев// Доклады Национальной Академии наук Республики Казахстан. – 2007. №5. С. 41-47.
- 3 Гриценко, Д.А. Идентификация бактериального ожога молекулярно-генетическими методами [Текст] / Д.А. Гриценко [и др.] // Новости национальной академии наук РК. Серия аграрных наук. – 2017. – №6 (42). – С.109-115.
- 4 Колесникова, В.А. Плодоводство: Учебники и учебное пособие для высших сельскохозяйственных учебных заведений [Текст] / В.А. Колесникова // М.: Колос, 1979. – 415 с.
- 5 Маденов, Э.Д. Плодоводство и виноградарство [Текст] / Э.Д. Маденов// Доклады Национальной академии наук Республики Казахстан. – 2011. – №3. – С.74-87.
- 6 Kabyzbekova, B. Reduced major minerals and increased minor nutrients improve micropropagation of three apple cultivars [Text] / B. Kabyzbekova[and etc.] // In Vitro Cellular and Developmental Biology – Plant. – 2020. – Vol. 56(3). – P. 335-349.
- 7 Долгих, С.Г. Международный опыт сертификации посадочного материала плодовых и ягодных культур[Текст] / С.Г.Долгих // Алматы: ТОО «Нур-Принт», 2022. – 262 с.
- 8 Каирова, Г.Н. Перспективные клоновые подвои яблони для развития интенсивного садоводства в Казахстане[Текст] / Г.Н.Каирова [и др.] // Плодоводство и ягодоводство России. – 2018. – Том 52. – С.57-62.
- 9 Kovalchuk, I. New techniques for rapid cryopreservation of dormant vegetative buds [Text] / I. Kovalchuk[and etc.] // Acta Horticulturae. – 2014. – Vol. 1039 (22). – P. 137-146.
- 10 Дренова, Н.В. Бактериальный ожог плодовых культур в республике Казахстан [Текст] / Н.В.Дренова [и др.] // Журнал Карантин растений. Наука и практика. – 2013. – №1. – С. 39-43.
- 11 Pozharskiy, A.S.Genotyping and morphometric analysis of kazakhstani grapevine cultivars versus asian and european cultivars [Text] / A.S. Pozharskiy [and etc.] // Genetics and Molecular Research. – 2020. – 19(1). – gmr18482.
- 12 Куралов, Н. Как фермеру получать \$10 000 с одного гектара [Текст] / Н.Куралов // ElDala. – 2022. – 3 фев.
- 13 Куралов, А. Площади садов в РК практически не растут [Текст] / Н.Куралов // ElDala. – 2021. – 15 фев.
- 14 Смаилов А. Сельское, лесное и рыбное хозяйство в Республике Казахстан 2010-2014 // Статистический сборник [Текст] / А. Смаилов // Алматы: Агенство Республики Казахстан по статистике, 2015. – 194 с.
- 15 Смаилов А. Сельское, лесное и рыбное хозяйство в Республике Казахстан 2011-2015 // Статистический сборник [Текст] / А. Смаилов // Алматы: Агенство Республики Казахстан по статистике, 2016. – 196 с.
- 16 Смаилов А. Сельское, лесное и рыбное хозяйство в Республике Казахстан 2012-2016 // Статистический сборник [Текст] / А. Смаилов // Алматы: Агенство Республики Казахстан по статистике, 2017. – 198 с.
- 17 Смаилов А. Сельское, лесное и рыбное хозяйство в Республике Казахстан 2013-2017 // Статистический сборник [Текст] / А. Смаилов // Алматы: Агенство Республики Казахстан по статистике, 2018. – 209 с.
- 18 Смаилов А. Сельское, лесное и рыбное хозяйство в Республике Казахстан 2014-2018 // Статистический сборник [Текст] / А. Смаилов // Алматы: Агенство Республики Казахстан по статистике, 2019. – 218 с.
- 19 Смаилов А. Сельское, лесное и рыбное хозяйство в Республике Казахстан 2015-2019 // Статистический сборник [Текст] / А. Смаилов // Алматы: Агенство Республики Казахстан по статистике, 2020. – 221 с.
- 20 Смаилов А. Сельское, лесное и рыбное хозяйство в Республике Казахстан 2016-2020 // Статистический сборник [Текст] / А. Смаилов // Алматы: Агенство Республики Казахстан по статистике, 2021. – 212 с.
- 21 Кукушева, А.Н. Практикум по плодоводству Северного Казахстана: Учебное пособие для агрономических специальностей высших учебных заведений [Текст] / А.Н.Кукушева [и др.] // Павлодар: Кереку, 2016. – 124 с.

