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GEOGRAPHY OF DISTRIBUTION OF *Malus* VARIETIES IN AZERBAIJAN DEPENDING ON SOIL

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ГЕОГРАФИЯ РАСПРОСТРАНЕНИЯ В АЗЕРБАЙДЖАНЕ СОРТОВ ЯБЛОНИ В ЗАВИСИМОСТИ ОТ ПОЧВЫ

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Abstract. More than 6,000 plant species have been identified in the Caucasus, of which 4,200 species (70%) are common in Azerbaijan. 11% are trees and shrubs, and 9% are endemic plants. There are more than 280 local varieties and forms of apple trees in Azerbaijan. After the 1920s, the area of fruit orchards in Azerbaijan was expanded to 21 thousand hectares due to local varieties, of which 13 thousand hectares (62%) were apple orchards. In 1926, the Azerbaijan Scientific Research Institute of Horticulture, Viticulture and Subtropical Plants was established in Azerbaijan with the aim of developing fruit growing. New varieties of apple trees are created through selection. Due to the newly created varieties through selection, apple orchards in Azerbaijan have significantly developed. In 1976, 13 thousand hectares of new industrial apple orchards were planted. Since 1982, the existing gene pool of apple trees has been studied.

Аннотация. На Кавказе выявлено более 6000 видов растений, из которых 4200 видов (70%) распространены в Азербайджане. 11% — деревья и кустарники, 9% — эндемичные растения. На территории Азербайджана более 280 местных сортов и форм яблонь. После 1920-х годов площадь плодовых садов Азербайджана была расширена до 21 тыс. га за счет местных сортов, из которых 13 тыс. га (62%) составляли яблоневые сады. В 1926 году в Азербайджане с целью развития плодоводства был создан Азербайджанский научно-исследовательский институт садоводства, виноградарства и субтропических растений. Создание новых сортов яблони осуществляется путем селекции. За счет вновь созданных путем селекции сортов, яблоневые сады в Азербайджане получили значительное развитие. В 1976 году было заложено 13 тыс. га новых промышленных яблоневых садов. С 1982 года изучается существующий генофонд яблонь.

Keywords: *Malus*, soil, gene pool, breeding, varieties, Azerbaijan

Ключевые слова: яблоня, почва, генофонд, селекция, сорта, Азербайджан.

Due to the diversity of Azerbaijan's rich soil and climate conditions, it is one of the centers of initial formation and cultivation of many plants, having a great genetic richness of the plant world [1]).

Azerbaijan is one of the centers of formation of fruit plants, it is an ancient country of fruit growing. The history of fruit growing here dates back to the "Stone" and "Bronze" periods, which belong to the III millennium. Archaeologists conducting excavations in a number of regions of the

republic found the kernels of cherries, plums, and peaches belonging to this period. At the same time, it is mentioned in the first written sources of antiquity that ancient Azerbaijan was rich in various fruit plants [2].

This is related to the observation of historically rich soil cover in Azerbaijan. Currently, 6.5% of the country's 8,641.5 thousand hectares of land fund are mountain-meadow lands, 14.01% are brown mountain-meadow lands, 0.9% are mountain-black lands, 30.09% are yellow chestnut, 1.8% are gray and 28.9 % gray-brown, 12.2% grassland, 5.5% saline, brackish, marshy and other soils [3; 4].

From this point of view, the genotypes of the apple plant in Azerbaijan are distinguished by their wide polymorphism, their population is formed from different biotypes, clones, forms, and variations and they are hereditary carriers of valuable economic and breeding traits.

The diversity of soils in the country has led to the creation of rich vegetation (4200 species), which makes up 62% of the Caucasian flora and 11% of the world flora. Among those plants, people have historically used the wild forms of tumulus, sedum, gerzak, subtropical, citrus, and berry plants growing in the forests of the republic, and the forms with high efficiency have been selected and brought to modern times. Currently, taking into account the high genetic characteristics of those forms and varieties, they are used in the parental lines in the selection program. As a result of the agrarian reforms carried out in our country at a time when market economy prevailed in the world, the land fund suitable for agriculture was appropriated and distributed to peasant farms. In order to efficiently use those lands, high-efficiency, quick-harvest, and sufficient breeding varieties have been created [8-12].

Apple tree breeding in Azerbaijan was started by P. A. Ryabchenko in 1932. In 1936-1940, P. V. Kuznetsov, A. D. Rajabli, I. M. Akhundaz continued the work, and in 1961-1980, M. P. Maksimova and Z. A. Hidayatli continued the apple tree breeding research and developed 20 thousand hybrids. In total, more than 60 new varieties were created [2].

Starting from 1980, the study of the gene pool of the apple plant in the country was started by us, and the creation of new selection varieties was started by using the high-yielding local, introduced and existing selection varieties (in F₂) of the Scientific Research Institute of Fruit and Tea Cultivation in parental pairs.

