The Influence of Abiotic Factors on the Development and Productivity of Apricot Plantations in the Republic of Moldova

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Abstract
The main factors that conditioned the spread of apricot culture on a larger scale are the low return temperatures at the end of the rest period and late spring, which affect the generative organs. The aim of the research was to choose apricot varieties more resistant to the low return temperatures in the northern part of the country. The object of the research was the trees of the apricot varieties 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, but the research was conducted in 2020 year. Trees were trained to a Trident canopy. It was established that the biological characteristics of the variety influence the parameters of trees, the period of onset of phenophases of the generative organs, the period between flowering and maturation of apricot fruit harvest, morphological parameters, shape index, plantation productivity and the redistribution of the fruits in different quality classes. The Kyoto variety had 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.
Keywords: Apricot, low temperatures, development, blooming, productivity, quality.

Introduction

The apricot is an important species for regions with temperate climates, and apricots are in high demand among consumers (Balan, 2008; Cociu, 1993).

The latest investigations carried out in the Republic of Moldova show that large areas of apricot are grown in the South and Centre of the country, but due to climate change in the last 10-15 years, apricot cultivation is planted in larger areas and in the area northern, northern steppe subzone and northern Dniester (Peşteanu,. 2018; Pîntea, 2018).

Until recently, apricot cultivation was considered a risky species. The main factors that conditioned the spread of apricot culture on a larger scale are the low return temperatures at the end of the rest period and late spring, which affect the generative organs (Abbas, 2016), premature wilting of trees (apoplexy), infections with various viruses (Balan, 2008; Cociu, 1993), the absence of a modern assortment of varieties, rootstocks (Duval, 2012) and crown forms (Stănică, 2010; Negru, 2019) suitable for such varieties / rootstock associations, which would intensify the culture and would allow obtaining high and competitive productions (Balan, 2008; Maria, 2006).

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, 2020; Liu, 2012; Xue, 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, 2020), it is necessary to carry out tests under production conditions and then to be approved (Stănică, 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, 2018; Pîntea, 2019).

The consumer has always been looking for homogeneous apricots in size, with 50-70% of the surface covered with red colour, high average weight, firm pulp, dry detachment, relatively small pips, attractive external appearance and valuable nutritional biochemical composition (Balan, 2008; Milatovic, 2013; Souty, 1990).

In the classic plantations with low density, apricot trees are guided by the untied pyramid crown, or the best ordinary pot variant (Babuc, 2012; Balan, 2001; Cimpoieş, 2018). In modern apricot orchards, the crowns are driven by one (thin spindle), two (U-shaped) or three vertical axes (trident) that form a well-lit fruit wall (Musacchi, 2008; Stănică, 2019). The vertical location of the stems (Robinson, 2011; Dorigoni, 2011; Stănică, 2019), allows trees the natural tendency of trees to grow (Lauri, 2011), easy to drive and maintained, offers the possibility of annual renewal of degarnisite fruit branches (Neri, 2010) and obtaining fruit in the upper part of the crown, even in years with low temperatures of late spring return.

The practical argumentation of some phenophases of development of apricot fruit organs, of garnishing the crown with vegetative macrostructure and fruiting microstructure morphological characteristic and quality indices of fruits, seeds of various apricot varieties produced within the Trident management system were the main objectives of the research in question.

Material and Method

The experiences took place in the super-intensive apricot plantation, within the didactic orchard of the enterprise "Vilora" LLC, Stolniceni village, Edineți district. 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 biological material used in the experiment was represented by 4 varieties of apricot widely spread in countries with advanced fruit growing and which for growers in the Republic of Moldova are new varieties. 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 Nadezhda. The trees were guided by the trident crown system (chandelier).

The soil between the intervals between the rows was maintained as artificial grass, the vegetal mass being mowed 3-4 times during the vegetation periods, when it reaches a height of 15-20 cm, and between the trees in a row the herbicide field. 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 development of the length of the trunk circumference was performed by the measurement method at the beginning of the vegetation period in all the trees in the experiment at 20 cm above the grafting site.

The height of the tree, the width of the crown along the length of the row and perpendicular to the row was determined for all trees, and the average and total length of the annual branches - for 4 typical trees per repeat.

