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APRICOT PRODUCTIVITY IN THE NORTHERN PART OF THE COUNTRY UNDER THE INFLUENCE OF ABIOTIC FACTORS

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ABSTRACT

The object of the research was the trees of the apricot varieties of Spring Blush, Pinkcot, Kyoto and Faralia, grafted on the Mirobalan 29C rootstock. Planting distance was 4.0x2.2 m. The planting of apricot trees was carried out in spring of 2018. Trees were trained to a Trident canopy. During the research was studied the morphological parameters of fruits and seeds, shape index, productivity and fruit redistribution quality classes. It was established that the biological characteristics of the variety influence the plantation productivity and the redistribution of the fruits in different quality classes. The Kyoto variety had a higher resistance to the late return temperatures, which in the conditions of the northern area registered productions of 17.03 t/ha in the third year after planting.

INTRODUCTION

According to the Horticulture Development Program for 2021-2025 and the action plan for its implementation, it is expected that the plantations with untapped potential will continue to be efficiently exploited and their staggered replacement with new ones, where modern varieties/rootstocks will be found, forms of crowns suitable for sustainable technologies, able to ensure early fruiting, high productivity of competitive fruits in conditions of high economic efficiency (Babuc 2012).

Currently, worldwide (Dejampour 2012, Gouble et al. 2020, Liu et al. 2012, Xue et al. 2020) is a constant interest in promoting and introducing in cultivation new varieties of apricot. In order to evaluate the behaviour of new varieties in different cultivation areas (Gouble et al. 2020), it is necessary to carry out tests under production conditions and then to be approved (Balan et al. 2008, Peşteanu et al. 2018, Stănică et al. 2010; Stănică & Eremia 2014).

At present, among the apricot varieties grown in our country, there is an acute lack of mature varieties from very early to very late. These would allow the completion of the assortment of varieties, which ensures the continuity in the consumption of fresh fruits and their industrial capitalization for a period of 50-60 days or even more (Negru & Peșteanu 2019, Pîntea 2019).

MATERIAL AND METHODS

The experiences took place in the intensive apricot plantation, of the enterprise "Vilora" LLC, Stolniceni village, Edineți district, Republic of Moldova. The trees were planted in 2018, at distances of 4.0 m between rows and 2.2 m per row, at a density of 1136 trees/ha and were grafted on the rootstock Mirobalan 29C.

The varieties studied were: Spring Blush, Pinkcot, Kyoto and Faralia. The Kyoto variety was taken as a control, having the same maturation period as that of the local apricot variety Nadejda. Trees were trained to a Trident canopy. The orchard is equipped with a drip irrigation system.

Approved methodological principles and methods in genetic improvement and the study of fruit species were used for the research. They were performed both in the field, where biometric measurements were performed to highlight the influence of biological characteristics of the variety on tree growth and fruiting, and in the laboratory.

The number of fruits in the crown of the trees was calculated by 2 weeks before harvest. The productivity of the plantation was established by the method of weighing the fruits. The average weight of a fruit was determined by mathematical calculations during the harvest, by weighing 100 fruits collected in a row from each variant. Then the average yield of a tree and a unit of area was calculated by mathematical operations.

The height, small and large diameter of fruits and seeds of different varieties was determined in the laboratory of the Department of Horticulture by the method of measurement. The quality of apricots was determined by the method of measuring the large diameter in the equatorial area of the fruit. Apricots with a diameter of 30-35 mm were marked with the letter C. Apricots with a diameter are divided into the following classes: the diameter of 35-40 mm is assigned to class B; with a diameter of 40-45 mm - class A; with a diameter of 40-45 mm - class 2A; with a diameter of 50-55 mm - class 3A and with a diameter of 55 mm and larger - 4A.

The main results obtained were statistically processed by the method of dispersion analysis.

RESULTS AND DISCUSSIONS

The height of the fruit in the varieties studied varied from 45.3 to 56.6 mm. Lower values were recorded for the Spring Blush and Kyoto varieties (45.3-45.6 mm), and the highest for the Pinkcot and Faralia varieties, where the index under study was 50.4 and 56.6 mm, respectively (tab. 1).

According to the large and small diameter of the fruits, the entered values were higher than 40 mm. If, for example, after the large diameter recorded values between 44.0 and 48.5 mm, then in the case of the small diameter a decrease of 2.5-10.3% was recorded depending on the variety, ranging from 42, 9 to 45.1 mm.