A sufficient hybrid fund and about 30 new breeding varieties that meet the requirements of the market economy and industrial horticulture have been created. Paizlıg Guba, Winter Guba, Sevinj, Elvin, Zumrüd varieties were created from these varieties and are used in the establishment of industrial apple orchards. 40 thousand hectares of 223 thousand hectares of orchards in our republic are apple orchards. Selection apple varieties were used in planting those varieties.

Materials and methods

Cultivated and wild varieties belonging to the gene pool of the apple plant in the main fruit-growing economic regions of Azerbaijan, including the Guba-Khachmaz region, were studied and analyzed, and highly efficient varieties and forms were included in the selection program.

In carrying out the research, the methodology of the All-Union Institute of Botany named after [1-5], "Program on the introduction and variety study of fruit plants", [6, 7], "Selection and breeding of fruit and berry plants" (1981), mathematical and statistical processing of statistical analysis methods, computer technologies (MINITAP, Sigma Stat, SPSS, MSTAC, MCEXCEL, etc. programs, database management systems - MC FoxPro, MS Access, etc.).

Table

AGROBIOLOGICAL CHARACTERISTICS AND DISTRIBUTION OF SELECTED APPLE VARIETIES DEPENDING ON THE SOIL COVER OF AZERBAIJAN (2021-2023)

<i>Undergrow</i>	<i>Food area, m</i>	<i>Don't fall into full production period</i>	<i>Average yield per hectare, tons</i>	<i>Average mass of fruits, g</i>	<i>Disease and pests, 5 points</i>			<i>Tasting price, 5 points</i>	<i>Total sugar, %</i>	<i>Vitamin "C" mg/%</i>	<i>Length of stay, days</i>	<i>Distribution of varieties depending on soil cover, %</i>		
					<i>Apple scab</i>	<i>Powdery Mildew</i>	<i>Apple fruit eater</i>					<i>Brown mountain-forest</i>	<i>Chestnut</i>	<i>Burning mountain forest</i>
<i>Ziya (summer)</i>														
MM-106	5x3	4-5	15	120	0.6	1.0	0.9	4.4	9.1	4.4	15-18	40	35	25
<i>Zirva summer</i>														
MM-106	5x3	4-5	17	122	0.6	1.1	1.1	4.3	9.4	5.6	16-18	45	35	20
<i>Fahima summer</i>														
MM-106	5x3	4-5	13	118	0.7	1.3	1.3	4.3	8.4	4.4	16-18	47	30	23
<i>Lala summer</i>														
MM-106	5x3	4-5	15	118	0.7	1.2	1.2	4.4	9.3	5.6	18-20	51	35	14
<i>Nigar summer</i>														
MM-106	5x3	4-5	13	117	0.8	1.3	1.1	4.4	8.6	4.3	18-20	48	30	22
<i>Sulh autumnal</i>														
MM-106	5x3	4-5	18	160	0.8	1.2	1.3	4.3	8.4	4.3	20-25	53	32	15
<i>Marfa autumnal</i>														
MM-106	5x3	4-5	15	130	0.9	1.3	1.3	4.2	8.3	4.0	20-25	44	35	21
<i>Ulvi winter</i>														
MM-106	5x3	4-5	20	140	0.7	1.0	0.9	4.5	9.6	5.6	130	51	35	14
<i>Vatan winter</i>														
MM-106	5x3	4-5	20	130	0.6	1.2	1.2	4.6	9.7	5.0	145	48	33	19
<i>Nubar winter</i>														
MM-106	5x3	5-6	19	125	0.7	1.3	1.3	4.5	8.4	4.6	140	47	33	20
<i>Chiraggala winter</i>														
MM-106	5x3	5-6	20	125	0.8	1.0	1.1	4.6	9.4	4.8	145	54	29	17
<i>Davamli winter</i>														
MM-106	5x3	5-6	19	120	0.6	1.1	0.9	4.5	9.3	4.8	145	48	32	20
<i>Gizil taj winter</i>														
MM-106	5x3	5-6	21	135	0.6	1.2	0.9	4.7	9.6	5.2	150	48	30	22
<i>Paizlig Guba winter</i>														
MM-106	5x3	5-6	21	120	0.8	1.3	1.2	4.0	8.4	4.2	140	49	33	18
<i>Qishlig Guba winter</i>														
MM-106	5x3	5-6	18	125	0.9	1.3	1.3	4.0	8.6	4.2	140	49	30	21
<i>Emil winter</i>														
MM-106	5x3	5-6	23	130	0.7	1.0	0.9	4.5	9.3	5.4	155	50	30	20
<i>Elvin winter</i>														
MM-106	5x3	4-5	23	133	0.7	1.0	0.9	4.5	9.4	5.5	155	55	45	-
<i>Zumrud winter</i>														
MM-106	5x3	4-5	18	120	0.7	1.2	1.3	4.4	8.4	5.0	140	60	40	-
<i>Eldar winter</i>														