Phenological research (beginning, end of flowering, flowering period), the period of fruit harvest maturation was performed by the visual method on all trees in the variant according to the method accepted in the state trial of varieties (Chisinau, 1975). As the beginning of flowering was considered the flowering of the first flowers on the tree, maximum - 50% of flowers in bloom, the end - when only 10% of non-flowering flowers remained on the tree. The ripening period of fruit harvesting began when the fruits accumulated the characteristic colour and taste qualities of the variety.

The number of fruit formations was established by counting them on branches of different ages at 4 model trees in each variant.

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 shape of the fruit was expressed on the basis of the shape index, which was the correlation between the height of the fruit and the large diameter of the fruit and the seeds.

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 Discussion

Bioconstructivi parameters (tree height, crown width, crown length) play a rather important role in establishing the rootstock variety association, in choosing the method of crown management and finally on plantation productivity.

Investigations carried out in the spring of 2020 show that the length of the trunk circumference is influenced by the biological peculiarities of the variety, registering higher values for the Pinkcot variety compared to the Spring Blush, Kyoto and Faralia varieties. If the length of the trunk circumference in the Spring Blush variety was 13.5 cm, then in the Pinkcot, Kyoto and Faralia varieties it increased, amounting to 14.5; 14.0 and 14.0 cm, respectively (Table 1). The difference between the Spring Blush variety and the other varieties is also statistically proven.

The height of the trees driven by the shape of a trident crown in the varieties studied differs depending on the biological peculiarities of the variety.

In the case of the Spring Blush and Faralia varieties, a higher plant height was recorded than in the Pinkcot and Kyoto varieties. If, for example, in the Spring Blush and Faralia varieties the average height of the trees was 390 cm, then in the Pinkcot variety the index in the study registered lower values, constituting 320 cm, or a decrease by 17.9% compared to the previous varieties. The Kyoto variety has average values compared to the other varieties studied.

Table 1. Bioconstructive parameters of apricot trees driven by crown shape trident in the third year of training

Variety	Length of the circumference, cm	Tree hight, cm	Crown lenght, cm	Crown width, cm
Spring Blush	13,5	390	230	100
Pinkcot	14,5	320	240	103
Kioto	14,0	370	195	119
Faralia	14,0	390	225	118
LDS 5%	0,64	16,4	9,7	4,6

The length of the crown, as well as the other indicators of the bioconstructive parameters of apricot trees are closely dependent on the biological particularities of the variety studied. Higher values of crown length were recorded for Pinkcot compared to other varieties. If, for example, in the case of the Spring Blush variety the length of the crown was 240 cm, then in the other varieties the index in question recorded lower values which ranged from 195 to 230 cm, in the case of the Kyoto variety, the shortest average length was recorded - 195 cm, while for the Spring Blush and Faralia varieties, the index in question recorded average values, amounting to 230 cm and 225 cm, respectively.

Within the varieties that recorded average values, no statistical difference was registered, while within the other two varieties the trend in question is visible.

Lower values within the bioconstructivi parameters of the trees were recorded within the crown width. A smaller crown width was recorded for the Spring Blush variety - 100 cm, whose growth shape is more pyramidal compared to the other varieties studied. Next, with a small increase, there is the Pinkcot variety, whose width was 103 cm, which is also statistically demonstrated by mathematical processing. In the case of Kyoto and Faralia varieties with a bazitonic development in the lower part of the crown, the index under study recorded identical values, which were 119 and 118 cm, respectively.

Depending on the width of the crown, the varieties studied can be divided into two groups. Spring Blush and Pinkcot can be placed in the first group and the Kyoto and Faralia varieties in the second group.

The number of branches and their average length in the crown of apricot trees demonstrate the activity of the plantation, how the physiological processes in the plants take place, what can be the productivity potential and when to intervene with rejuvenation cuttings to maintain the physiological balance between growth and fruiting.

The investigations show that in the study, the biological characteristics of the variety influence the number of branches of different origin and age and their total length.

