RESEARCH REGARDING THE INFLUENCE OF GRAFTING MOMENT ON THE QUALITY AND QUANTITY OF THE CHERRY TREE PLANTING MATERIAL

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RESEARCH ARTICLE

Abstract

The aim of this research is to establish the right moment of grafting for some cherry cultivars. The research was carried out in a private nursery, in the North-Western part of the country and started from the premise that the biological quality of the fruit planting material plays a decisive role in the quality of the fruit trees plantations. They also influence the efficiency and longevity of the plantations. The cherry varieties studied were Kordia and Carmen, and the rootstock used was Prunus mahaleb. From the research that was carried out, it is found that at the time of grafting on August 10, a significantly higher production difference is obtained in a positive sense for both varieties of cherry.

Keywords: grafting moment, cherry cultivars, planting material, nursery.
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INTRODUCTION

Grafting is the process that leads to the growth of two living parts of the plant. Grafting is a method of vegetative propagation of trees by which two whole plants or only portions of them (buds, branches) are taken and joined, to grow and live together for a long time (Cimpoieș, 2020). The plant resulting from grafting forms a new individual, capable of independent life. The basal part of this individual (the root system) is called the rootstock and fulfills the specific functions of the anchoring root of the plant, etc. (Blind, 2020) The upper part, usually represented by the trunk and crown, is called the graft. At the time of grafting, the scion must be one year old, and the rootstock can be of any age (Istrate, 2014). Grafting presents the following advantages: maintaining genetic purity, as well as the rapid and economical propagation of valuable varieties, earlier fruiting of trees, improving the quantity and especially the quality of fruits, obtaining trees of reduced vigor, to establish intensive and super-intensive plantations (Venig, 2006). The factors that determine the success of grafting are of two kinds: biological and technical. The main biological factors that ensure a higher percentage of grafting are represented by the good physiological affinity between grafts and rootstocks, at the time of grafting the rootstock should have sap in circulation, and the graft should have viable buds and be in a state of rest, there should be generative tissues in a viable state, with a sufficient content of reserve substances and water (Köller, 2019). The technical factors are constituted by the cambial tissues of the graft and the rootstock, which must overlap on as large surfaces as possible, the grafting operation must be performed as quickly as possible to avoid oxidation of the tissues, the surfaces of the sections must be flat, fresh, executed in a single movement, away from dust or oxidized sap from the blade of the knife, the graft must have 2-3 buds and the graft and rootstock must be tied as tightly as possible immediately after grafting (Mayer, 2019).

First, the success of grafting largely depends on the degree of compatibility between grafts and rootstocks. They must be

perfectly healthy and not have any kind of disease. In addition, the optimal period of grafting and the skill of the fruit grower influence the degree of success (Branişte & co., 2010). The most productive type of grafting is buds grafting, because this gives the highest percentage of attachment and the grafting system most used in nurseries is grafting with detached buds (Drăgănescu, 2006). Buds grafting facilitates obtaining the best results in all species. Made with great precision in favorable conditions, strictly respecting the grafting technique, it offers the highest percentage of attachment (Otto & co., 2015). The wound that is made in the rootstock is quite small and heals quite quickly and few graft branches are used, because every eye on the branch is beneficial for grafting, except for those at the ends (Borsai & Mitre, 2021).

The grafting of seedlings into sleeping buds takes place between July 20 and August 20 in the more southern areas and between August 10 and September 20 in the eastern and western subcarpathian hills. Grafting begins at the rootstocks where the sap circulation stops earlier, in the following order: hair, cherry, sour cherry, plum, peach, mahaleb, blackberry, quince, cork oak, Frankincense apple and vegetative (Haas, 2016).

