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ESTIMATION CONCERNING THE GROWTH OF SWEET CHERRY TREES ON FOUR ROOTSTOCKS IN NURSERY

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ABSTRACT: *Kordia and Regina sweet cherry tree cultivars were grafted on Prunus avium, Prunus mahaleb, F 12/1 and Colt rootstocks, by using a T budding method. There was no incompatibility between cultivars and rootstocks in a nursery. According to the diameter of sweet cherry scion, the greatest growth was registered in F 12/1 rootstock and the lowest, in Prunus mahaleb. The cultivars grafted on Colt rootstock had more lateral shoots than the other rootstocks. Sweet cherry tree cultivars grafted on F 12/1 and Colt rootstocks were more compatible than Prunus avium and Prunus mahaleb. The cultivar has influenced only the height and the average length of lateral shoots of sweet cherry scions.*

Key Words: sweet cherry scion, rootstock, cultivar, growth

REZUMAT–Aprecieri privind creşterea cireşului pe patru portaltoaie, în pepinieră. *Cultivarele de cireş Kordia şi Regina au fost altoite în pepinieră pe portaltoaiele Prunus avium, Prunus mahaleb, F 12/1 şi Colt, folosind metoda de altoire în formă de T. Nu a existat incompatibilitate între cultivare şi portaltoaie. În funcţie de diametrul altoiului de cireş, cea mai mare creştere a fost înregistrată de portaltoiul F12/1, iar cea mai redusă, de Prunus mahaleb. Cultivarele altoite pe portaltoiul Colt au prezentat mai mulţi lăstari laterali, în comparaţie cu celelalte portaltoaie. Cultivarele de cireş, altoite pe portaltoaiele F 12/1 şi Colt, au fost mai compatibile, în comparaţie cu Prunus avium şi Prunus mahaleb. Cultivarul a avut influenţă doar asupra înălţimii şi a lungimii medii ai altoiului de cireş.*

Cuvinte cheie: altoi de cireş, portaltoi, cultivar, creştere

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INTRODUCTION

Very intensive studies on sweet cherry rootstocks were carried out in many countries (Perry 1987; Perry and Cummins 1990; Kloutvor 1991; Franken-Bembenek 1995; Edin 1996; Kemp and Wertheim 1996; Wolfram 1996; Azarenko and McCluskey 1998; Grzyb at al. 1998; Kappel at al. 1998; Callesen 1998; Sansavini and Lugli 1998; Sther 1998; Webster 1998; Wertheim at al. 1998). This rich literature is the result of the growing interest in cultivating sweet cherry trees. Their late fructification represents a barrier in sweet cherries production. The requirement of intensifying sweet cherry tree culture is to obtain trees with a big number of fruit-bearing shoots in nursery. The influence of four rootstocks on the growth and branching of two sweet cherry tree cultivars grafted on different rootstocks was examined in this trial.

MATERIALS AND METHODS

The nursery experiment was set up in a randomized block design with four replicates, 25 rootstocks per plot. The biologic material of this study was the generative rootstocks *Prunus avium, Prunus mahaleb* and the vegetative ones F12/1 and Colt, and sweet cherry tree cultivars *Kordia* and *Regina.* In the spring 2003 and 2004, the rootstocks were planted in nursery, at 90x30 cm spacing. A T- budding method was used in the first decade of August. In the autumn of 2004 and 2005, the following measurements and observations were done: scion height (cm) and diameter (mm) measured 30 cm above ground, number of lateral shoots and their length (cm). Based on these data, a percentage of trees consistent with PN-R-67010 norm was calculated. The STAT program, using the analysis of two-factor variance (cultivar and rootstock), carried out the statistical analysis of the results. The significance of differences among combinations was evaluated according to the confidence intervals, calculated by Duncan's test for the confidence level $\alpha = 0.05$. The results presented in tables are the mean values of the two series.

RESULTS AND DISCUSSION

The rootstocks used in the experiment have affected the tree height in a different way (*Table 1*). The trees growth on F12/1 and Colt rootstocks was the highest, and they were different from those grafted on *Prunus avium*. The height of *Kordia* cultivar was greater, compared to *Regina.*

Analysing the influence of rootstock on the tree trunk diameter, we noticed that the trees grafted on F12/1 rootstock were significantly thicker. The cultivars grafted on Colt and *Prunus avium* were thinner. The smallest diameter was found in the trees grafted on *Prunus mahaleb* rootstock. Both examined cultivar scions did not differ in their thickness (*Table 2*).

Table 1

Height of sweet cherry trees depending on rootstock (cm)

Variety	Rootstock				Average value of cultivar
	Prunus mahaleb	*Prunus avium*	F12/1	Colt	
Kordia	161.9 bcd *	144.8 ab	174.7 d	177.4 d	164.7 b
Regina	142.4 ab	134.4 a	168.2 cd	150.3 abc	148.8 a
Average value of rootstock	152.2 ab	139.6 a	171.5 b	163.8 b	

* Means followed by the same letter do not differ significantly at the level α = 0.05

Table 2

Diameter of sweet cherry trees depending on rootstock (mm)

Variety	Rootstock				Average value of cultivar
	Prunus mahaleb	*Prunus avium*	F12/1	Colt	
Kordia	15.4 abc *	17.7 c	23.6 d	17.9 c	18.7 a
Regina	13.9 a	15.0 ab	23.0 d	17.2 bc	17.3 a
Average value of rootstock	14.6 a	16.4 b	23.3 c	17.6 b	

* Means followed by the same letter do not differ significantly at the level α = 0.05

The Colt rootstock had a very positive influence on the number of lateral shoots, especially for *Regina* cultivar. In addition, sweet cherry trees, grafted on *Prunus mahaleb,* had a similar number of lateral shoots than on Colt rootstock, and in case of *Kordia* cultivar, even bigger. A smaller number of lateral shoots was found in the trees grafted on F12/1 and *Prunus avium* rootstocks. The cultivars did not differ significantly as concerns the number of lateral shoots (*Table 3*).