Undergrow	Food area, m	Don't fall into full production period	Average yield per hectare, tons	Average mass of fruits, g	Disease and pests, 5 points			Tasting price, 5 points	Total sugar, %	Vitamin "C" mg/%	Length of stay, days	Distribution of varieties depending on soil cover, %		
					Apple scab	Powdery Mildew	Apple fruit eater					Brown mountain-forest	Chestnut	Burning mountain forest
MM-106	5x3	4-5	15	110	0.9	1.3	1.3	4.5	8.5	4.3	140	60	40	-
Makhmari winter														
MM-106	5x3	4-5	21	130	0.6	1.3	1.2	4.7	9.4	5.1	145	60	40	-
Nuran winter														
MM-106	5x3	4-5	17	118	0.8	1.2	1.2	4.0	8.5	4.8	140	50	40	10
Sarvan winter														
MM-106	5x3	4-5	17	120	0.7	1.3	0.9	4.0	8.6	4.4	135	48	32	20
Sadaf winter														
MM-106	5x3	5-6	22	145	0.7	1.1	0.9	4.5	9.4	5.3	155	100	-	-
Sahil winter														
MM-106	5x3	5-6	18	130	0.8	1.3	0.9	4.3	8.4	5.2	145	100	-	-
Sevinj winter														
MM-106	5x3	4-5	23	130	0.7	1.0	0.9	4.7	9.6	5.3	150	70	30	-
Shabran winter														
MM-106	5x3	4-5	21	128	0.8	1.2	1.3	4.0	9.4	5.0	145	75	25	-
Gobustan winter														
MM-106	5x3	4-5	22	130	0.8	1.3	1.2	4.2	9.6	4.9	145	80	20	-

Conclusions and discussion

In modern agriculture, the creation of new varieties and hybrids through selection and adaptation to the soil and climate conditions of each region are considered as one of the most important factors. From this point of view, we have continued the breeding research work on the apple plant on the existing fund (in F₂) and created a sufficient hybrid fund and about 30 highly efficient varieties. Scientific research is being conducted on the agrobiological characteristics of those varieties and their cultivation in the main soil types of the country (Table).

Among the varieties, Ziya, Zirva, Fahima and Lala varieties belong to summer varieties, Sulh and Marfa varieties belong to autumn varieties, and other varieties belong to winter varieties. Chiraggala, Nubar, Davamli, Gizil Taj, Paizlig Guba, Qishlig Guba, Emil, Sadaf, Sahil varieties are harvested in 5-6 years, and other varieties are harvested in 4-5 years. The average yield per hectare is 13-23 tons. Among the varieties, the high productivity of Sevinj, Elvin, Emil, Sadaf, Shabran, Gobustan, Makhmari, Paizlig Guba, Kizil Taj varieties was 21-23 tons per hectare, and partially low productivity (13-18 tons) was recorded in other varieties. The average weight of the fruits was 110-145 grams, that is, 145 grams in the Sulh variety and 100 grams in the Eldar variety. Varieties are mainly resistant (infected with 0.6-0.9 points) to powdery mildew (*Ventura inaequalis* (Cke) and *Ventura prina* Aderh.) and partially susceptible to powdery mildew (*Podasphaera leucotricha*) disease (1.0-1.3 points). Among the pests, the apple fruit borer (*Cydia pomonella* L., *Laspeyresia pomonella* L.) was infected mainly persistently (0.9-1.3 points). Ziya, Ulvi, Davamli, Gizil taj, Emil, Elvin to that pest. Sarvan, Sadaf, Sulh and Sevinj cultivars are persistently infected with a score of 0.9, while other varieties are partially infected, i.e., with a score of 1.0-1.3.

The varieties were highly rated by tasters (4.0-4.7 points). While the amount of total sugar is partially high in Zirva, Ziya, Ulvi, Vatan, Chiraggala, Davamli, Gizil taj, Emil, Elvin, Makhmari, Sevinj, Shabran and Gobustan varieties (9.3-9.6 %) compared to the varieties, while the other research varieties are relatively less (8.3-8.6%) was determined. The amount of vitamin "C" fluctuated between 4.2-5.0 mg%.

Summer varieties had 15-18 days, autumn varieties 18-25 days, and winter varieties 130-155 days. Sevinj variety was observed for 150 days, Sadaf, Emil and Elvin varieties for 155 days. As with all agricultural crops, soil plays an important role in achieving high productivity in the apple plant. From this point of view, while studying the adaptation of apple cultivars in the most widespread soils in the country, it was determined that the cultivars were mainly oriented to be used in brown mountain-forest soils (40-80%), and more efficient crops were obtained from those soils compared to other soils. It is possible to do. Certain results have been obtained that 20-45% in chestnut soils and 17-22% in brown mountain-forest soils have average efficiency.

Thus, the results of our long-term research studies have shown that the agrobiological characteristics of selected apple varieties, depending on the specified land cover of the republic, allow obtaining a high-efficiency fruit crop. Based on the results of the agrobiological characteristics of selected apple varieties studied for many years, it can be concluded that it is more appropriate to plant and cultivate the apple plant in the areas suitable for the soil and climate conditions.

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