THE BHAVIOUR OF SOME APRICOT CULTIVARS GRAFTED ON WAX CHEERY

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RESEARCH ARTICLE

Abstract

The paper points out the influence of the planting intervals and of the shape pf the tree-top on the growth vigour (highlighted by the sectioned trunk area) in case of the apricot cultivars Viorica and Favorit, planted at 4x 3 m, respectively Pannonia and Mamaia, planted at 4x 3m. We have observed that the cultivars Viorica has an average growth rate lower than the cultivar Favorit, whereas the cultivar Mamaia has a lower average growth rate as compared in the cultivar Pannonia. The level of yields obtained in the 6th year turns in favour of Viorica and Pannonia.

Keywords: apricot cultivar, crown shape, planting distance, fruit production
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INTRODUCTION

Apricot culture in Romania has a national character and its trend, like the culture of other fruit species, is increasingly marked by the process of intensification. This is due both to the technological evolution in world horticulture, through the establishment of intensive and super-intensive plantations, as well as to its expansion on various types of land, because of the legislative evolution regarding the land fund promoted in recent years.

One of the causes that can lead to poor production in apricot orchards is the inadequate density per surface unit, which together with diseases, pests, and the unfavorable time during the flowering period, can make this crop unprofitable (Adams, 2019). Reducing the size of an orchard, from those with a family character to those on small and medium areas, as well as the promotion of new apricot varieties that, in the vast majority, have a high production potential, which can be better exploited in plantations with high densities, it shows us the opportunity to find solutions to increase the productivity of apricot plantations (Wheeler, 2023).

The purpose of the research is to evaluate the influence of planting distances and crown shapes on the growth vigor of some apricot varieties grafted on wax cherry in high-density orchards. It was thus attempted, by creating experimental plots, but also with a demonstrative character, to cultivate several apricot varieties at different planting distances, with the objective of obtaining appropriate management forms, suitable for the modern apricot culture.

Apricot is a highly appreciated species for its tasty and fragrant fruits used fresh or for the preparation of compote, jam, jam, juice, nectar, apricot, liqueurs, etc. Apricot culture is difficult, because it is a demanding species in terms of climate and soil, in addition it is affected by an incompletely known disease, premature death. It succeeds quite well in plains or low hills up to 200-250 m altitude, with average annual temperature between 10 and 11˚C, and absolute minimum not to fall below -25...-26˚C. In spring, after relatively warm days, it loses its flower buds at -3...-4˚C, and the newly formed fruits at -1.5...2.2˚C (Wallin, 2020).

Temperature is the limiting factor for the expansion of apricot culture. During the period of vegetative rest, the trees withstand temperatures of - 26 °C. It blooms if temperatures are higher than 12 °C. Low temperatures during the flowering phase do not prevent pollination. Sometimes the pollination is done before the flowers fully open. Apricot is picky about light (Guy, 2021). In low light conditions, the shoots do not ripen well, they freeze easily in winter, and the fruits are weakly aromatic.

Apricot also grows in areas where 450-550 mm of precipitation fall annually, being not pretentious about water (Himmelhuber, 2013). It makes good use of the soil water stored

during the winter. It is one of the most pretentious tree species in terms of light. Apricots are planted on the most well-lit areas with rows-oriented north-south. Special attention will be paid to the planting scheme, so that the trees do not shade each other (Fassman. 2017). The tree does well on all types of soil, but it does not last for many years on heavy and wet soils. Apricot uses consolidated sands only if additional irrigation and fertilization is provided (Maurer, 2016).

In Romania, apricot culture is limited by the high demands on heat, the sensitivity shown by it to return frost, etc. Due to unstable weather conditions in recent years, fruit trees are often affected by late spring frosts. These can compromise the harvest, therefore, to protect the trees, the fumigation technique can be considered. When low temperatures are announced, easily flammable materials (collected in piles) are burned in the orchard, which produce a large amount of smoke (rubber, straw, manure, pitch, peat, etc.). Thus, the layer of smoke that forms above the orchard does not allow the release of heat from the soil and thus maintains a higher temperature at the level of the trunk/crown of the trees. It is very important to maintain the fire throughout the night, especially before sunrise, when the temperatures drop drastically. This operation can protect the trees from temperatures up to -3 degrees Celsius.

