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## Orchard Performance of some Romanian Plum Cultivars Grafted on Two Rootstocks

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### Abstract

The pomological values of three Romanian plum cultivars ('Carpatin', 'Centenar', 'Tita') grafted on two rootstocks ('Saint Julien' and 'Myrobalan C5') were evaluated. These varieties were compared with 'Stanley' variety as a control. The experimental plot was established in Research Institute for Fruit Growing Pitești-Maracineni. The trees were planted in the spring of 2010 at different distance: 4x4 m in the case of 'Myrobalan C5' rootstock and 4x2.25 m in the case of 'Saint Julien' rootstock. The planting system comprised either 4 trees with 3 replicates. The trees were irrigated and their crowns were trained as spindles (in the case of 'Saint Julien' rootstock) and flat open center (in the case of 'Myrobalan C5' rootstock). In this experimental plot, in 2012-2014 period, were evaluated: tree vigour based upon measuring of trunk-diameter and calculated trunk cross sectional area, yields in kg/tree and basic parameters of fruit quality. Behind observations and measurements we found that the trees of all cultivars grafted on 'Saint Julien' rootstock came into bearing in the second year after planting, but production was very low, and those on 'Myrobalan C5' rootstock in the third year. The vigour of all cultivars grafted on 'Saint Julien' rootstock was weaker than those grafted on 'Myrobalan C5'. The Romanian varieties on both rootstocks were noted by fruit large, appearance and quality, designed for fresh consumption.

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## 1. Introduction

At plum culture, using almost exclusively ‘Myrobalan’ rootstock, with some negative points (too vigorous growth and insufficient compatibility with some cultivars), need to adopt the classical system, with distance of 6 m between rows and 5.0 m between the trees one at a time (333 trees/ha), with productivity as about 5-8 t/ha (Butac et al., 2014; Kaufmane et al., 2007). In the period 1976 - 1980 was started action to increase the density of trees - so called modernization, setting the standard distance of 5.0/4.0 m which we consider acceptable in new plum orchard located on land in the hills, sloping. Currently there is a trend to spread a dense system, with planting distances of 4 x 2 m (1250 trees / ha) with low vigor rootstock (‘Saint Julien’), with trees training form spindle bush, under fertirigation (Blazek and Pistekova, 2009, 2012). In this paper, the pomological values of three Romanian plum cultivars (‘Carpatin’, ‘Centenar’, ‘Tita’) grafted on two rootstocks (‘Saint Julien’ and ‘Myrobalan C5’) were evaluated. These varieties were compared with ‘Stanley’ variety as a control.

## 2. Material and method

The experimental plot was established in Research Institute for Fruit Growing Pitesti-Maracineni. The trees were planted in the spring of 2010 at different distance: 4x4 m in the case of ‘Myrobalan C5’ rootstock and 4x2.25 m in the case of ‘Saint Julien’ rootstock. The planting system comprised either 4 trees with 3 replicates. The trees were irrigated and their crowns were trained as spindles (in the case of ‘Saint Julien’ rootstock) and flat open center (in the case of ‘Myrobalan C5’ rootstock).

Climatic conditions of Maracineni are characterized by the average annual temperature of 9.7°C and the average annual rainfall of 663.3 mm.

The following records were taken annually: trunk cross sectional area (TCSA), yielding capacity, fruit weight, flesh firmness and soluble solids content of the fruits. Trunk cross sectional area was measured with caliper digital (cm<sup>2</sup>); fruit production was determined by weighing in kg/tree and t/ha; productivity index (calculated like yield in kg/tree per trunk cross sectional area in cm<sup>2</sup>); fruit weight was recorded with a balance in g/fruit; fruit firmness was measured with non-destructive penetrometer Qualitest HPE equipped with a plunger of diameter 0.10 cm<sup>2</sup>; soluble solid contents were measured with a digital refractometer, in % Brix.

Data were analyzed statistically using Duncans multiple range test -  $P \leq 0.05$ .

## 3. Results and discussions

### 3.1. Tree growth vigour

‘Myrobalan’ is the most popular rootstocks in Romania and ‘Saint Julien’ is one of the most popular rootstocks in Europe. The vigour of all cultivars grafted on ‘Saint Julien’ rootstock was weaker than those grafted on ‘Myrobalan’. Some authors showed that ‘Saint Julien’ rootstock limit shoot growth in the first years after planting, but after few years it is become vigorous (Boyan et al., 1995).

Statistical analysis of data on trunk cross sectional area (TCSA) using Duncan’s multiple range test ( $P \leq 0.05$ ) showed that between varieties were significant differences. On average (2012-2014), TCSA on the 4 plum varieties grafted on 2 rootstocks had a value of 26.03 cm<sup>2</sup>, the highest average TCSA recorded in ‘Centenar/Myrobalan C5’ (32.99 cm<sup>2</sup>) and the lower average values ‘Carpatin/Saint Julien’ (20.12 cm<sup>2</sup>). The standard deviation had values between 4.38 cm<sup>2</sup> (2012) and 8.17 cm<sup>2</sup> (2014), and the coefficient of variation (standard deviation/mean, expressed as a percentage) had values between 19.00% in 2014 – 41.60% in 2012) (Tables 1.a; 1.b).