REFERENCES

- 1 Dzhangaliev, A.D. Dikie plodovye rastenija Kazahstana [Tekst] / A.D. Dzhangaliev [i dr.] // Almaty: KazgosINTI, 2001. – 135 s.
- 2 Dzhangaliev, A.D. Unikal'noe i global'noe znachenie genofonda jablonevych lesov Kazahstana [Tekst] / A.D. Dzhangaliev // Doklady Nacional'noj Akademii nauk Respubliki Kazahstan. – 2007. №5. S. 41-47.
- 3 Gricenko, D.A. Identifikacija bakterial'nogo ozhoga molekuljarno-geneticheskimi metodami [Tekst] / D.A. Gricenko [i dr.] // Novosti nacional'noj akademii nauk RK. Serija agrarnych nauk. – 2017. – №6 (42). – S.109-115.
- 4 Kolesnikova, V.A. Plodovodstvo: Uchebniki i uchebnoe posobie dlja vysshih sel'skohozjajstvennyh uchebnyh zavedenij [Tekst] / V.A. Kolesnikova // M.: Kolos, 1979. – 415 s.
- 5 Madenov, Je.D. Plodovodstvo i vinogradarstvo [Tekst] / Je.D. Madenov // Doklady Nacional'noj akademii nauk Respubliki Kazahstan. – 2011. – №3. – S.74-87.
- 6 Kabylbekova, B. Reduced major minerals and increased minor nutrients improve micropropagation of three apple cultivars [Text] / V. Kabylbekova [and etc.] // In Vitro Cellular and Developmental Biology – Plant. – 2020. – Vol. 56(3). – P. 335-349.
- 7 Dolgih, S.G. Mezhdunarodnyj opyt sertifikacii posadochnogo materiala plodovyh i jagodnyh kul'tur [Tekst] / S.G.Dolgih // Almaty: TOO «Nur-Print», 2022. – 262 s.
- 8 Kairova, G.N. Perspektivnye klonovye podvoi jabloni dlja razvitija intensivnogo sadovodstva v Kazahstane [Tekst] / G.N.Kairova [i dr.] // Plodovodstvo i jagodovodstvo Rossii. – 2018. – Tom 52. – S.57-62.
- 9 Kovalchuk, I. New techniques for rapid cryopreservation of dormant vegetative buds [Text] / I. Kovalchuk [and etc.] // Acta Horticulturae. – 2014. – Vol. 1039 (22). – P. 137-146.
- 10 Drenova, N.V. Bakterial'nyj ozhog plodovyh kul'tur v respublike Kazahstan [Tekst] / N.V.Drenova [i dr.] // Zhurnal Karantin rastenij. Nauka i praktika. – 2013. – №1. – S. 39-43.
- 11 Pozharskiy, A.S. Genotyping and morphometric analysis of kazakhstani grapevine cultivars versus asian and european cultivars [Text] / A.S. Pozharskiy [and etc.] // Genetics and Molecular Research. – 2020. – 19(1). – gmr18482.
- 12 Kuralov, N. Kak fermeru poluchat' \$10 000 s odnogo hektara [Tekst] / N.Kuralov // ElDala. – 2022. – 3 fev.
- 13 Kuralov, A. Ploshhadi sadov v RK prakticheski ne rastut [Tekst] / N.Kuralov // ElDala. – 2021. – 15 fev.
- 14 Smailov A. Sel'skoe, lesnoe i rybnoe hozjajstvo v Respublike Kazahstan 2010-2014 // Statisticheskij sbornik [Tekst] / A. Smailov // Almaty: Agenstvo Respubliki Kazahstan po statistike, 2015. – 194 s.
- 15 Smailov A. Sel'skoe, lesnoe i rybnoe hozjajstvo v Respublike Kazahstan 2011-2015 // Statisticheskij sbornik [Tekst] / A. Smailov // Almaty: Agenstvo Respubliki Kazahstan po statistike, 2016. – 196 s.
- 16 Smailov A. Sel'skoe, lesnoe i rybnoe hozjajstvo v Respublike Kazahstan 2012-2016 // Statisticheskij sbornik [Tekst] / A. Smailov // Almaty: Agenstvo Respubliki Kazahstan po statistike, 2017. – 198 s.
- 17 Smailov A. Sel'skoe, lesnoe i rybnoe hozjajstvo v Respublike Kazahstan 2013-2017 // Statisticheskij sbornik [Tekst] / A. Smailov // Almaty: Agenstvo Respubliki Kazahstan po statistike, 2018. – 209 s.
- 18 Smailov A. Sel'skoe, lesnoe i rybnoe hozjajstvo v Respublike Kazahstan 2014-2018 // Statisticheskij sbornik [Tekst] / A. Smailov // Almaty: Agenstvo Respubliki Kazahstan po statistike, 2019. – 218 s.
- 19 Smailov A. Sel'skoe, lesnoe i rybnoe hozjajstvo v Respublike Kazahstan 2015-2019 // Statisticheskij sbornik [Tekst] / A. Smailov // Almaty: Agenstvo Respubliki Kazahstan po statistike, 2020. – 221 s.
- 20 Smailov A. Sel'skoe, lesnoe i rybnoe hozjajstvo v Respublike Kazahstan 2016-2020 // Statisticheskij sbornik [Tekst] / A. Smailov // Almaty: Agenstvo Respubliki Kazahstan po statistike, 2021. – 212 s.