Table 3

Average number of lateral shoots of sweet cherry trees depending on rootstock

Variety	Rootstock				Average value of cultivar
	Prunus mahaleb	*Prunus avium*	F12/1	Colt	
Kordia	5.0 c *	4.2 bc	1.5 a	3.6 abc	3.6 a
Regina	1.7 a	1.5 a	2.5 ab	5.4 c	2.8 a
Average value of rootstock	3.4 ab	2.9 a	2.0 a	4.5 b	

* Means followed by the same letter do not differ significantly at the level α = 0.05

The trees grafted on *Prunus mahaleb* rootstock had longer lateral shoots and they did not differ significantly in their length from those grafted on Colt. The cultivars grafted on *Prunus avium* had the shortest lateral shoots. Comparing the influence of a cultivar, *Kordia* had significantly longer lateral shoots (*Table 4*).

Table 4

Average length of sweet cherry tree lateral shoots depending on rootstock (cm)

Variety	Rootstock				Average value of cultivar
	Prunus mahaleb	*Prunus avium*	F12/1	Colt	
Kordia	55.7 d *	41.3 abc	40.0 abc	51.7 cd	47.2 b
Regina	48.0 bcd	31.0 a	38.3 ab	41.1 abc	39.1 a
Average value of rootstock	51.9 c	36.2 a	39.2 ab	46.4 bc	

* Means followed by the same letter do not differ significantly at the level α = 0.05

The sweet cherry trees obtained in the trial on F12/1 and Colt rootstocks were much more consistent with the norm PN-R-67010 than those two other rootstocks. The variety did not affect the consistency of the trees with the norm (*Table 5*).

Table 5

Consistency of sweet cherry trees with norm PN-R-67010 depending on rootstock (%)

Variety	Rootstock				Average value of cultivar
	Prunus mahaleb	*Prunus avium*	F12/1	Colt	
Kordia	70.6 ab *	71.7 abc	78.5 bcd	78.7 cd	75.0 a
Regina	69.7 a	70.8 ab	81.2 d	74.4 abcd	74.2 a
Average value of rootstock	70.2 a	71.2 a	79.9 b	76.6 b	

* Means followed by the same letter do not differ significantly at the level α = 0.05

There was noticed a strong growth of sweet cherry trees grafted on Colt and F12/1 rootstocks. In the studies carried out earlier (Pannell et al.,1983; Webster 1984; Kloutvor 1987), sweet cherry tree cultivars grafted on Colt rootstock showed a 30% smaller vigour in comparison with F12/1. In these studies, we did not notice such a reduction in the vigour of trees grafted on Colt rootstock. This fact is also confirmed by Seipp, 1989 and Grzyb et al., 1998. The existing differences may have resulted from the observations of different sweet cherry tree cultivars grafted on these rootstocks. In addition, a trend of significant decrease in the height of trees, compared with their thickness in Colt rootstock, observed by Ystass (1990), was not confirmed in this study.

The length and number of lateral shoots show the advantage of the trees grafted on Colt and *Prunus mahaleb* rootstocks. Colt stimulated the formation of average 4,5 lateral shoots. The studies performed earlier by Świerczyński (1996) on branching of one-year-old sweet cherry trees gave similar results (on the average, 4,4 shoots). Pannell et al. (1983) stated that the Colt rootstock has

stimulated a formation of lateral shoots, which significantly accelerated the fructification period.

Like apple trees, which have a different tendency to create lateral shoots, sweet cherry trees may also show a different attitude in this concern. In the present experiment, the only difference between the studied varieties was observed in the average length of long shoots, but not in their number.

Sweet cherry trees grafted on Colt rootstock had a very interesting appearance. Their lateral shoots grew at a right angle from the guiding stem. According to Sitarek (1990), big ramification angles between the guiding stem and lateral shoots made easier tree cutting and formation. An additional advantage was the facility of propagation by cuttings. It enabled a fast and cheap production of this rootstock (Świerczyński, 1996).

These facts resulted in a wider use of Colt rootstock for sweet cherry tree production in nursery. The trees grafted on this rootstock were much cheaper than those grafted on PHL series or *Gisela* rootstocks.

CONCLUSIONS

A higher growth of sweet cherry trees was observed in F12/1 and Colt rootstocks compared to *Prunus avium* and *Prunus mahaleb*.

Colt and *Prunus mahaleb* rootstocks have stimulated the formation of a bigger number of longer lateral shoots, compared to the other two ones, taken into consideration in this experiment.

Kordia and *Regina* sweet cherry tree cultivars obtained in a nursery did not show any symptoms of physiological incompatibility in the tested rootstocks.

Sweet cherry trees grafted on the examined rootstocks in more than 70% were consistent with the norm PN-R-67010.

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