The varieties studied form a different number of anticipated branches, based on the hereditary particularities of each individual taken separately. Lower values were recorded for Spring Blush and Kyoto varieties, where the index in question was 16 and 14 pcs/tree, respectively. In the case of Pinkcot and Faralia varieties, the number of anticipated branches registered higher values compared to the previous varieties, constituting 43 and 52 pieces/tree, respectively, ie an increase of approximately 3.8 - 3.4 times compared to the previous varieties (Table 2).

The average length of the anticipated branches is closely correlated with their number within the crown and the vigour of growth of each variety. The average length of the anticipated branches for the varieties studied varied from 21.4 cm to 31.9 cm. Spring Blush varieties recorded lower values of the average length of the anticipated branches - 21.4 cm. Next, in ascending order are placed the Kyoto variety - 24.1 cm, the Faralia variety - 26.0 cm and the Pinkcot variety - 31.9 cm.

Table 2. The average number and length of different branches in the crown of apricot trees based on the biological characteristics of the variety

Variety	anticipated		annual		two years old	
	number of brunches, pcs/tree	average length, cm	number of brunches, pcs/tree	average length, cm	number of brunches, pcs/tree	Average length, cm
Spring Blush	16	21.4	41	44,5	3	198.3
Pinkcot	43	31.9	23	80,0	3	183.0
Kioto	14	24.1	29	68,9	3	184.0
Faralia	52	26.0	29	90,6	3	167.7
LDS 5%	0,85	1.43	1.15	2.28	0.12	8.7

Anticipated shoots are of great importance in the crown of apricot trees, because these elements of the crown are bearing fruitful microstructure. In the case of 2020, when flowering was early, and late spring frosts were recorded, part of the crop was possible to save due to this fruitful microstructure.

The study carried out on the number and average length of the annual branches, highlights that the biological particularities of the variety correlate with the indices in question. Lower values of the number of annual branches were registered for the Pinkcot variety - 23 pcs/tree, and higher values for the trees from the Spring Blush variety - 41 pcs/tree. In the case of the Kyoto and Faralia varieties, the index in question recorded identical values of the number of annual branches, amounting to 29 pcs/tree.

This demonstrates that varieties with a higher branching capacity form a smaller number of anticipated branches. The study performed on the correlation of the number of anticipated branches to the number of annual branches for the investigated varieties registered different results. In the case of the Spring Blush variety, this ratio was 0.39. Next, in ascending order was placed the Kyoto variety with a coefficient of 0.48, the Faralia variety - 1.79 cm and the Pinkcot variety - 1.87 cm. Basically, in the Faralia and Pinkcot varieties, the respective ratio was 4 times higher compared to the Spring Blush and Kyoto varieties.

The study carried out on the average length of the annual branches showed that, on the varieties studied, the index in question varied from 44.5 to 90.6 cm. Lower values of the average length of annual branches were recorded in the Spring Blush variety, where the index in question was 44.5 cm, which was a decrease of twice compared to the Pinkcot and Faralia varieties.

A higher average length of annual branches was recorded for Pinkcot and Faralia varieties, where the index in question was 80.0 and 90.6 cm, respectively. Within the Kyoto variety, the average length of the annual branches registered average values, constituting - 68.9 cm. This average length of the annual branches in the crown of apricot trees is reasonable enough to obtain a rational correlation between growth and fruiting, and for the physiological processes to proceed normally.

The study performed on the number of branches with the age of 2 years considered as constant elements within the trident crown, did not have large deviations, because in all trees the number of branches was constant - 3 pcs/tree.

In the case of the average length of two-year-old branches, the index in question ranged from 167.7 cm to 198.3 cm. Lower values of the average length of the basic branches were recorded for the Faralia variety -167.7 cm, and higher for the Spring Blush variety - 198.3 cm. The average length of the two-year-old branches of the Pinkcot and Kyoto varieties was 183.0 and 184.0 cm, respectively.

The accumulation of vegetative macrostructure and fruitful microstructure is an important indicator, because it can influence the fruiting precocity of the plantation. Apricot is a species that bears fruit both on anticipated shoots and annual branches of different growth values, as well as on the bouquet, which have differentiated on branches aged 2 years.

The rootstock Mirabolan 29C is a biotype that requires apricot varieties to form early harvests compared to other biotypes, forms a higher share of fruitful microstructure, especially anticipated branches (Table 3).