Table 1

Morphological parameters of apricot fruits according to their particularities biological characteristics of the variety

Variety	Height, mm	Large diameter, mm	Small diameter, mm	Shape index
Spring Blush	45.3	44.0	42.9	1.03
Pinkcot	50.4	48.0	45.1	1.05
Kioto (m)	45.6	45.0	42.9	1.01
Faralia	56.6	48.5	43.5	1.17
LDS 5%	2.27	2.17	2.01	-

In the Spring Blush, Pinkcot and Kyoto varieties, the fruit shape index ranged from 1.01 to 1.05, and in the Faralia variety it increased to 1.17.

The stone/fruit ratio and their morphological parameters were important indicators in the study of varieties, because they were directly related to the quality of the product obtained and how the consumer would perceive the importance of the variety.

After the weight of the stone in the fruit, lower values were observed within the Kyoto variety (4.2%). Among the Spring Blush, Pinkcot and Faralia varieties, the share of stone in the fruit was 5.8; 5.2 and 5.5%, respectively (tab. 2).

Lower kernel height values were recorded for the Kyoto variety (21.4 mm), medium for the Spring Blush (25.3 mm) and Pinkcot (27.3 mm) varieties, and the highest for the Farbaly variety (31, 0 mm).

If, according to the large diameter of the seed, for the Kyoto, Spring Blush and Pinkcot varieties the indicator under study was 20.0; 21.1 and 22.0, respectively, then for the Faralia variety - 24.7 mm.

Table 2

Morphological parameters of apricot kernels according to particularities biological characteristics of the variety

Variety	The weight of the stone in the fruit, %	Height, mm	Large diameter, mm	Small diameter, mm	Shape index
Spring Blush	5.8	25.1	21.1	13.7	1.19
Pinkcot	5.2	27.3	22.0	11.9	1.24
Kioto (m)	4.2	21.4	20.0	11.4	1.07
Faralia	5.5	31.0	24.7	14.3	1.25
LDS 5%	-	1.36	1.14	0.53	-

The small diameter of the seed showed that lower values were recorded for the Kyoto (11.4 mm) and Pinkcot (11.9 mm) varieties, and higher values for the Spring Blush (13.7 mm) and Faralia (14.3 mm).

The kernel shape index is correlated with the biological particularities of the variety, registering lower values, of 1.07, for the Kyoto variety. The index studied for Spring Blush, Pinkcot and Faralia varieties ranged from 1.19 to 1.25, ie it had a longer shape compared to the Kyoto variety.

The fruit production registered in the apricot plantation was influenced more essentially by the number of fruits left on the fruiting microstructure and their average weight (tab. 3).

Lower values of the number of apricots left in the crown of the trees were recorded for the Pinkcot variety - 5 pcs/tree. Next, the Spring Blush varieties were increased - 28 pcs / tree and Faralia - 44 pcs/tree. The Kyoto variety recorded a higher number of apricots in a tree, amounting to 351 pcs/tree.

The biological particularities of the variety also influenced the average weight of the fruit. After average weight, the apricot varieties studied can be divided into two groups. The Kyoto and Spring Blush varieties were placed in the group of medium-fruited varieties, whose average fruit weight was 46.6 g and 49.9 g, respectively. Faralia and Pinkcot varieties, according to the average fruit weight, belonged to the group of fruit varieties, very high, recording values of 61.2 g and 63.4 g, respectively.

Because the Pinkcot variety was most affected by the low temperatures of

late spring, respectively the productivity of the fruit within the tree registered lower values, constituting - 0.32 kg/tree, followed by the Spring Blush varieties (1.40 kg/tree) and Faralia (2.69 kg/tree). The Kyoto variety recorded a higher apricot production in a tree, amounting to 16.36 kg/tree.

Table 3

The productivity of apricot plantation according to the biological particularities of the variety

Variety	The number of fruits, pcs/tree	Average weight, g	Production	
			kg/tree	t/ha
Spring Blush	28	49.9	1.40	1.46
Pinkcot	5	64.3	0.32	0.33
Kioto (m)	351	46.6	16.36	17.03
Faralia	44	61.2	2.69	2.80
LDS 5%	34,1	2.38	1.37	1.58

The study carried out on how the global production is carried out per unit area, we register that the legality exposed in a tree is also confirmed for this indicator. Respectively, higher yields per unit area were included in the Kyoto variety (17.03 t/ha). Far lower values, but which can reimburse part of the investments aimed at obtaining production, were entered by the Faralia variety (2.80 t/ha). Within the Spring Blush variety, the apricot production was 1.46 t/ha, and the lowest values were recorded by the Pinkcot variety - 0.33 t/ha.