The apricot needs more nitrogen and phosphorus than the other species, it also needs a larger number of microelements. Administration of fertilizers (dosage, ratio of elements) will be done only after a chemical analysis of the soil, completed by the foliar diagnosis. To ensure the necessary microelements, it is recommended to supplement the basic fertilization with the administration of foliar fertilizers (Blind, 2020).

Although it is resistant to drought, to reach its production potential, the apricot must be irrigated. It is not recommended to apply watering during the fruit ripening phase. In this phase, the irrigation causes the apricots to crack and the nutritional properties decrease. Depending on the climatic conditions, 4-5 irrigations can be applied with norms of 300-400 m^3/ha. The best results are obtained by applying water to the furrows and by dripping (Asseray, 2017).

Premature dying of trees is the most dangerous disease. It can be apoplexic (sudden) or slow, one branch or part of the tree dries up one by one. This disease cannot be completely combated, but only ameliorated, that is, to dry as few trees as possible through the following measures: apricot cultivation only in favorable areas; protecting trees from frost, frost, avoiding water stagnation at the root; avoiding bark injury, thick cuts, and glue leaks; whitewashing of the trunk and the base of the frames; maintaining the partially cleared soil. The fruits are harvested as close as possible to full ripening (2-3 days before) in 2-3 rounds for each cultivar. The optimal harvesting time also depends on the destination of the fruit (fresh consumption, compote, jam, etc.).

MATERIAL AND METHOD

The research was carried out in Oradea. Apricot trees grafted on wax cherry were planted at planting distances of 4x3 m (density 1250 trees/ha), respectively 4x 4 m (density 833 trees/ha), considering assessments of the vigor and productivity of the chosen varieties. The apricot varieties Viorica, Favorit, Pannonia, Mamaia were used. The crown shapes used are late vessel (at Viorica and Favorit) and goblet shape (at Pannonia and Mamaia). The research method used was that of subdivided plots, using the arithmetic mean of the variants as a witness. The climatic conditions in which the research took place (annual precipitation 615.6 mm and average annual temperature of 11.6^0 C) were those of Oradea.

RESULTS AND DISCUSSIONS

Following the comparative study of two varieties of apricot, grafted on wax cherry, in high-density plantations, of 1250 trees/ha, respectively of 833 trees/ha, it was found that the planting distances and the shape of the created crown influence the level of vigor of the fruit plants, with consequences that also affect the productive efficiency of apricot varieties, represented in table 1 and 2.

Table 1

The influence of the planting distance and the shape of the crown on the growth

Cultivar	Planting distance	Crown shape	Year	The surface of the trunk section cm^2	Growth spurt cm^2
Viorica	4x3	Late vessel	4 5 6	23.70 33.50 44.47	- 9.8 10.97
Favorit	4x3	Late vessel	4 5 6	49.00 86.55 106.61	- 37.55 20.06
Pannonia	4x4	Goblet shape	4 5 6	37.28 45.35 72.63	- 8.07 27.28
Mamaia	4x4	Goblet shape	4 5 6	28.26 38.47 46.54	- 10.21 8.07

Table 2.

Productive efficiency of plum varieties (6th year after planting)

Cultivar	Trees density Trees/ha	Fruit production Kg/tree	Production on hectar t/ha	Productivity index
Viorica	1250	14.64	18.3	0.33
Favorit	1250	5.92	7.4	0.06
Pannonia	833	10.7	8.9	0.15
Mamaia	833	6.5	5.4	0.14

Thus, in the first case, where the planting distance is 4x3 and the shape of the crown is late vessel, the intention is to temper the vigor impressed by the rootstock and stimulate the formation of anticipated and garnishing of the ridges. It is found that the growth vigor, expressed by the surface of the trunk section, has an average growth spurt of 10.4 cm^2 in the Viorica cultivar and 28.8 cm in the Favorit cultivar, the average growth spurt of the two varieties being 19.6 cm^2, represented in table 3.