MATERIAL AND METHOD

As rootstock, it was used Prunus mahaleb. It is slightly precocious and it is one of the most drought-tolerant cherry rootstocks, having deep-set roots. 'Mahaleb' is, however, extremely sensitive to water-logged soils as well as soils that may be anaerobic for a short time during the winter months. 'Mahaleb' is best suited to deep, well-drained loams and sands as well as the calcareous soils typical In addition, 'Mahaleb' is attractive to gophers. Consequently, control measures must be pursued with diligence. Mahaleb is resistant to crown gall, bacterial canker, and some nematodes, but highly susceptible to collar rot. It is cold hardy, precocious, and productive. When planted in the right conditions, this is an excellent and reliable rootstock.

For the present research, the used varieties were Kordia and Carmen. Kordia is a cherry variety originating from the Czech Republic. The tree has great vigor, very productive and self-sterile. Its pollinators are Vann and Germersdorf.

It has a wide-conical and tall crown; it bears fruit on May bouquets and medium branches. Flowering occurs late and is slightly sensitive to frost. The best results are obtained if the cuts are made early, i.e. after August 25. The fruit of the Kordia cherry is large, from 8-10 g, with an elongated shape and a convex dorsal part. The skin is bright red, and at full maturity it becomes grainy. The flesh is stony but juicy, sweet, non-adherent to the pit.

The Kordia cherry is resistant to cracking in conditions of excessive humidity, and the ripening period is late, in the middle of July. The fruit can be kept for up to 20 days.

Carmen is a carefully selected cherry variety, originally from Hungary, of low to medium vigor, with high productivity. Good pollinators are Katalin, Summit, Canada Giant, Starking Hardy Giant, Germersdorf. Kordia cherry fruits contain dry matter 10.8-24.7%, entire sugar 7.7-16.8%, entire acidity 0.49-1.3%, tannoid substances 0.6-1.3%, pectic substances 0.06-0.36%, vitamin V 6.51%, A 0.5 mg%, B1, E, Ca, K, P, Fe.

Carmen cherry variety is very popular, with huge cherries, stony cherries that can reach 33 mm in diameter, 10-13 g, bright red, heart-shaped. The pulp is stony, juicy, sweet, with a harmonious taste. The harvest period is beginning of June. It is ideal for small gardens. Carmen cherries contain dry matter 10.8-24.7%, entire sugar 7.7-16.8%, entire acidity 0.49-1.3%, tannin substances 0.6-1.3%, pectic substances 0.06-0.36%, vitamin V 6.51%, A 0.5 mg%, B1, E, Ca, K, P, Fe.

RESULTS AND DISCUSSIONS

Regarding the grafting, it can be observed that there are no differences recorded at the different times of grafting.

Table 1.

Mahaleb Rooting

Nr.	Grafting time	Mahaleb Rooting
1	August 10	95
2	August 20	95
3	August 30	95
	Medium Mt	95

The thickness of the seedlings at the time of planting, as can be seen in Table no. 2, has very significantly lower values compared to the Mt variant, statistically ensured for variant 1, respectively the time of grafting

August 10 and very significantly higher values for variant 3, respectively the time of grafting August 30.

Table 2.

Rootstocks thickness at grafting time

No.	Grafting time Variant	Mahaleb		
		Thickness	Difference	Significance
1	August 10	9,0	-0,9	000
2	August 20	9,7	-0,2	-
3	August 30 Average Mt	10,9 9,9	+1	XXX

LSD 5%-0446
1%-0592
0,1%-0,686

The catch at grafting recorded lower values of the percentage of catch since the precipitation was very little, below 450 mm annually. The differences between the variants, respectively the bending moments, are small, insignificant.

Table 3.

Rate of Grafted Trees

No.	Variant Grafting time	Rate of Grafting Carmen cherry variety %	Rate of Grafting Kordia cherry variety %
1	August 10	85	80
2	August 20	89	84
3	August 30 Average Mt	91 88	82 82

The start of grafted eyes in vegetation in May depending on the time of grafting, it is found that most grafts started at the time of grafting August 10 - 63.2% compared to Mt 53.5%, a very significant difference in a positive sense statistically ensured, and the weakest started grafted eyes where grafting was done on August 30 0 39.3% started eyes compared to Mt 53.5%, a very significantly negative difference, statistically assured.