The dimensions of the fruits are of special importance because depending on them, they are redistributed on different quality classes, on which then depends the selling price, so implicitly the economic efficiency. Particularly important is the diameter of the fruit in the equatorial plane, which is a very important quality element, which in addition to hereditary influences is strongly conditioned by environmental and cultural factors (tab. 4).

Table 4

The influence of biological particularities of apricot varieties on fruit quality by diameter and weight, %

Variety	Diameter			
	A	2A	3A	4A
Spring Blush	-	88.7	11.3	-
Pinkcot	-	43.1	32.5	24.4
Kioto (m)	79.1	20.9	-	-
Faralia	-	45.5	32.9	22.6

In quality class A, a higher share of fruits belonged to the Kyoto variety (79.1%), where the fruit harvest was 17.03 t/ha. Varieties with lower productivity as a result of low spring temperatures have influenced apricot quality.

If, in quality class 2A, a higher share of fruits belonged to the Spring Blush variety (88.7%), then the Pinkcot (43.1%) and Faralia (45.5%) varieties registered average values. Lower values in this class were included in the Kyoto variety (20.9%).

In the case of quality category 3A fruits, a higher share of apricots belongs to the Pinkcot variety (32.5%) and Faralia (32.9%), and to the Spring Blush variety

only 11.3%. Quality category 4A fruits were obtained only in the Pinkcot and Faralia varieties, where the given indicator constituted 24.4% and 22.6%, respectively.

The biological particularities of the variety, the number of fruits obtained in the crown of the trees and the conditions recorded during their development have directly influenced the quality of production.

The earliest of the apricot fruit branches start the May bouquets in the vegetation, and later the anticipated branches. More often, low temperatures in late spring affect the flowers on the May bouquets, leaving hope for lower quality harvests on the anticipated branches (tab. 5).

Table 5

Redistribution of apricots on various fruiting branches and vertically in the crown of trees according to the biological particularities of the variety, %, year 2020

Variety	Fruit branches		Crown areas	
	Anticipated branches	Bouquet branches	0-150 cm	151-300 cm
Spring Blush	100.0	-	-	100.0
Pinkcot	100.0	-	-	100.0
Kioto (m)	66.7	33.3	41.0	59.0
Faralia	100.0	-	9.1	100.0

The anticipated apricot branch has a morphological organization similar to that of mixed branches, and sometimes as wild branches bearing laterally groups of vegetative and flowering buds, or only flowers, less developed than on other fruiting branches.

They are not basic branches for fruiting, but in years with temperature fluctuations the flower buds on these branches are more resistant to frost and can help save the harvest.

For Spring Blush, Pinkcot and Faralia varieties in 2020, all fruit production was obtained within the anticipated branches. In the case of the Kyoto variety, on bouquet branches or formed at 33.3% of fruits, and the rest, 66.7% apricots were placed on branches anticipated by different growth wave.

A special role in the affection of the reproductive organs by the low temperatures of the late spring period is played by the height of the crown. The investigations revealed that, in the Spring Blush and Pinkcot varieties, all the fruits were placed vertically in the crown in the area of 150-300 cm.

In the case of the Faralia variety, 9.1% of the fruits were obtained in the area of 0-150 cm, and 90.9% on the height of the crown from 150 to 300 cm. A more rational redistribution of these four apricot varieties has been introduced in the Kyoto variety. If, for example, on the height of the crown, in the area 0-150 cm, the variety in question formed 41.0% of the fruit, then 59.0% apricots were redistributed in the area 150-300 cm.

CONCLUSIONS

Within the studied varieties, high yields were obtained for the Kyoto variety, self-fertile variety and resistance to abiotic factors due to its heredity to withstand low return temperatures in the spring that frequently fly over the territory of our country.

The production of fruits at the Kyoto variety in the plantation managed according to the Trident crown system in the third year after planting constituted 17.03 t/ha. Among the varieties studied, partly with resistance to low temperatures, the Faralia variety can be considered, but not to the same degree as the Kyoto variety.

The morphological parameters of apricots are a valuable tool in assessing fruit quality, which is valuable information for fruit growers, who must pay more attention to technological elements in order to penetrate new markets with cultivated fruits and enjoy success among consumers.

Most of the studied apricot varieties have a spherical fruit shape and only in the Faralia variety the fruits had an elongated spherical shape.

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