21 Kukusheva, A.N. Praktikum po plodovodstvu Severnogo Kazahstana: Uchebnoe posobie dlja agronomicheskіh special'nostej vysshіh uchebnyh zavedenij [Tekst] / A.N.Kukusheva [i dr.] // Pavlodar: Kereku, 2016. – 124 s.

ТҮЙІН

Қазақстанда бау-бақшалар мен жүзімдіктерді қалпына келтіру бағдарламасы жүзеге асырылуда. Мемлекет көпжылдық жеміс-жидек ағаштары мен екпелерінің жаңа алқаптарын қайта құру және отырғызу шығындарының бір бөлігін субсидиялайды, бірақ, соған қарамастан, өңірлердегі бау-бақша және жүзімдік алқаптарының көлемі іс жүзінде өспей отыр. Қазақстанда отандық тәлімбақ шаруашылығын қолдауға субсидия енгізілді, жеміс-жидек дақылдары мен жүзімнің көпжылдық екпелерін отырғызу материалдарын өндіруге кеткен шығындарды ішінара (50%) өтеу арқылы субсидияланады. Дегенмен, Қазақстан бойынша 2012-2020 жылдар аралығында жеміс-жидек ағаштары мен екпелерінің өсірілетін ауданы орта есеппен 58740,4 га құрайды. Ең көп алқапты алма ағаштары алып жатыр (32616,9 га), одан кейін жүзім – 14530,1 га, өрік – 3598,5 га, алмұрт – 2061,1 га, шие – 1575,2 га, қара өрік – 1334,7 га, таңқурай – 1259,7 га, құлпынай – 916,1 га және шабдалы 578,4 га егілген. Отандық аграрлық ғылымның саланы қолдау тақырыбы, оның ішінде білікті мамандарды даярлау тұрғысынан ерекше назар аударуға тұрарлық, оларсыз жеміс-жидек дақылдарының өнімділігін әлемдік стандарттарға жақындату мүмкін емес. Бұл мәселені шешу арқылы Қазақстан жеміс-жидек өндірісін, тіпті қазіргі уақыттағы қол жетімді бау-бақша алаңдарымен-ақ 5 есеге арттыруға мүмкіндік береді. Жеміс-жидек дақылдарының отырғызу материалдарын инспекциялау және сертификаттау жүйесін енгізу тәлімбақ шаруашылығында ашықтық пен объективтілікті қамтамасыз етеді, бұл тұқым шаруашылығына инвестицияларды айтарлықтай арттыруға және жеміс-жидек дақылдарының отырғызу материалдарын дамытуға алғышарттар жасайды.

РЕЗЮМЕ

В Казахстане реализуется программа восстановления виноградников и садов. Государство субсидирует часть затрат на реконструкцию и закладку новых площадей многолетних насаждений, но, несмотря на это, площади садов и виноградников в регионах практически не растут. В Казахстане внедрена субсидия с целью поддержки отечественного питомниководства субсидируются маточники многолетних насаждений плодово-ягодных культур и винограда, путем частичного (50%) возмещения затрат на производство посадочного материала. Однако, по всему Казахстану площадь плодово-ягодных насаждений составляет в среднем за 2012-2020 годы 58740,4 га. Наибольшую площадь составляет насаждение яблони (32 616,9 га), затем виноград – 14 530,1 га, абрикос – 3 598,5 га, груша – 2 061,1 га, вишня – 1 575,2 га, слива – 1 334,7 га, малина – 1 259,4 га, клубника – 916,1 га и персик – 578,4 га. Особого внимания заслуживает тема поддержки отрасли отечественной аграрной наукой, в том числе и в плане подготовки квалифицированных специалистов, без которых невозможно приблизить урожайность плодово-ягодных культур к мировым стандартам. Решение этого вопроса позволило бы Казахстану увеличить производство фруктов в пять раз даже при имеющейся площади садов. Внедрение системы инспекции и сертификации обеспечит прозрачность и объективность при выращивании посадочного материала плодовых культур, что создаст предпосылки для существенного роста инвестиций в семеноводство и развитие посадочного материала плодово-ягодных культур.

UDK: 632.915
IRSTI: 68.33.15

DOI 10.52578/2305-9397-2023-3-2-139-150

Shaimardan E., Master of Chemistry, **the main author**, <https://orcid.org/0000-0002-3173-0220>
«Scientific Center of Composite Materials», Almaty, 79 Nurmakov str., 050026, Kazakhstan,
esbol_shay@mail.ru
Kabdrakhmanova S.K., candidate of Technical Sciences, associate professor, <https://orcid.org/0000-0001-5760-2967>