Table 4.

Grafted Buds- Carmen Cherry Variety

No.	Grafting time	Grafted buds vegetative stage %	Difference to Mt	% to Mt	Difference to Mt - %	Signifi cance
1	August 10	63,2	+ 9,7	118	+ 19	XXX
2	August 20	58	+ 4.5	108	+ 9	XX
3	August 30 Average Mt	39,3 53,5	- 14.2	73	-26	000

DL 5% - 2,03
1% - 2,83
0.1% - 5.47

The start of graft eyes in vegetation at cherry occurs best at the grafting times of August 10 and 20 with 51.2 - 56.6% graft eyes initiated in vegetation, compared to 43.4% graft eyes initiated in vegetation in the control variant, with differences between 7.8 and 4.5% statistically significantly positive graft eyes.

Table 5.

Grafted Buds-Kordia Cherry Variety

No.	Grafting time	Grafted buds vegetative stage %	Difference to Mt	% to Mt	Differen ce to Mt - %	Signifi cance
1	August 10	56,6	7,8	130,7	+ 30,7	Xxx
2	August 20	51,2	+ 4.5	118,2	+ 18,2	Xxx
3	August 30 Average Mt	22,3 43,4	-21.1	51.3	-48.7	000

LSD 5% - 1,79
1% - 3,07
0.1% - 5,71

The growth in height of cherry grafted trees is influenced by the time of grafting, in the sense that the highest height of grafted trees is recorded at the time of grafting on August 10, 148-153 cm, compared to 142-147 cm Mt variant, with significant positive differences ensured statistical. And the lowest heights of the grafted trees are achieved at the time of grafting on August 30, 136-138 cm, compared to 142-147 cm for the Mt variant, with statistically significant smaller differences.

Table 6.

Grafted Tree Height- Carmen Cherry Variety

No.	Grafting time	2022		
		Height (cm)	Difference to Mt	Significance
1	August 10	148	6	X
2	August 20	142	-	
3	August 30 Medium Mt	136 142	-6	0

LSD 5% - 5.85
1% - 8.86
0.1 % - 14.24

The growth in height of trees grafted to the Kordia cherry variety is not influenced by the timing of grafting.

Table 7.

Grafted Tree Height- Kordia Cherry Variety

No.	Variant Grafting time	2022		
		Height (cm)	Difference to Mt.	Significance
1	August 10	161	+5	-
2	August 20	153	-3	-
3	August 30 Medium Mt	155 156	-1	-

LSD 5%- 5,24
1 %- 7,93
0.1% - 12,75

The increase in thickness of grafted cherry trees is influenced by the time of grafting, in the sense that at the time of grafting on August 10, a smaller increase in thickness is recorded, 9 mm, compared to 10 mm in the Mt variant, with a distinctly smaller statistically significant difference.

Table 8.

Wands' Weight - Carmen and Kordia Cherry Variety

No	Variant Grafting time	Carmen			Kordia		
		Weight grafted tree (mm)	Difference to Mt (mm)	Significance	Weight grafted tree mm	Difference to Mt mm	Significance
1	August 10	9,0	-1	00	8,9	-0,5	-
2	August 20	9,7	-0,3	-	9,5	+0,1	-
3	August 30 Medium Mt	10,2 10,0	+0,2	-	10,0	+0,6	X

DL 5% - 0,490
1% - 0.742
0,1% - 1.192

The leaves area per tree and hectare in cherry, depending on the time of grafting, is not influenced, but the weight of the leaves per tree and ha is influenced in the sense that the highest weight of leaves per tree and ha is signaled at the time of grafting, August 10.

Table 9.

Leaves Area and Leaves Weight Depending on the Grafting Time at Carmen Cherry Variety

No.	Variant	Carmen			
		Leaves Area		Leaves Weight	
		cm^2/ tree	m^2/ha	kg/ tree	kg/ha
I	August 10	4260	234300	0.280	9380
2	August 20	4200	231136	0.168	5334
3	August 30 Medium Mt	4190 4216	230450 231962	0.189 0.212	4555 6423

Table 10.

