INFLUENCE OF ROOTSTOCK AND BUDDING HEIGHT ON THE QUALITY OF PLANTING MATERIAL AT SOME FRUIT TREES SPECIES

INFLUENȚA PORTALTOIULUI ŞI A ÎNĂLȚIMII DE ALTOIRE ASUPRA CALITĂȚII MATERIALULUI SĂDITOR LA UNELE SPECII POMICOLE

CĂULEȚ RALUCA, GRĂDINARIU G., DASCĂLU M., MORARIU ALIONA, CIOBOTARI GH., BRÎNZĂ MARIA
University of Agricultural Sciences and Veterinary Medicine Iasi

Abstract. *This paper is the result of some experiences organized with the aim of emphasizing the influence of the rootstock, and budding height (10, 20 and 40 cm) on the quality of planting material obtained. Apple rootstocks (MM106 and M9) and sour cherry rootstocks (Mazzard and VV1) were each budded with 2 cultivars. Observations and determinations were made on vegetative aspects of the grafted trees (bud healing, bud overwintering, scion shoots length).*

Rezumat. *Această lucrare este rezultatul unor experienţe organizate în scopul evidenţierii influenţei portaltoiului şi a înălţimii de altoire (10, 20 şi 40 cm) asupra calităţii materialului săditor obţinut. Au fost luaţi în studiu portaltoi din speciile măr (MM 160, M9) şi vişin (mahaleb şi vişin vegetativ – VV1), pe care s-au altoit câte 2 soiuri. Observaţiile şi determinările realizate au cuprins aspecte ale comportamentului vegetativ al pomilor (procent de prindere la altoire, rezistenţa peste iarnă a mugurilor altoi, lungimea lăstarilor altoi).*

The choice of rootstocks depends mostly on climatic conditions, which are different form one region to another. The lenght of vegetative period depends on temperature acumulated and precipitation and has a significant effect on the quality of maiden trees produced. The low temperature in winter may be a limiting factor in the production of high budded trees.

Higher budding can be an effective way to reduce the vigour of trees and increase the productivity. Numerous trials show that increasing budding height increases vigour control and yield efficiency of apple trees in the orchard (Quamme et al., 1998; Webster, 1993).

The objective of our research was to study the effect of rootstock and budding height on the quality parameters of apple and sour cherry planting material produced under Iasi environmental conditions.

MATERIALS AND METHODS

The trial was performed at the Faculty of Horticulture in the experimental field between 2006-2007.

Research material was represent by apple rootstocks (MM106 şi M9) and sour cherry rootstocks (*Prunus mahaleb* and V.V.1), which were planted at 90×15 cm. Apple rootstocks were budded with Florina and Auriu de Bistrița cultivars and sour cherry rootstocks were

budded with Mocăneşti and De Botoşani cultivars. Rootstock diameter was 9-11 mm, and budding height varied from 10 cm, to 20cm and 40 cm

The following spring, rootstocks were cut just above the bud and tree height (cm), length of scion shoot (cm) bud survival was measured, during and at the end of the vegetative period.

RESULTS AND DISCUSSIONS

Grafting success was measured after 15-20 days. On the average, grafting success percent was between 83,9% and 85,1% on apple and between 80,9% and 71.3 % on sour cherry and it depended of rootstock and the scion grafted.

There was no significant effect of rootstock and budding height on bud healing in the autumn. There were also no interactions between rootstocks and budding height (Tab.no.1)

Table 1

Grafting success percentage at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm

Graft height	MM 106	M9	MM 106	M9	Mahaleb	V V 1	Mahaleb	V V 1
	Florina (%)		Auriu de Bistrița (%)		Mocăneşti (%)		De Botoşani (%)	
10 cm	85,0	85,2	84,9	85,1	80,9	76,1	73,3	75,7
20 cm	84,8	84,9	84,8	84,6	74,6	74,1	74,3	74,5
40 cm	84,5	84,5	83,9	83,8	72,5	75,9	71,3	73,1

Significant differences among rootstocks and budding height were observed when bud survival was evaluated the following spring as a following of bud over-wintering evaluation.