Table 3

Analysis of the results regarding the average growth rate in the case of apricot planted at 4 x 3 m

Cultivar	Average growth rate cm^2	Relative average %	Differences cm^2	Significance
Viorica	10.4	53.06	-9.2	00
Favorit	28.8	146.94	+9.2	xx
Average (Ct)	19.6	100	-	-

DL 5%=2.3
DL1%=5.4
DL 0.1%=17.1

In the second case, where the planting distance is 4x 4 m, the growth vigor expressed by the surface of the trunk section has an average growth spurt of 17.67 cm^2 for the Pannonia cultivar and 9.14 cm^2 for the Mamaia cultivar, the average growth spurt of the two varieties being 13.4 cm^2.

Table 4

Analysis of the results regarding the average growth rate in the case of the plum tree planted at 4x3 m

Cultivar	Average growth rate cm^2	Relative average %	Differences cm^2	Significance
Pannonia	17.67	131.8	+4.26	Xx
Mamaia	9.14	68.2	-4.26	00
Average (Ct)	13.40	100	-	-

The analysis of the results regarding the average growth rate of the section surface, as an expression of growth vigor, shows us that the Viorica variety, in the first case and the Mamaia variety in the second case, show lower levels of vigor growth than the Favorit variety, in the first case and the Pannonia variety in the second case. Compared to the control average, the average increase in growth in the case of planting distances of 4x3 m, the Favorit variety has a higher level by 46.94% and in the case of planting distances of 4x 4 m, the Pannonia variety has a higher level by 31.8%. It follows that the Stanley variety, in the first case, and the Mamaia variety, in the second case, lend themselves better to high-density orchards.

Regarding the productions made in year IV (the year in which fruit set suffered due to unfavorable pollination conditions), the Viorica variety, with 18.3 t/ha (14.64 kg/tree), is superior to the Mamaia variety. Among all the four analyzed varieties, the Viorica variety has the best productivity index, followed by Pannonia. The analysis of the results shows that in the first case the Viorica variety has a production level 42.4% higher than the control average, and in the second case, the Pannonia variety has a 24.5% higher production level compared to the control average, represented in the table 5 and 6.

Table 5

Analysis of the results regarding production in the case of orchards planted at 4x 3 m

Cultivar	Production t/ha	Relative production %	Differences t/ha	Significance
Viorica	18.3	142.4	+5.45	xx
Favorit	7.4	57.6	-5.45	00
Average (Ct)	12.85	100	-	-

DL 5%=1.54 DL 1%=3.57 DL 0.1%=11.38

Table 6

Analysis of the results regarding the production in the case of orchards planted at 4x 4 m

Cultivar	Production t/ha	Relative production %	Differences t/ha	Significance
Pannonia	8.9	124.5	+1.75	Xx
Mamaia	5.4	75.5	-1.75	00
Average (Ct)	7.15	100	-	-

DL 5%=0.86 DL 1%= 1.99 DL 0.1%=6.32

As expected, the differences under this aspect are primarily related to the cultivar, in the sense that they are larger from the Suncrest cultivar to the Michelin cultivar, which doubles its weight, making 6 fruits per kilogram. Depending on the nutrition space, a decrease in weight is observed, the variant with 5000 trees/ha presenting 11% smaller fruits, respectively instead of 8 fruits per kilogram, this variant presents 8, 9 fruits/kg. The slight tendency to reduce fruit weight can be greatly reduced by fertilization and differentiated irrigation depending on the number of trees/ha.

CONCLUSIONS

The growth vigor of the apricot varieties analyzed under the conditions of high-density orchards in the Oradea area, represented by the indicator of the surface of the trunk section, shows us that in the case of a density of 1250 trees/ha, it has the value of an average growth spurt of 19.6 cm^2, the Viorica variety indicating a lower average growth rate compared to the Favorit variety, and in the case of a density of 833 trees/ha, it has the value of an average growth rate of 13.4 cm^2, the Mamaia variety indicating a lower average growth compared to the Pannonia variety.

The production level achieved in the sixth year after planting indicates that the Viorica variety is superior to the Favorit variety in the case of planting distances of 4 x 3 m and the Pannonia variety is superior to the Mamaia variety in the case of 4 x 4 m planting distances.

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