Leaves Area and Leaves Weight Depending on the Grafting Time at Kordia Cherry Variety

No.	Variant	Kordia			
		Leaves Area		Leaves Weight	
		cm^2/ tree	m^2/ha	kg/ tree	kg/ha
I	August 10	4000	220000	0.217	7399
2	August 20	3900	214626	0.210	6741
3	August 30	3900	214626	0.196	4939
	Medium Mt	3933	216417	0.207	6360

The total production of Carmen grafted trees per hectare is influenced by the timing of others, in the sense that trees grafted on August 30 have a statistically significantly lower production in relation to the Mt variant, namely 20.900 thousand pieces/hectare compared to 28.966 pieces/hectare of the Mt variant. The STAS production of grafted trees is also influenced by the time of others in the sense that the highest production to be obtained at the time of others from August 10.29854 pieces/hectare compared to 25525 pieces/hectare Mt variant, with a difference of 4329 pieces distinctly significant in positive meaning statistically assured, and the lowest at the time of grafting August 30, 20000 pieces/ hectare compared to 25525 pieces/ hectare with a difference of 5525 pieces/ hectare, very significantly lower statistically assured.

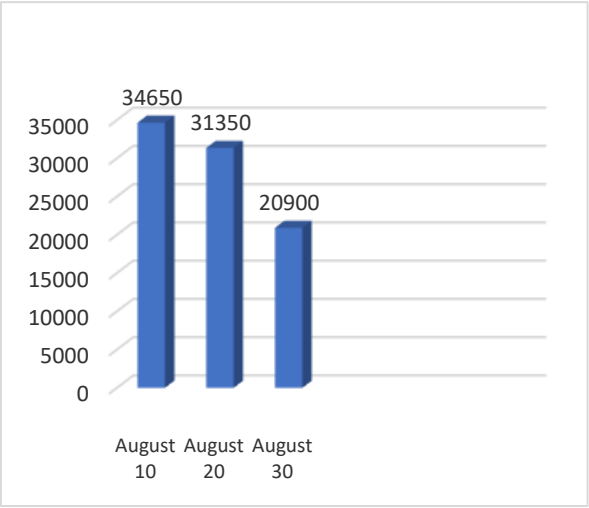

Figure 1. **Entire trees yield for Carmen cherry variety**

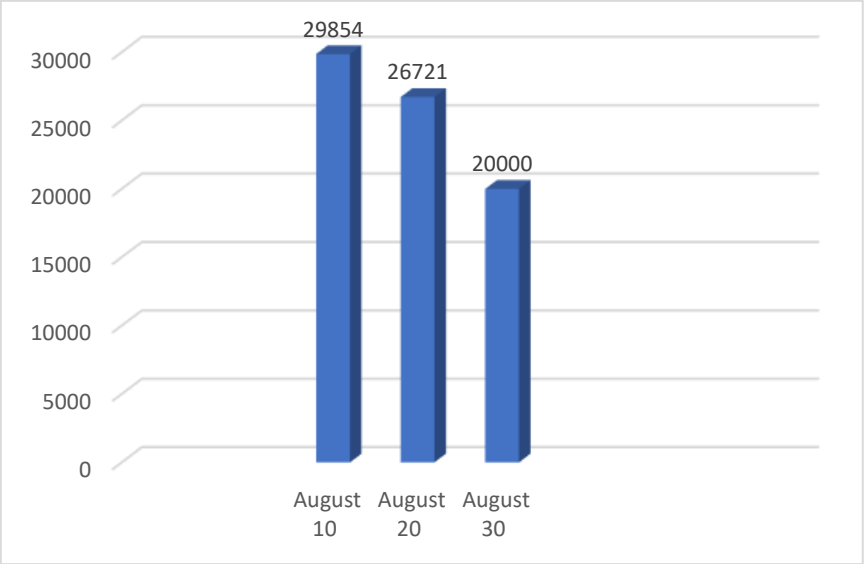

Figure 2. **STAS trees yield for Carmen cherry variety**

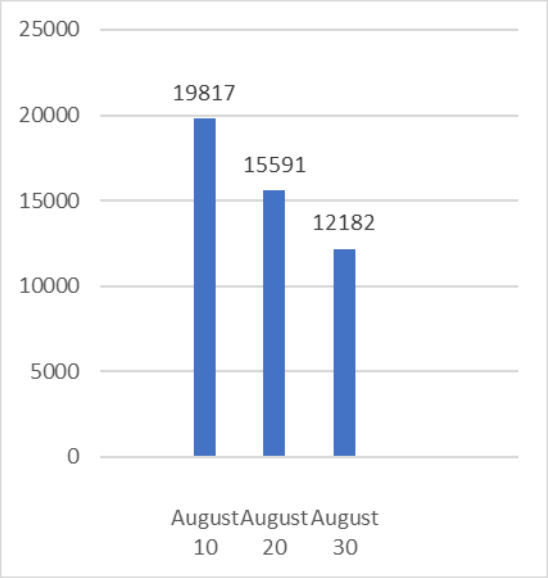

Figure 3. **Entire trees yield for Kordia cherry variety**

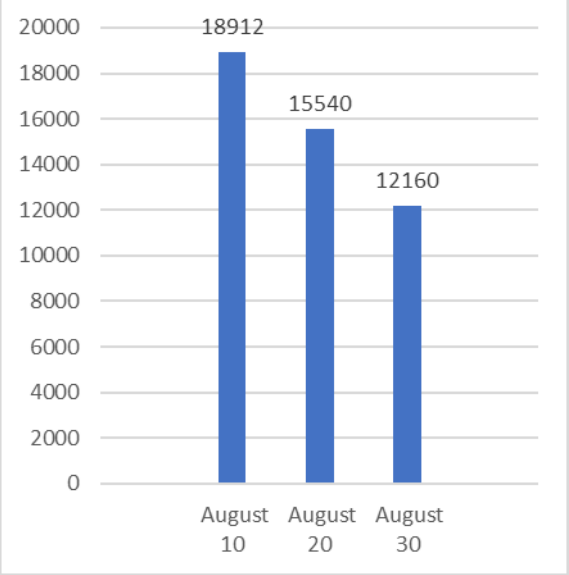

Figure 4. **STAS trees yield for Kordia cherry variety**

