

## UN NOU PORTALTOI VEGETATIV INTERSPECIFIC DE CIREȘ. STUDII ÎN FAZA DE PEPINIERĂ ÎN INTERACȚIUNE CU CINCI VARIETĂȚI A NEW INTERSPECIFIC VEGETATIVE ROOTSTOCK FOR CHERRY. STUDIES IN THE NURSERY STAGE IN INTERACTION WITH SIX VARIETIES

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### Abstract

Studies were conducted at ICDP Pitesti-Maracineni, during 2008-2010, aiming to establish the propagation capacity by softwood cuttings of the interspecific hybrid 2000-OR-59 (IP-C7) and to outcome its interaction with any grafting combination of six varieties of sweet cherry, compared with IP-C4 vegetative rootstock. Referring to propagation by softwood cuttings of the new rootstock it was 90 % higher, significantly (without synthetic auxins treatment). Establishment in the field I of the nursery was 92.6 %, six percent more than the control, statistically assured by DL 5 %. Bud take, according to the variety was variable, ranged between 77,33 % (at budding with Stella variety) and 87,66 % (at budding the 'Severin' variety). The growth of the scions and quality at the point union have been influenced by the epibiont. The best results were recorded by budding of new rootstock with 'Severin', 'Daria', 'Stella' and 'Van' varieties. The root system of trees grafted on interspecific hybrid 2000-OR-59, was developed mainly in horizontal-oblique direction and less in depth, exploring the soil volume between 0,5 and 0,7 mc, with significantly differences from the control. Return in grafted trees was influenced by the varieties within the same rootstock and the rootstocks within the same variety, with values exceeding 75 % in the most varieties grafted on the interspecific hybrid 2000-OR-59, significantly superior to control rootstocks. At the end of the studies in the orchard, this new vegetative interspecific rootstock will be promoted as IP-C7.

**Keywords:** rootstock, variety, softwood cuttings, orchards, budding  
**Cuvinte cheie:** portaltai, soi, butasi rasinoase, livezi, inmugurire

### 1. Introduction

Rootstock is a tool by which valuable varieties of cherries are propagated. Vegetative rootstock, compared with generative ones, ensures on orchards uniformity in terms of vigour and fruit bearing and a better adaptation to different the soil types (Webster A; Lucas A., 1997). Also, vegetative rootstock is propagated by cuttings or layering to less costs, without the risk to have not mother-plant-stock (Hartman T.M., Kester E.D., 1965).

For generative rootstock is necessary that each year, to have adequate amount of stones, which is dependent on constant bearing cherry trees, which does not occur every year in cherry trees due to climatic accidents (Mladin Gh., 2004; long A.G., 1997).

The studies effected at RIFG Pitesti-Romania, during 2008-2010, aimed to know the performance in the nursery phase of a new interspecific hybrid 2000-OR-59 (IP-C7) as a rootstock for sweet cherry varieties, aiming to establish cherry orchards with new levels for productivity and quality.

### 2. Material and method

Comparative experiments were established in the greenhouse, to determine the propagation capacity by softwood cutting of the new rootstock versus IP-C4 rootstock as control. The cutting were collected from mother plant, from beginning of June (first ten days) up to end of July. To stimulate rooting, cuttings were treated with Radistim-2, compared with control treatment. There were determined rooting efficiency, number and length of roots and, finally, index of rooting by formula:

$$I_r = \frac{\text{No. of roots x rooting efficiency}}{100}$$

In the nursery, in the comparative experiments, were carried out studies on root cuttings establishment, bud take, for six cherry varieties with two vegetative rootstock combinations (Table 2), growing of scions, grafting union analysis and calculations of the cross sectional area of stem at 5 cm both above and below the point of union. Based macroscopic sections, effected through the point union and ratio scion/rootstock, was assessed as graft compatibility estimation.

In each scion/rootstock variant was dug up the root system and its development was established by calculating the volume of the soil explored by roots, using the formula:

$$V_r = \frac{\pi r^2 \times h}{2}$$

$\pi r^2$  = roots in the horizontal line  
 $h$  = roots in the depth direction

After harvesting the trees from the nursery, they were calibrated and appreciated in respect with quality of planting material and the production of every variant and reported to hectare.

Data were calculated with ANOVA program, statistically assured by DL 5 %.

### 3. Results and discussion

In the greenhouse efficiency for propagation by softwood cuttings of the new rootstock was 90 % higher, significantly versus control rootstock at the variant without synthetic auxin treatment. The number and length of roots had higher values when they were treated with Radistim-2. Index of rooting was higher to the new rootstock, showing its better rooting capacity (table 1).

