

Production and biological characteristics of apricot varieties (*Armeniaca vulgaris Lam.*) in the conditions of Uzbekistan

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Abstract

The article provides data on the results of studies on the selection of highly productive varieties resistant to spring frosts and clothosporium disease, as well as to the conditions of a hot dry climate, created at the Samarkand scientific station of the Scientific Research Institute of Horticulture, Viticulture, and Winemaking named after Academician M.M. Mirzaev (Uzbekistan). As a result of many years of research, it was revealed that the latest terms of mass flowering were observed in the variety Mulla Sodik (April 09) and hybrid № 4332 (April 12), which is 9-12 days later than the control variety Yubileiny Navoi. Fruit ripening in varieties and hybrids was noted from June 25 to July 10. The varieties Marokand, Mulla Sodik, and hybrid № 4332 were distinguished by their resistance to clothosporium. The largest fruits were cultivar Mulla Sodik (55.8 g) and hybrid No. 4332 (51.3 g). During the research years (2015-2020), the highest yield was obtained for the late-flowering variety Mulla Sodik (14.9 t/ha) and hybrid No. 4332 (15.7 t/ha), which is 24.2-30.8 % higher than the indicators of the control variety Yubileiny Navoi. According to the indicators of the tasting assessment, the fruits of the varieties Mulla Sodik, Marokand (4.6 points), and hybrid № 4332 (4.7 points) stood out. On the basis of the research carried out, the apricot variety Mulla Sodik and hybrid № 4332 were submitted to the State Variety Testing Station of the Republic of Uzbekistan and are recommended for specialized fruit-growing farms. The results of scientific research will contribute to the successful cultivation of apricots, obtaining a constant and high yield, increasing the export of valuable fruits to the countries of the world.

Keywords: apricot; humus; soil; cultivar, hybrid, tree; spring frosts; vegetation period; flower; fruit ripening; leaf fall; clothosporium; tasting assessment; average fruit weight; yield

INTRODUCTION

In Uzbekistan, the urgent task is to fully provide the population with fruit-growing products throughout the year, expand export potential, produce, store and process fruits. Today the area of orchards in the republic is more than 280 thousand hectares, and the volume of fruits exceeds 3.0 million tons. In 2020, for the first time, an agreement was reached with the World Bank on the allocation of \$ 500 mil-

lion for the implementation of a project to modernize the horticulture and viticulture industry (Mirziyoyev, 2020).

Apricot (*Armenika vulgaris Lam.*) is the leading fruit crop in Uzbekistan. This crop occupies 45% of all fruit plantations of the republic. Apricot fruits are distinguished by high sugar content, vitamin A content, the presence of organic acids, aromatic and very valuable minerals (Buriev & Enileev, 2014). Apricots are an important source of several vita-

mins, especially carotene. Depending on the variety and soil and climatic conditions, the content of carotene in apricot fruits grown in Uzbekistan ranges from 0.86 to 3.30 mg per 100 g of fresh weight (Normakhmatov, 2020).

In this regard, in addition to the nutritional value, the apricot fruits have extremely important dietary properties (they restore hemoglobin in the blood). It is an excellent product for drying and preserving. The seeds contain up to 55% fat and up to 28% protein, they are used to produce a refined kernel that replaces almonds. Pitted shells and wood are used in industry (Nabiev et al., 1986).

Apricot is distinguished by its rapid growth and early fruiting (3-4 years after planting), resistance to heat and drought, and a long life span. In the conditions of Uzbekistan, flowering apricot orchards are often damaged by spring frosts (Isroilov, 2019; Karshiev, 2019). Therefore, it is important to create varieties and hybrids that later bloom and, as a result, trees are not damaged by frost (Potapova & Pil'shchikova, 2000).

The aim of the research was to identify highly productive, late flowering, resistant to clostosporium and hot dry climate conditions, to assess biological and production characteristics, fruit quality and yield of apricot varieties created at the Samarkand Scientific Station of the Academician M. Mirzaev Research Institute of Horticulture, Viticulture and Winemaking.

The research task included:

- selection of promising late-flowering apricot cultivars and their production and biological characteristics;
- to identify the dynamics of the onset of phenophases of development, depending on the duration of the growing season;
- assessment of the resistance of varieties to clastosporium disease;
- determination of the average weight of fruits, their tasting assessment and yield.

MATERIAL AND METHODS

Materials, methods and objects of research. The work was carried out in the conditions of the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M. Mirzaev in 2015-2020.

The area of the orchard is 850 hectares, including the apricot orchard - 34 hectares, of which 28 hectares is a fruitful garden and 6 hectares is a young garden. Seedlings are grown on an area of 50 hectares of a fruit nursery. The studies were carried out according to the methods of Buriev (2014) and others "Methodology for taking into account phenological observations in experiments with fruit and berry plants" (Buriev & Enileev, 2014), Moysenchenko (1967) "Methodology for recording and observing in experiments with fruit and berry plants".