The total production of grafted trees of the Kordia cherry variety is not influenced by the timing of grafting, the recorded values being close to the values of the Mt variant 12182-19817 pieces/hectare compared to 15863 pieces/hectare, the recorded differences not being significant. The STAS production of trees grafted to the Kordia variety is also not influenced by the time of grafting: 12160-18912 pieces/hectare compared to 15537 pieces/hectare of the Mt variant, and the differences recorded are not significant.

CONCLUSIONS

The rooting of Mahaleb seedlings in the spring of 2021 does not register differences depending on the control variant; the grafting of the eyes was good at all times of grafting, the values being close to the control variant; the onset of eyes in vegetation in the spring of 2022 in the Carmen cherry variety is influenced by the time of grafting, most eyes begin in vegetation at the time of grafting August 10 (63.2%), compared to the control variant (53.5%) with a the difference of 9.7% is very significantly higher statistically guaranteed; the onset of eyes in vegetation in the spring of 2022 in the Kordia cherry variety is influenced by the time of grafting, most eyes begin in vegetation at the time of grafting August 10 (56.6%) and August 20 (51.2%) with differences of 7 .8% and 4.5% eyes, statistically significant positive differences. The entire and standard yield of grafted trees per hectare, for both varieties of cherry, is influenced by the time of grafting, respectively

at the time of grafting on August 10, a significantly higher production difference is obtained in a positive sense, and at the time of grafting on August 30 a production difference in a distinctly significant negative sense statistically assured.

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