Studying the total length of the anticipated branches, we noticed that lower values were registered for the Spring Blush and Kyoto varieties, where the index in question was 342 and 338 cm, respectively, this constituting 11.7-12.4% of the total share. of the branches in the crown of the trees.

Table 3. The crown structure of apricot trees according to the biological characteristics of the variety, cm

Variety	Branches length			
	anticipated	annual	two years old	summed up
Spring Blush	342	1825	595	2762
Pinkcot	1372	1839	549	3760
Kioto	338	1998	552	2888
Faralia	1355	2629	503	4487
LDS 5%	16,2	63,4	23,6	-

In the case of Pinkcot and Faralia varieties, the total length of the anticipated branches registered higher values compared to the previous varieties, constituting 1372 and 1355 cm, respectively, this being around 30.2-36.5% of the total share of the branches in the crown of trees.

The study carried out on the total length of the annual branches shows that lower values were recorded for the Spring Blush and Pinkcot varieties, where the index in question was 1825 and 1839 cm, respectively, which amounted to 66.0 and, 48.9% of the total share of branches in the crown of trees.

Values higher than the total length of the annual branches were registered for the Faralia variety - 2629 cm, which constituted 58.5% of the total weight of the branches in the tree crown. This is explained by the fact that the Faralia variety has a higher growth force and branching capacity compared to the other varieties.

In the case of the Kyoto variety, the total length of the annual branches was insignificantly higher than in the Spring Blush and Pinkcot varieties, but much smaller than in the Faralia variety, registering values of 1998 cm, or 69.2% of the total share of the crown branches of trees.

The study carried out on the total length of the annual branches shows that the varieties studied are decreasing in the following order: Spring Blush, Pinkcot, Faralia and Kyoto.

Depending on the share of annual branches in relation to the total length of the branches in the tree crown, higher values were recorded for the Kyoto variety (69.2%), and the Spring Blush variety is still decreasing (66.0%), Faralia variety (58.5%) and Pinkcot variety (48.9%).

Because the apricot trees were led after the trident crown (chandelier), meaning the central axis and two branches directed along the length of the row at 60 cm above the ground are highlighted, the two-year-old branches had a practically identical total length (503-595 cm), with some small deviations depending on the biological particularities of the variety. The study carried out on the total length of the two-year-old branches registered higher values of the two-year-old branches at the Spring Blush variety - 595 cm, and lower at the Faralia variety (503 cm). The varieties Pinkcot and Kyoto registered average values, constituting 549 and 552 cm, respectively.

Depending on the share of annual branches in relation to the total length of the branches in the tree crown, higher values of the index in question were recorded for the Spring Blush variety (21.6%), and further, the Kyoto variety is decreasing (19.2%), Pinkcot variety (14.6%) and Faralia variety (11.3%).

The total length of the vegetative macrostructure and the fruiting microstructure correlates directly with the biological peculiarities of the studied varieties. Higher values of the index in question were recorded for the Faralia variety - 4487 cm, and then, in decreasing order, the Pinkcot variety - 3760 cm, the Spring Blush variety - 2962 cm and the Kyoto variety - 2888 cm.

This increase in the total length of the branches in the crown of apricot trees occurred due to the total length of the fruiting microstructure, ie at the expense of the anticipated branches in each variety studied.

The biological particularities of the variety and the sum of the active temperatures recorded in the period from the beginning of flowering to the start of harvesting of the varieties studied were different.

The onset of the flowering period in the experimental group began on 23.03. the organs of the flower were not affected, being in a button state. Major disease of the flowers was registered, between 31.03-01.04. 2020, when the average air temperature dropped between 21.00 - 09.00 from -1.12 ...- 8.570C (Figure 1). During that period, only in the Kyoto variety 50% of the flowers in the basal part of the crown on the bouquet branches were open. The rest of the flowers were in the bud phase.