Six varieties and hybrids of apricot created in the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M.M. Mirzaev were used as objects of research in the experiment: Yubileiny Navoi, Marokand, Mulla Sodik, Navruz, hybrid № 4332 and Kursodik. Of these, 4 varieties (Yubileiny Navoi, Marokand, Navruz, Kursodik) are included in the State Register of Agricultural Crops of the Republic of Uzbekistan. Variety Mulla Sodik and hybrid № 4332, created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M.M. Mirzaev, were handed over to the State Variety Testing Station.

Yubileiny Navoi. The variety was created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M. Mirzaev. Included in the State Register of Agricultural Crops of the Republic of Uzbekistan. A high-quality variety, the tree bears fruit for 4 years, the fruits ripen in early July. The fruits are large, shiny, golden yellow in color with a large bright blush. The shape of the fruit is round. The flesh is very dense, somewhat crispy with fine fibers. The frost resistance is satisfactory and the yield is high. The yield of dried products in the form of dried apricots is 24-26% (Mirzaev & Kuznetsov, 1984).

Marokand. The variety was created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M. Mirzaev. Included in the State Register of Agricultural Crops of the Republic of Uzbekistan. A mid-ripening variety, begins to bear fruit at the age of 5 years, the fruits ripen in the first decade of July, the fruits are large, the yield is high and the tasting score is 4.6

points. The variety is frost-resistant, resistant to spring frosts and clothosporium disease.

Mulla Sodik variety. The variety was created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M. Mirzaev. Delivered to the State Variety Testing Station. Late-flowering, after planting seedlings in the garden, it begins bearing fruit for 4-5 years, when processed, high-quality jam, compote and dried dried apricots are obtained. The fruits are large, oval in shape, the flesh is yellow, when fully ripe, the fruits are juicy yellow, they have a smooth surface, and the fruit contains 20% sugars. The variety is winter-hardy, resistant to spring frosts and clothosporium disease (0-1 points).

Navruz. The variety was created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M. Mirzaev. Included in the State Register of Agricultural Crops of the Republic of Uzbekistan. Bears fruit for 5 years after planting seedlings. The fruits ripen in the first ten days of July, the average height of the trees is 5.4 m and the crown diameter is 4.4 m. The fruits are large, oval-round, yellow with a dark red blush, which occupies most of the fruit. The pulp is light orange, juicy, medium density, slightly fibrous, with a pleasant aroma, sweet and sour taste, contains 13% sugar, 0.84% acids. The variety is frost-hardy, characterized by regular fruiting, good yield (Mirzaev & Kuznetsov, 1984).

Hybrid № 4332. Created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after Academician M. Mirzaev. Delivered to the State Variety Testing Station. The flowering of the hybrid occurs 9-11 days later than the control variety, regular fruiting, resistant to clothosporium (0-1.5 points), winter-hardy, resistant to spring frosts, fruits are large, yellow, on the sunny side the fruits are covered with a red blush, in the composi-

tion of the fruit contains 17.6% of sugars, the quality of the fruit is good.

Kursodik. The variety was created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after academician M. Mirzaev. Included in the State Register of Agricultural Crops of the Republic of Uzbekistan. Late flowering, flowering duration 5-7 days. Trees begin to bear fruit at 7-8 years. Fruits are medium-sized, pointed-oval in shape, dark yellow pulp, firm, elastic, limited juicy, sweet, excellent taste, aromatic. When dried, the pulp of overripe fruits is weakly swollen. A frost-resistant variety, but the bud resistance to spring frost is insufficient (Mirzaev, 1968).

RESULTS AND DISCUSSION

Research results. In the arable horizon (0-30 cm) of the old-irrigated light gray soils of the apricot orchard, the humus content is 1.27%, and in the subsoil (31-50 cm) -0.10%, the total nitrogen, respectively, is 0.127 - 0.115% , phosphorus 0.185 - 0.155%, potassium 2.7–2.0%. The soil is poorly supplied with mobile forms of nitrogen and phosphorus, and the supply of potassium is average. The N-NH₄ content is 21.2-16.3; N-NO₃ 23.2-18.8; mobile phosphorus 25.8-16.3; mobile potassium 230–180 mg/kg. The reaction of the soil solution of the soil in the arable layer (0-30 cm) is weakly alkaline and is pH = 7.6-7.8 (Table 1).

Great difficulties in growing apricots are associated with systematic freezing of flower buds due to their short dormant period and early flowering periods. Young ovaries die already at -0.6 °C. Therefore, it is important to select late-flowering, high-yielding, clothosporium-resistant apricot varieties (Potapova & Pil'shchikova, 2000).