Irrespective of budding height, the highest percentage of live buds was found on semi-dwarfing rootstocks (up to 95% at MM.106 and *Prunus mahaleb*). When M9 and VV1 rootstocks were used, percentage of live buds was approximately 90%. (Tab.no.2)

Table 2

Average of bud over-wintering percentage at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm

Graft height	MM 106	M9	MM 106	M9	Mahaleb	V V 1	Mahaleb	V V 1
	Florina (%)		Auriu de Bistrița (%)		Mocăneşti (%)		De Botoşani (%)	
10 cm	98,45	91,64	97,86	91,45	97,87	92,25	98,15	92,10
20 cm	97,52	90,98	97,58	90,87	96,55	90,35	97,64	90,12
40 cm	95,12	89,94	96,68	89,97	95,04	89,67	95,88	89,54

Dwarf rootstock (M9 and VV1), being more susceptible at winter frost, had more winter damaged buds when were budded at 40 cm than at 10 cm.

We can say that low temperature resistance can be influenced in a bigger way from rootstock genetically characteristics than budding height.

. Differences in growth intensity appeared at the beginning of the season. When rootstock MM106 and *Prunus mahaleb* were used scion burst buds began with 1-2 days earlier, than scions grafted on M9 and VV1 (Tab. no. 3).

Table 3

Bud opening time at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm

Graft height	MM 106	M9	MM 106	M9	Mahaleb	V V 1	Mahaleb	V V 1
	Florina		Auriu de Bistrița		De Botoşani		Mocăneşti	
10 cm	31.03.08	26.03.08	31.03.08	27.03.08	24.03.08	23.03.08	25.03.08	24.03.08
20 cm	1.04.08	29.03.08	1.04.08	30.03.08	25.03.08	24.03.08	26.03.08	25.03.08
40 cm	1.04.08	31.03.08	2.04.08	31.03.08	25.03.08	25.03.08	26.03.08	26.03.08

Determinations made in May, June, July and September, had show differences between scions growth at both studied species.

At the sour cherry scions, shoot length was significantly bigger than at the apple scions.

Irrespective of rootstock, on the same species, no significant differences were found regarding of average length of the shoots scion. (Tab. no.4)

Table 4

Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (May 2007)

Graft height	MM106		M9		Mahaleb		V V 1	
	Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10 cm	29,15	29,34	29,10	29,20	46,25	48,51	45,90	48,37
20 cm	28,42	28,62	28,35	28,59	43,21	47,50	43,18	47,38
40 cm	28,23	28,20	28,16	28,22	43,17	47,35	42,50	47,26

Later, the differences regarding the length of shoot scions depended in a bigger degree on grafting height (*Tab. no.5, 6)*.

Table 5

Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (June 2007)

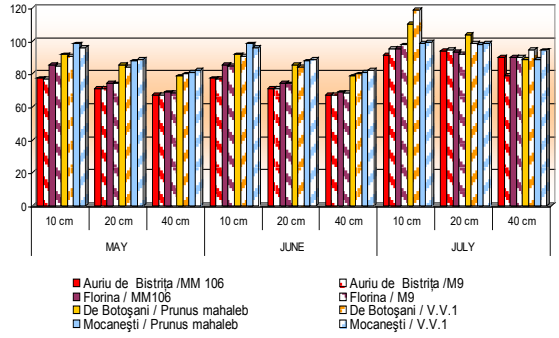
Graft height	MM106		M9		Mahaleb		V V 1	
	Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10 cm	77,34	85,32	76,86	84,95	91,60	98,30	90,50	95,74
20 cm	71,21	74,19	71,22	74,10	85,60	87,84	84,21	88,58
40 cm	67,38	68,74	67,34	68,30	78,54	81,03	80,01	82,41

Table 6

Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (July 2007)

Graft height	MM106		M9		Mahaleb		V V 1	
	Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10 cm	91,23	95,17	95,38	97,45	110,12	118,56	98,45	99,01
20 cm	93,86	94,65	93,22	92,13	103,84	98,54	98,05	98,67
40 cm	90,22	78,80	90,15	89,97	88,85	94,60	88,63	94,21

Fig. 1 Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10cm, 20cm and 40cm (May, June and July 2007)



During the growing season, a suppressing of growth scions shoot in length was recorded, in direct correlation with increasing budding height

On the same species, the scion length reduction tendency increased, all the more as rootstock is dwarfing.