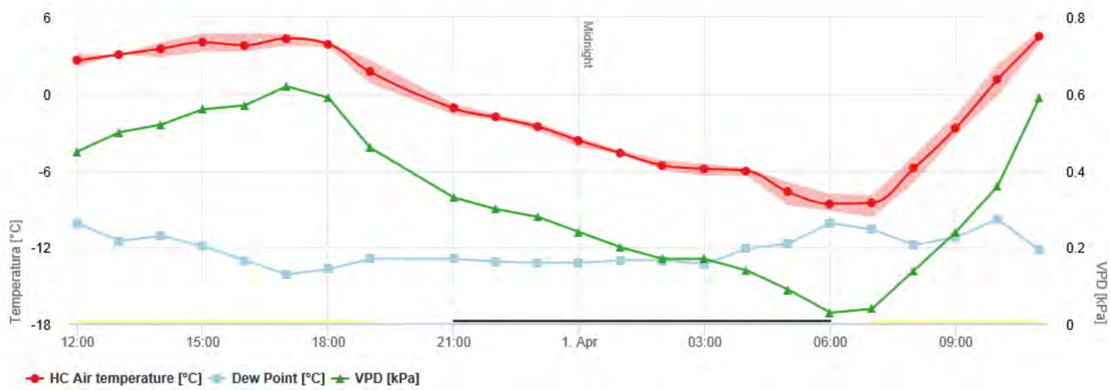

Figure 1. Temperatures fluctuation per hour within the plantation of stone species within the enterprise LLC "Vilora" during 31.03-01.04.2020

The varieties Pinkcot, Spring Blush and Faralia had at this time at 85-100% open flowers within the crown, which led to their damage by the low temperatures that occurred during that period.

The data entered in table 4 show that the flowering started on March 23 with the Pinkcot variety. Two days later, the flowering of the Spring Blush variety was registered - March 25. Then, from March 28, the Faralia variety bloomed and the latest flowering was registered in the Kyoto variety, starting with March 29. Practically, during 7 days, the phenophase started flowering in the studied varieties in the northern part of the country.

The study carried out on the degree of flowering registered that in the investigated varieties, 50% of the flowers were flowered in the Pinkcot variety on March 26, and in the Spring Blush variety this stage coincided with March 27. The latest varieties of flowers in the area were Faralia and Kyoto, which coincided with March 29 and March 30, respectively.

That is, the period between the beginning of flowering and the 50% flowering phenophase lasted about 2-4 days depending on the biological characteristics of the variety and the air temperature in that period.

The duration between the phenophase 50% flowering and full flowering (100%) in the apricot varieties studied was 2-3 days depending on the biological characteristics of the variety (Table 4).

Table 4. The influence of the biological particularities of apricot varieties on the onset of phases flowering trees in the northern part of the country

Variety	The start of the phase the beginning of the flowering of the trees				
	Triggering flowering	Flowering 50%	Full flowering	Falling petals	Endocarp strengthening
Spring Blush	25.03	27.03	29.03	06.04	19.05
Pinkcot	23.03	26.03	27.03	05.04	18.05
Kioto (m)	29.03	31.03	03.04	08.04	21.05
Faralia	28.03	29.03	01.04	07.04	20.05

Depending on when 100% flowering was recorded, the varieties studied can be placed in the following sequence: Pinkcot variety - March 27, Spring Blush variety - March 29, Faralia variety - April 1 and Kyoto variety - April 3.

The fall of the petals invokes the period when the fruits had just been formed and they were quite sensitive to various biotic and abiotic hazards. The results listed in table 4 show that the fall of the petals in the studied varieties took place from 05 to 08 April, a shorter period of time compared to other previous periods.

Hardening of the endocarp is a rather important phenophase for apricot cultivation, because until that period if we had a large amount of apricots in the crown of trees, their thinning must be done, in order to have a uniform differentiation of fruit buds in the following year. In addition, during this period, if the soil moisture was lower than 75% of the field capacity, it was necessary to water the trees to rule out water shortages.

The study carried out on the early ripening period of fruit harvesting of the apricot varieties studied shows that this phenophase began 87 days after the onset of Spring Blush flowering. In the Faralia variety, the harvest maturation was registered 117 days after flowering, and in the Pinkcot and Kyoto varieties 93 and 103 days, respectively.