In the nursery establishment in the field I was 92.6 % for the new rootstock, six percent more than the control, statistically assured by DL 5 %, which revealed a better recovery of the root system after transplantation in field nursery (Table 2). Bud takes and scions growths were influenced by the epibiont in the same rootstock. The average bud take have evolved at the grafting rate of 77,33 % at the Stella variety, up to 87,66 % for the 'Severin' variety with the interspecific hybrid 2000-OR-59, and ranged between 66,83 % and 82 % at the control (IP-C4). Also, growing of scions and quality at the point of union were influenced by the varieties within the same rootstock with higher significantly values at grafting combinations of the new rootstock, compared with control. A good grafting compatibility was recorded at the new vegetative rootstock in combinations with 'Severin', 'Daria', 'Stella' and 'Rubin' varieties (Table 3).

Development of the root trees system in the field had a different pattern depending on each variety in the same rootstock and on the rootstocks in the some variety. Interspecific hybrid 2000-OR-59 induced the development of root system predominantly in horizontal-oblique direction and less in depth, with a greater number and length of roots compared with IP-C4 rootstock control.

The volume of the soil explored by roots at the new vegetative rootstock showed lower values with the varieties 'Superb' (0.5 m<sup>3</sup>) and 'Rubin' (0.59 m<sup>3</sup>) and higher values with the varieties 'Severin' (0.74 m<sup>3</sup>), 'Daria' (0,68 m<sup>3</sup>) and 'Van' (0,68 m<sup>3</sup>), significantly superior compared to IP-C4 control vegetative rootstock (Table 4).

Efficiency in grafted trees, versus rooted cuttings planted in the I<sup>st</sup> field of the nursery, recorded significantly higher values for interspecific hybrid 2000-OR-59, compared with control.

### 4. Conclusions

The interspecific hybrid 2000-OR-59 (IP-C7) has been ousted through high capacity of propagation by softwood cuttings, even without hormone treatment, on a long period of summer season;

The synthetic auxin (Radistim-2) influenced emergence of a significantly greater number of cutting roots and rooting index, superior compared with no treatment variant;

Restoring the root system, after transplanting of the rooted cuttings into the field I of the nursery, took a significantly greater proportion for the new rootstock compared with control;

Scion shoots of the varieties Severin, Daria, Rubin and Van started in vegetation at a higher rate and were higher significant increases on interspecific hybrid 2000-OR-59, versus IP-C4;

Differences of cross sectional area between the simbiotics at the grafting area and the point of union quality showed a good compatibility between the new vegetative rootstock and Daria, Rubin and Stella varieties. The control for vegetative rootstock IP-C4 showed a low compatibility with Rubin, Van and Stella varieties;

Return in the grafted trees was influenced by the varieties within the same rootstock and the rootstocks within the same variety, with values-exceeding 75 % in the most varieties grafted on the interspecific hybrid 2000-OR-59, significantly superior to control rootstock;

At the end of the studies in the orchard, this new vegetative interspecific rootstock will be named as IP-C7.

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## Tables and figures

**Table 1. Capacity of propagation by softwood cuttings for two interspecific vegetative rootstocks**

Rootstock	Treatment of variant	Number of green cuttings - buc -	Number of root cuttings - buc -	Return of root cuttings - % -	Propagation of capacity			Index of rooting
					Number of roots on cuttings - buc -	Length of roots - cm -	Length from base of cutting with roots - cm -	
IP-C4	Radistim 2	100	87	87 a	35.3 b	301.33 b	2.34 a	30.71 c
	Control treatment	100	81	81 b	20.3 b	96.76 b	1.74 a	16.44 d
IP-C7	Radistim 2	100	92	92 a	98.0 a	524.23 a	2.91 a	90.16 a
	Control treatment	100	90	90 a	38.3 b	125.96 b	2.57 a	34.47 b
DL – 5 %				4,315	25,66	185.37	2.383	0.167

**Table 2. The behavior of two interspecific vegetative rootstocks in the field of nursery**

Rootstock	Number of rooted cuttings planted - buc -	Number of rooted cuttings established - buc -	Percentage of established - % -	Increases of rootstocks		Plant of rootstock good for buddings procentage from the cuttings planted in the field - % -
				Hight of stem - cm -	CSA of stem from 10 cm above the soil - cm <sup>2</sup> -	
IP-C4	150	130	86.6 b	126.50 a	0.244 a	85.3 a
IP-C7	150	139	92.6 a	120.75 a	0.244 a	91.3 a
DL – 5 %			2,868	6.572	0.236	25.815

CSA = cross sectional area

**Table 3. The behaviour of two interspecific rootstocks in the field II of nursery in grafted combinations with six cherry varieties**