The measurements made in September did not show significant differences regarding total length of the grafted trees irrespective of budding height, on both species (*Tab. no. 7).*

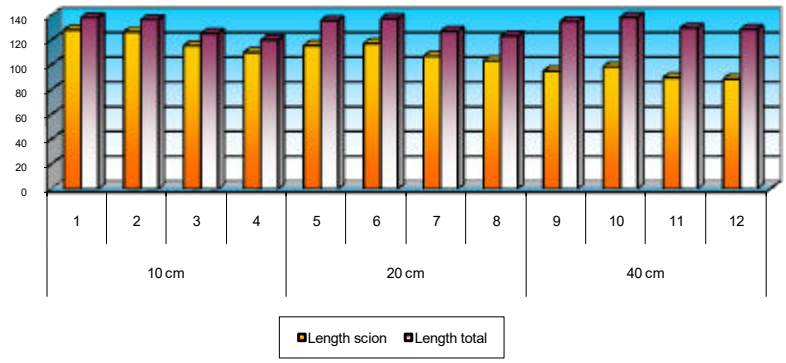
Table 7

Average length of shoot scions and total tree length (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (September 2007)

H. graft (cm)	Lenght (cm)	MM106		M9		Mahaleb		V. V. 1	
		Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10	scion	128,23	126,54	115,42	110,10	138,80	139,35	132,86	134,52
	grafted tree	138,23	136,54	125,42	120,10	148,80	149,35	142,86	144,52
20	scion	115,65	117,25	106,96	103,34	125,73	120,47	126,34	121,32

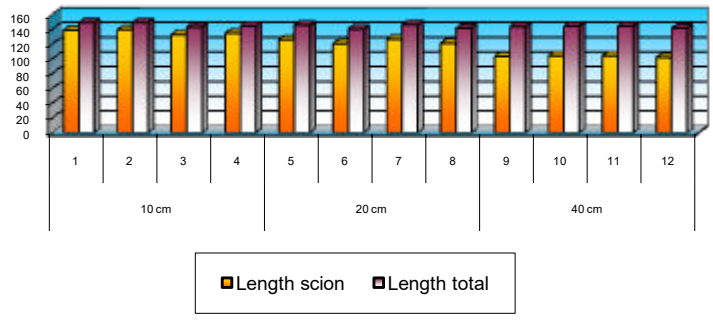
	grafted tree	135,65	137,25	126,96	123,34	145,73	140,47	146,34	141,32
40	scion	94,98	98,45	89,73	88,58	103,36	104,25	104,12	101,74
	grafted tree	134,98	138,45	129,73	128,58	143,36	144,25	144,12	141,74

Fig. 2 Average length of shoot scions and total tree length (cm) at some apple scions grafted on different rootstocks at 10 cm, 20 cm and 40 cm (September 2007)



1. Auriu de Bstrița/ MM106
2. Florina/ MM106
3. Auriu de Bstrița/ M 9
4. Florina/ M9
5. Auriu de Bstrița/ MM106
6. Florina/ MM106
7. Auriu de Bstrița/ M 9
8. Florina/ M9
9. Auriu de Bstrița/ MM106
10. Florina/ MM106
11. Auriu de Bstrița/ M 9
12. Florina/ M9

Fig. 3 Average length of shoot scions and total tree length (cm) at some sour cherry scion grafted on different rootstocks at 10 cm, 20 cm and 40 cm (September 2007)



1. De Botoşani/ Mahaleb
2. Mocăneşti/ Mahaleb
3. De Botoşani/ V.V.1
4. Mocăneşti/ V.V.1
5. De Botoşani/ Mahaleb
6. Mocăneşti/ Mahaleb
7. De Botoşani/ V.V.1
8. Mocăneşti/ V.V.1
9. De Botoşani/ Mahaleb
10. Mocăneşti/ Mahaleb
11. De Botoşani/ V.V.
12. Mocăneşti/ V.V.1

On the average the length of the scion shoot was between 88,58 cm and 128,23 cm at apple, and 101,74 cm and 138,8 cm at sour cherry.

At both apple and sour cherry, we observed a diminishing of scion shoot growing rhythm, as the budding height was increased so we can say that modifications in budding height and rootstock influence on the scion are directly correlated.

CONCLUSIONS

1. Grafting success percentage was good, a small decrease in the case of budding height being noticed.
2. Budding height influenced significantly live buds percentage, bigger damages being observed when budding height was increased to 40cm.
3. Scions bud over-wintering was better when rootstocks MM106 and *Prunus mahaleb* were used.
4. Budding height did not influence significantly the time of scions bud opening
5. During the growing season we observed a indirect correlation between scion shoot growing rhythm and budding height, these results are to be verified over the next year.

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