Among fruit crops, apricot fruits are considered the most valuable and productive, they are consumed fresh, dried, and processed fruits are export-

Table 1. Agrochemical indicators of the soil of the apricot orchard

Soil incision, cm	Humus, %	Overall, %			Mobile, mg/kg			
		N	P	K	N-NH ₄	N-NO ₃	P ₂ O ₅	K ₂ O
0 – 30	1,27	0.127	0,185	2,7	21,2	23,2	25,8	230
31 – 52	0,10	0,115	0,155	2,0	16,3	18,8	16,3	180

ed to different countries of the world. In our studies, the average weight of one fruit, depending on the variety, was 35.7 (Morokand) -55.8 g (Mulla Sodik). The largest fruits were the Mulla Sodik variety and hybrid № 4332, the average fruit weight of these varieties and hybrid, respectively, was 55.8 and 51.3 g (Table 2).

In our studies, the beginning of flowering in the tested varieties and hybrids of apricot was observed on March 26 - April 09. A later flowering of 8-11 days was found in the variety Mulla Sodik and hy-

brid № 4332 compared to the control. Mass flowering in the Marokand variety was observed on April 2, in the Navruz variety on April 7, in the Mulla Sodik variety on April 9 and hybrid No. 4332 on April 12. Fruit ripening in varieties and hybrids was noted from June 25 to July 10. The beginning of leaf fall fell on the first decade of November, and the end was on November 30 (Table 3).

Apricot fruits are considered the most valuable and productive among fruit crops. They are consumed fresh, dried and processed and fruits are

Table 2. Productivity of promising, late-flowering apricot varieties (2015-2020)

Varieties	Average weight of one fruit, g	Tasting score, points	Yield by years, t/ha						Yield, t/ha	
			2015	2016	2017	2018	2019	2020	t/ha	%
Yubileiny Navoi (control)	45,9	4,5	9,4	11,7	12,6	13,3	11,9	13,1	12,0	100,0
Marokand	35,7	4,6	13,9	13,4	14,8	14,5	14,2	15,0	14,3	119,2
Mulla Sodik	55,8	4,6	13,6	14,1	15,2	16,2	14,7	15,6	14,9	124,2
Navruz	45,6	4,4	13,1	13,7	13,9	14,7	14,0	15,8	14,2	118,3
№ 4332	51,3	4,7	14,5	15,0	15,8	16,6	15,4	16,9	15,7	130,8
Kursodik	38,2	4,5	9,9	13,8	14,3	14,9	13,8	14,9	13,6	113,3
LSD₀₅ (t/ha)			2,63	2,86	3,14	3,56	3,12	3,34		
S_x (%)			3,13	3,21	3,47	3,64	3,41	3,51		

Table 3. Production and biological characteristics of apricot varieties (2015-2020)

Varieties	Bloom		Fruit ripening	Clasterosporium resistance	Fall of the leaves		Duration of the growing season, in days	Average weight of one fruit, g	Tasting score, points	Yield	
	beginning	massive			beginning	massive				c/ha	%
Yubileiny Navoi (control)	26.03	31.03	1-10 July	medium stable	01.11	25.11	243	45,9	4,5	120,0	100,0
Marokand	27.03	02.04	1-10 July	stable	02.11	27.11	244	35,7	4,6	144,3	120,3
Mulla Sodik	03.04	09.04	1-10 July	stable	04.11	30.11	241	55,8	4,6	149,4	124,5
Navruz	31.03	07.04	1-10 July	medium stable	03.11	30.11	244	45,6	4,4	141,6	118,0
№ 4332	06.04	12.04	1-10 July	stable	04.11	30.11	242	51,3	4,7	156,7	130,6
Kursodik	26.03	31.03	25 June - 05 July	medium stable	01.11	26.11	244	38,2	4,5	135,8	113,1

exported to different countries of the world. In the studies, the highest yield, 156.7 c/ha, was obtained for hybrid № 4332, this figure compared to the control variant of Yubileiny Navoi was 30.6% higher. For the Mulla Sodik variety, this indicator, respectively, amounted to 149.4 c/ha and 24.5%. The new variety (Mulla Sodik) and hybrid (hybrid № 4332) created at the Samarkand Scientific Station of the Scientific Research Institute of Horticulture, Viticulture and Winemaking named after Academician M. M. Mirzaev are recommended for specialized fruit growing farms of the Republic and they are handed over to the State Variety Testing Station.

The results of the yield and tasting assessment of apricot fruits are consistent with the data of other researchers. So, in work Makhmudov & Aliev (2020), the authors obtained data on the yield of apricot varieties 10.7-13.9 t/ha and a tasting score of 4.0-4.6 points.

CONCLUSION

Thus, for the successful cultivation of apricot, obtaining a systematic and high yield of valuable fruits, it is important to take into account its biological characteristics, to use late flowering varieties. On the basis of the studies carried out, the results obtained and analyzes on resistance to spring frosts, to clastosporia, tasting assessment and yield, we recommend the Mulla Sodik variety and hybrid № 4332 when growing apricots indicators.

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