

Evaluation of arobiological characteristics of persimmon varieties

Abduqodir Nazarov^{1*}, *Abduqahhor* Nazarov¹, *Malokhat* Khakimova¹ and *Mavjuda* Khakimova¹

¹Tashkent State Agrarian University, 100140 Tashkent, Uzbekistan

Abstract. In this scientific article, the persimmon palm is a subtropical plant of which there are many species. More than 800 varieties of persimmons have been studied and propagated around the world. Such varieties and forms are effective as large-fruited, fertile, seed-bearing and pollinating trees with flowering at the same time. Today, the drying of persimmon fruits in the world is common in China, Japan, Korea and Brazil. Ripe, but not yet softened hard fruits are peeled off and hung on a string.

1 Introduction

China, Japan, the USA and Korea grow the main part of persimmon products in the world. Persimmons are a staple food throughout the Middle East. Its history begins several thousand years BC. Currently, according to the information of FAO, "there are palm groves in 17 countries of the world; the total land area is 1 million hectares. The 90 % of the area of these parks corresponds to the territory of China. In China, it is planted on an area of 8,419 ha, and the yield is 112,854 thousand tons per year, in the USA it is 89,406 thousand tons, in Iran it is 81,685 thousand tons, and in Pakistan it is 44,770 thousand tons. One of the urgent problems is to dry high-quality persimmons in order to provide the world's population with high-quality persimmons [1-7].

More than 800 varieties of persimmons have been studied and propagated around the world. Such varieties and forms are effective as large-fruited, fertile, seed-bearing and pollinating trees with flowering at the same time. Today, the drying of persimmon fruits in the world is common in China, Japan, Korea and Brazil. Ripe, but not softened hard fruits are peeled off and hung on a string. A little skin should remain on the tip of the fruit when it is peeled, otherwise a lot of liquid may flow out. For this reason, many scientific works are focused on current directions such as reducing the cost and cost of production of persimmon fruit, drying and other assortment of products [15].

The dynamics of persimmon tree growth processes are evaluated according to the beginning of phenological stages during the entire vegetation period. According to the data obtained from phenological observations, information is provided about the speed of ripening of persimmon varieties and their individual characteristics of their development.

* Corresponding author: nazarov@mail.ru

Oriental persimmons planted from seed begin to bear fruit in 4-6 years, and grafted ones begin to bear fruit in 2-3 years after planting in gardens. Some cultivars also produce on one-year-old grafted stock in the nursery. Persimmon trees reach their full harvest at the age of 8-10 years, and at this age, one tree can yield 120-150 kg and more. The period of full productivity is 40-60 years. A palm tree lives for more than 100 years. 400-500-year-old palm trees are also found in China. The growing season of the palm tree begins when the average daily temperature is 10-12.

Some fruits and vegetables usually were picked depending on the purpose of use. First, as soon as the harvest of the fastest varieties is harvested, the technical ripening of the latest varieties begins. The advantage of such an approach is that it plays an important role in our research work, i.e. the time it takes to dry persimmons and the efficient organization of work [11, 16-19].

2 Materials and Methods.

In the scientific research, the agro-technological characteristics of persimmons were evaluated, the methods of drying them, the existing physical and chemical processes and phenological observations, biometric measurements, determination of the average weight and yield per unit area, organoleptic evaluation before and after storage and natural reductions in it were carried out, organoleptic evaluation, on the technology of drying fruits Z.S. Iskandarov (2017), physical, chemical and organoleptic quality parameters before and after drying of persimmons were determined according to the method of E.P. Shirokov (1999), statistical analysis of the results obtained in the experiments was carried out using "Excel 2010" and "Statistica 7.0 for Windows" mathematical-statistical analysis according to B.A.Dospikhov (1985) method with 0.95% confidence interval was performed in computer programs.

3 Results and Discussion

One of the important aspects is the organization of arrival of persimmon fruits to the drying area by conveyor method. First, it is necessary to pay attention to the early and late ripening of persimmon varieties. Usually, during fruit ripening, irreversible changes are observed in their cells, the turgor state is disturbed; tissues begin to soften and shrivel, and microorganisms can be easily affected.

As a result, complex organic substances can be converted into simpler substances, the level of sugars can decrease or increase. During the period of physiological ripening of a persimmon, the number of seeds contained in it can be up to 6-8, depending on the variety. But among some varieties of persimmons, there are almost no seeds, and even if there are, they are immature. Examples of this are Fuyu and Tamopon varieties. Persimmon fruits are considered suitable for consumption during the period of physiological ripening. During the period of technical ripening, storage, drying and canned fruit and vegetables are the best quality products. Timely harvesting of fruits during the technical ripening period also depends on proper organization of storage. The size, density, color, taste and texture of the fruit, the development of the seed also depend on the period of its technical ripening [3, 9, 14].