If we compare the ripening period of the apricot fruit harvest with the Kyoto variety, considered as a control, we registered that the studied varieties are assigned to 4 maturation groups (Figure 2). The group of varieties with early ripening was attributed to the Spring Blush variety, whose fruit harvest began 16 days earlier compared to the control variety. The group Pinkcot was assigned to the group of early maturing varieties, the difference of which was 6 days in terms of the start of the harvest period compared to the control variant. The varieties with medium maturity include the Kyoto variety (0 days), and the group of late maturing varieties Faralia variety, whose harvesting period started 14 days later compared to the control variant.

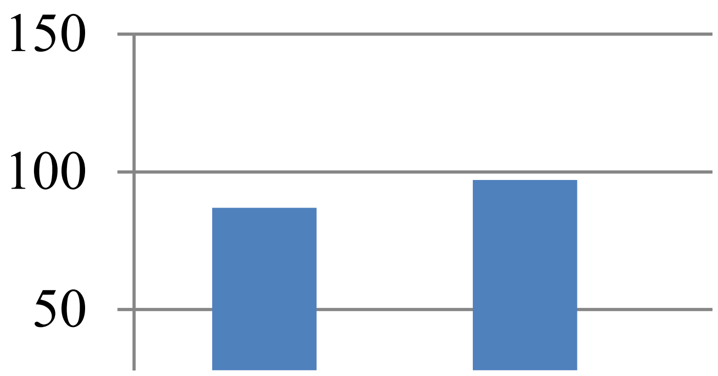

Figure 2. The influence of the biological particularities of apricot varieties on the period from the beginning of the beginning of the flowering of the trees until the ripening of the fruit harvest

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. (Table 5).

Table 5. Morphological parameters of apricot fruits according to their particularities biological characteristics of the variety

Variety	Hight, 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	-

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.

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 (Table 6).

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).

The studies performed on the large diameter of the seed in the varieties studied were correlated with their height. 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 6. Morphological parameters of apricot kernels according to particularities biological characteristics of the variety

Variety	The weight of the stone in the fruit, %	Hight, 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 (Table 7).

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.

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.

Table 7. 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 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 (Table 8).

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%).

Table 8. 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 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 (Table 9).

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.

Table 9. 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

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.

Conclusion

The biological particularities of the variety influence the length of the trunk circumference and the bioconstructivi parameters of the crowns.

The number of anticipated branches and their average length are correlated with the vigour of growth of the varieties studied and were of major importance in obtaining the harvest in spring 2020, when low temperatures were recorded in the northern area, which negatively influenced the production of apricots.

The apricot flowering period in the spring of 2020 in the northern part of the country with different maturation period was staggered over 7 days. The development of vegetative phenophases in apricot trees studied with geographical and climatic locations is based on the sum of active temperatures recorded in the period from the beginning of flowering until the start of harvest and only after this stage the fruits can reach consumption and harvest.

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.

References

Abbas, M. M., Bakhsh, M. A., Sumrah, M. A., Hussain, A., Akhtar, A., 2016. Evaluation of different apricot varieties under climatic conditions of Soon Valley. J Agric. Res., vol. 54 (4). pp. 727-735.

Babuc, V., 2012. Pomicultura. Chişinău. 662 p.

Balan, V., Cimpoieş, Gh, Barbăroşie, M., 2001. Pomicultura. Chişinău: Museum, 453 p.

Balan, V., Stănică, Fl., Chira, L. et al., 2008. Caisul şi caisele. Bucureşti: Ceres. p. 686.

Cimpoieş, Gh., 2018. Pomicultura specială. Chişinău: Colograf – Com, pp. 196-203.

Cociu, V., 1993. Caisul. Bucureşti: Editura Ceres. 401 p.

Dejampour, J., 2012. New Apricots from a Breeding Program in Sahand Horticultural Research Station. Acta Hortic. 966, 75-79.

Dorigoni, A., Lezzer, P., Dallabetta, N., Serra, S., Musacchi, S., 2011. Bi-axis: an alternative to slender spindle for apple orchards. Acta Hortic. 903, 581-588.

Duval, H., Masse, M., Jay, M., Loquet, B., 2012. Results of French Apricot Rootstock Trials. Acta Hortic. 966, 37-41.

Gouble, B., Scofield, C., Mcglone, A., Boldingh, H., Clark, C., Audergon, J.M., Bureau, S., Stanley, J., 2020. Evaluation of apricot fruit quality diversity in two countries, France and New Zealand. Acta Hortic. 1290, 147-154.