Rootstock	Variety	Bud take - % -	Increase of scions		Increase of stema at grafted area				Appreciated the rank of compatibility between scion and rootstock combination
			Height of stem - cm -	CSA of stem from 50 above the soil - cm <sup>2</sup> -	CSA from 5 cm above the point union - cm <sup>2</sup> -	CSA from 5 cm below the point union - cm <sup>2</sup> -	CSA on the point union - cm <sup>2</sup> -	Raport scion/rootstock	
0	1	2	3	4	5	6	7	8	9
IP-C4	Daria	79.66 bc	138.13 ab	1.20 ab	1.92 a	2.59 b	7.68 ab	0.745 a	A
	Severin	82.00 abc	141.90 ab	1.20 ab	1.95 a	2.64 b	8.42 a	0.740 a	A
	Rubin	80.33 d	94.00 e	0.69 c	1.03 c	2.69 b	4.78 c	0.394	C
	Superb	72.00 bc	125.23 bc	0.91 abc	1.27 bc	2.06 b	.01 bc	0.607 ab	B
	Van	71.33 d	95.96 e	0.77 bc	1.01 c	2.65 b	5.76bc	0.375 c	C
	Stella	66.33 e	100.90 cde	0.74 bc	1.35 bc	2.82 ab	5.68bc	0.478 bc	C
0	1	2	3	4	5	6	7	8	9
IP-C7	Daria	85.66 ab	145.46 ab	1.27 ab	2.12 a	3.12 ab	4.56 c	0.682 ab	A
	Severin	87.66 a	152.03 a	1.14 abc	2.42 a	3.98 a	5.45bc	0.617 ab	B
	Rubin	86.00 bc	122.73 bcd	1.02 abc	2.34 a	3.12 ab	5.87bc	0.790 a	A
	Superb	79.33 ab	102.63 de	0.82 bc	1.07 b	2.36 b	4.16 c	0.623 ab	B
	Van	81.66abc	135.80 ab	1.46 a	2.04 a	2.98 ab	5.31 c	0.682 ab	A
	Stella	77.33 c	137.46 ab	1.13 abc	2.29 a	3.08 ab	4.70 c	0.742 a	A
DL = 5 %		4,488	16.637	0.297	0.325	0.775	1.512	0.153	

<sup>x</sup> = Good compatibility: A

Satisfaction compatibility: B

Low compatibility: C

CSA = cross sectional area

**Table 4. Developing of root system at the grafted from the field II of the nursery, variable of the scion/rootstock combination**

Rootstock	Variety	Number of roots on trees		Length of roots with over 3 mm the thickness	Extension of the roots		Volume of the soil explored of the roots - cm -
		With over 3 mm of the thickness	With under 3 mm of the thickness		On horizontal-oblique-direction - cm -	On depth direction - cm -	
IP-C7	Daria	55.5 b	870.2	1039.3	75.5	153.1	0.68 ab
	Severin	53.4 b	820.4	1120.4	59.8	179.2	0.74 ab
	Rubin	38.3 e	502.6	589.5	72.0	146.2	0.59 ab
	Superb	33.5 f	421.8	532.7	53.0	122.0	0.50 b
	Van	42.3 d	710.2	464.8	57.3	175.2	0.68 ab
	Stella	57.2 a	796.2	506.7	55.0	171.5	0.63 ab
IP-C4 (mt)	Daria	50.3 c	388.7	751.4	83.0	133.2	0.57 b
	Severin	48.3 c	511.4	612.8	85.5	133.6	0.58 b
	Rubin	29.8 g	266.5	335.7	50.2	101.4	0.19 c
	Superb	41.7 d	308.2	712.9	59.4	116.0	0.30 c
	Van	26.8 h	237.4	409.8	51.3	117.8	0.27 c
	Stella	25.4 h	282.8	687.4	67.3	112.4	0.32 c
DL = 5 %		2.31					0.15

**Table 5. Number of tree grafted obtained in the experiment plots and reported at hectare, at six varieties grafted on two interspecific vegetative rootstock**

Rootstock	Variety	Grafted tree			
		In the experimental plots (27 mp) - pieces -	Percentage of number planted rootstocks - % -	Reported to hectare (mii buc.)	
				Total	Of which STAS
IP-C7	Daria	119.08	79.3 ab	44.10	35.8
	Severin	121.84	81.2 a	45.12	36.2
	Rubin	119.54	79.6 a	44.27	30.5
	Superb	110.26	73.5 bc	40.83	29.8
	Van	113.50	75.6 ab	42.03	31.8
	Stella	107.48	71.6 bc	39.80	32.4
IP-C4 (mt)	Daria	103.59	69.0 c	38.36	30.9
	Severin	106.60	71.0 c	39.48	31.7
	Rubin	104.42	69.6 c	38.67	20.6
	Superb	93.60	62.4 d	34.66	29.8
	Van	92.72	61.8 d	34.34	27.4
	Stella	86.22	57.4 e	31.93	25.3
DL = 5 %			1.70		