Table 1. Biometric dimensions of palm seedlings, m/cm (2019-2021 years)

№	Varieties name	Size, diameter of persimmon seedlings											
		2019			2020			2021			Average		
		age	tall	width	age	tall	width	age	tall	width			
1	Xiakume (control)	1	1,50	25,7	2	1,70	35,7	3	2,0	49,7	2	1,73	37,0
2	Zendji-maru	1	1,30	23,5	2	1,50	36,5	3	1,93	47,9	2	1,57	35,9
3	Tamopon	1	1,40	25,4	2	1,60	34,4	3	2,8	48,4	2	1,93	36,0
4	Sheng	1	1,25	22,2	2	1,40	32,2	3	1,85	45,2	2	1,50	33,2
5	Fuyu	1	1,27	22,8	2	1,45	32,8	3	1,80	42,8	2	1,50	32,8
6	Korolek	1	1,20	21,6	2	1,40	31,6	3	1,86	43,6	2	1,48	32,2

Table 2. Pre-harvest biometric dimensions of persimmon fruits, cm. (2019-2021 years)

№	Varieties name	Persimmon fruit size, diameter								± relative to the control
		2019		2020		2021		O'rtacha		
		width	tall	width	tall	width	tall	width	tall	
1	Xiakume (control)	6,3	7,2	6,5	7,0	6,8	7,5	6,5	7,2	-
2	Zendji-maru	5,9	6,3	6,2	6,8	5,7	6,3	5,9	6,4	87,5
3	Tamopon	7,8	5,4	7,3	5,5	7,7	5,4	7,6	5,3	75,0
4	Sheng	4,8	4,0	4,9	4,1	5,1	4,2	4,9	4,2	55,5
5	Fuyu	4,1	4,3	4,6	4,9	4,3	4,8	4,2	4,3	59,7
6	Korolek	5,0	5,5	5,1	5,8	4,9	5,0	5,0	5,4	76,3

According to the results of the study on the ripening of the selected varieties, according to the results of our study on the level of hardness of persimmon fruits, the level of hardness of the Tamopon variety was higher, i.e. 5.4 kg/cm, compared to the control Xiakume variety - 5.2 kg/cm. The lowest hardness level in this study was found in the Zenji-maru variety - 2.4 kg/cm (Table 2).

Table 3. Determining the ripeness of persimmons before the skin according to the level of hardness (2019-2021 years)

№	Varieties name	Degree of firmness of persimmon fruits			Average	± relative to the control
		2019	2020	2021		
1	Xiakume (control)	5,2	5,3	5,1	5,2	-
2	Zendji-maru	2,4	2,6	2,3	2,4	46,1
3	Tamopon	5,5	5,6	5,3	5,4	103,8
4	Sheng	2,8	2,5	2,4	2,5	48,0
5	Fuyu	2,5	2,8	2,6	2,6	50,0
6	Korolek	4,0	4,5	5,0	4,5	86,5

Timely harvesting, transportation and preparation methods for drying persimmon fruits increase the price of the product while obtaining a quality dried product.

During the years of research, when the yield of persimmon varieties was studied, they differed sharply from each other.

In our 2019 research, our control cultivar Xiakume outperformed other cultivars, Zenji-maru, Tamopon, Sheng, Fuyu and Korolek, with a yield of 26.0 t/ha.

In the same year, that is, according to the results of our research in 2019, the lowest yield in terms of yield was 15.0 t/ha in the Korolek variety (Table 3, 4).

Table 4. Harvest persimmons of persimmon varieties, days (2019-2021 years)

№	Varieties name	Collection times, days								
		September			October			November		
		I decade	II decade	III decade	I decade	II decade	III decade	I decade	II decade	III decade
1	Xiakume (control)									
2	Zendji-maru									
3	Tamopon									
4	Sheng									
5	Fuyu									
6	Korolek									

Table 5. Yield of persimmon varieties, t/ha (2019-2021 years)

№	Varieties name	Years of experience			Average yield, t/ha	± relative to the control
		2019	2020	2021		
1	Xiakume (control)	26,0	28,0	30,0	28,0	-
2	Zendji-maru	24,0	25,0	26,0	25,0	-10,8
3	Tamopon	22,0	24,0	27,0	24,3	-13,3
4	Sheng	18,0	20,0	21,0	19,6	-30,0
5	Fuyu	24,0	25,0	26,0	25,0	-10,8
6	Korolek	15,0	17,0	18,0	16,6	-40,7

In the second year of our study, that is, in 2020, the yield of studied persimmon varieties was slightly higher than in 2019. Observations showed that the leadership of this year's persimmon varieties in terms of productivity was observed in Xiakume (control) and was 28.0 t/ha. This year, Sheng, Fuyu, and Korolek cultivars had lower yields than the control.

In our 2021 research, the yield was slightly higher than the previous two years. In this year, the high rate of productivity was observed in Xiakume (control) and Tamopon varieties, that is, it was 27.0 - 30.0 t/ha.

During the analysis of the results of the research carried out for three years, a slightly closer productivity compared to the control variety was observed in the Zenji-maru hybrid - 25.0 t/ha, and it was -10.8% compared to the control. Our remaining three varieties, i.e. Korolek -16.6%, Sheng - 19.6% and Tamopon - 24.3%, had a slightly lower result than the control (Table 3.5).

4 Conclusion

Based on the results of the researches, the varieties of dry persimmon palm grown in local conditions, Xiakume, Zenji-maru, Tomopon, Korolek, Fuyu, Sheng, were determined and their agrobiological characteristics (Xiakume - width and height 6.5-7.2, Zenji-maru - 5.9-6, 4. Tomopon - 7.6-5.3. Korolek - 4.2-4.3, Sheng - 5.0-5.4 cm) and its technological properties were studied.

The technological factors affecting the quality of persimmon fruits were identified and divided into three varieties: high grade, first grade, and second grade.

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