Lauri, P.E., Hucbourg, B., Ramonguilhem, M., Méry, D., 2011. An architectural-based tree training and pruning - identification of key features in the apple. Acta Hortic. 903, 589-596.

Liu, W., Liu, N., Zhang, Y., Yu, X., Sun, M., Xu, M., Zhang, Q., Liu, S., 2012. Apricot cultivar evolution and breeding program in China. Acta Hortic. 966, 223-228.

Maria, L. M., Sosna, I., 2006. Evaluation of several apricot cultivars and clones in the lower Silesia climatic conditions. J. Fr. Orna. Pl. Res. Vol. 13. pp. 39-48.

Milatovic, D., Đurovic,D., Zec, G., 2013. Evaluation of french apricot cultivars in the region of Belgrade. IV International Symposium „Agrosym 2013". pp. 196-201.

Musacchi, S., 2008. Bibaum®: a new Training system for pear orchards. Acta Hort. 800: 763-768.

Negru, I., 2018. Dezvoltarea pomilor de cais altoiţi pe portaltoiul Mirobalan 29C în funcţie de modul de formare a coroanei în perioada de creştere a plantaţiei. Lucrări ştiinţifice. Chişinău Vol. 47. pp.77-82.

Negru I., 2019. Effect of tree conduce on the precocity, yield and fruit quality to apricot. Annals of the University of Craiova. Biology, horticulture, food products processing technology, environmental engineering. Vol. XXIV(LX). pp. 142-145.

Negru I., Peşteanu, A., 2019. Comportarea unor soiuri de cais din colecţia mondială cultivate în zona de sud a Republicii Moldova. In: Ştiinţa Agricolă. nr. 2, pp. 52-59.

Neri, D., Morini, F., Massetani, F., Pirazzini, P., 2010. Pruning: how to manage shoot growth. Proc. XIVth IS Apricot Breeding and Culture. Acta Hort. 862: 355-363.

Peşteanu, A., Manziuc, V., Cumpanici, A., Gudumac, E., Braghiş, A., 2018. Producerea caiselor. Manual tehnologic. Chişinău, pp. 196-201.

Pîntea, M., 2018. Date preliminare privind promovarea sortimentului de cais în Republica Moldova Lucrări ştiinţifice. Chişinău. Vol. 47. pp. 25-28.

Pîntea, M., 2019. Cercetări agrobiologice asupra sortimentului modern de cais. In: Lucrări ştiinţifice. Ştiinţa în Nordul Republicii Moldova: realizări, probleme, perspective. Bălti. pp. 249-253

Robinson, T.L., Hoying, S.A., Reginato, G.H., 2011. The tall spindle planting system: principles and performance. Proc. IXth IS on Orchard Systems. Acta Hort. 903: 571-579.

Souty, M.; Audergon, J.M.; Chambroy, L., 1990. Apricot, le critere de qualite. In: L'arboriculture fruitiere, Nr. 91, pp.16-24.

Stănică Fl., Armeanu I., Dumitraşcu M., Peticilă G.A., 2010. Influence of the Climate Conditions on Apricot Floral Biology in Bucureşti Area, XIV ISHS International Symposium on Apricot Breeding and Culture. Matera, Italia, Acta Hort. 862, pp. 283-291.

Stănică Fl., Eremia A., 2014. Behaviour of some new apricot cultivars under the parallel trident planting system. 10th ISHS International Symposium on Orchard Systems, Stellenbosch Univ. (3-6 Dec.) Acta Hort. (ISHS) 1058:129-136.

Stănică Fl., 2019. New tendencies in fruit trees training and orchard planting systems. Scientific Papers. Series B, Horticulture, Vol. LXIII, Issue 2,

Stănică, Fl., Butcaru A.C., Mihai, C.A., Florea I.M., Șerban D., 2020. Preliminary results regarding the behaviour of some new apricot cultivars in București area. RJH Vol. I, pp. 59-66,

Xue, X.M., Wang, J.Z., Han, X.P., Chen, R., 2020. A new late ripening apricot cultivar – „Longjinmi". Acta Hortic. 1290: 185-190.