Analyzing variation induced by variety to rootstock was found that the lowest average TCSA was recorded in rootstock ‘Saint Julien’ (22.28 cm<sup>2</sup>), and the highest average value was recorded for ‘Myrobalan C5’ rootstock (29.78 cm<sup>2</sup>) (Tables 1.a; 1.b).

Among the cultivars on ‘Myrobalan C5’ rootstocks, the most vigorously growing ‘Centenar’ variety (32.99 cm<sup>2</sup>), with those of ‘Carpatin’ variety was being the least vigorous (25.88 cm<sup>2</sup>). In the case of ‘Saint Julien’ rootstock, it is noted that the lowest mean value of TCSA recorded ‘Carpatin’ variety (20.12 cm<sup>2</sup>), followed very closely by the control – ‘Stanley’ variety (22.04 cm<sup>2</sup>) and the greatest vigour expressed by TCSA was recorded ‘Tita’ variety

(24.48 cm<sup>2</sup>). The trees grafted on ‘Myrobalan C5’ rootstock were found to grow by 13.15% - 18.68% (depending on the cultivar) less vigorously than those on ‘Saint Julien’ rootstock.

Table 1.a. The tree growth vigour expressed as trunk cross sectional area (TCSA) - Variation induced by the rootstock to the variety

No.	Cultivar	Rootstock	TCSA (cm <sup>2</sup> )			
			2012	2013	2014	Average
1	Carpatin	Myrobalan C5	9.99	23.08	44.56	25.88
		Saint Julien	6.28	17.27	36.80	20.12
		<b>Average</b>	<b>8.13</b>	<b>20.17</b>	<b>40.68</b>	<b>22.99<sup>b</sup></b>
2	Centenar	Myrobalan C5	17.47	32.43	49.07	32.99
		Saint Julien	8.31	22.82	36.37	22.50
		<b>Average</b>	<b>12.89</b>	<b>27.63</b>	<b>42.72</b>	<b>27.75<sup>a</sup></b>
3	Tita	Myrobalan C5	12.92	29.95	51.13	31.33
		Saint Julien	7.45	22.05	43.93	24.48
		<b>Average</b>	<b>10.19</b>	<b>26.00</b>	<b>47.53</b>	<b>27.91<sup>a</sup></b>
4	Stanley (Control)	Myrobalan C5	14.09	28.86	43.83	28.93
		Saint Julien	7.66	20.74	37.71	22.04
		<b>Average</b>	<b>10.88</b>	<b>24.80</b>	<b>40.77</b>	<b>25.48<sup>ab</sup></b>

Duncan's multiple range test ( $P \leq 0.05$ )

Table 1.b. The tree growth vigour expressed as trunk cross sectional area (TCSA) - Variation induced by the variety to the rootstock

No.	Rootstock	Cultivar	TCSA (cm <sup>2</sup> )			
			2012	2013	2014	Average
1	Saint Julien	Carpatin	6.28 <sup>b</sup>	17.27 <sup>b</sup>	36.80 <sup>b</sup>	20.12
		Centenar	8.31 <sup>ab</sup>	22.82 <sup>a</sup>	36.37 <sup>b</sup>	22.50
		Tita	7.45 <sup>ab</sup>	22.05 <sup>a</sup>	43.93 <sup>a</sup>	24.48
		Stanley (Control)	7.66 <sup>a</sup>	20.74 <sup>a</sup>	37.71 <sup>b</sup>	22.04
		<b>Average</b>				<b>22.28</b>
2	Myrobalan C5	Carpatin	9.99 <sup>c</sup>	23.08 <sup>b</sup>	44.56 <sup>b</sup>	25.88
		Centenar	17.47 <sup>a</sup>	32.43 <sup>a</sup>	49.07 <sup>ab</sup>	32.99
		Tita	12.92 <sup>b</sup>	29.95 <sup>a</sup>	51.13 <sup>a</sup>	31.33
		Stanley (Control)	14.09 <sup>b</sup>	28.86 <sup>a</sup>	43.83 <sup>b</sup>	28.93
		<b>Average</b>				<b>29.78</b>
<b>Average</b>			<b>10.52</b>	<b>24.65</b>	<b>42.92</b>	<b>26.03</b>
<b>Standard deviation</b>			<b>4.38</b>	<b>7.10</b>	<b>8.17</b>	<b>6.55</b>
<b>Variation coefficient (%)</b>			<b>41.60</b>	<b>28.80</b>	<b>19.00</b>	<b>25.20</b>

Duncan's multiple range test ( $P \leq 0.05$ )

### 3.2. Yielding capacity

The trees of the majority of the cultivars grafted on ‘Saint Julien’ rootstock came into bearing in the second year after planting, but production was very low, and those cultivars on ‘Myrobalan C5’ rootstock in the third year. Beginning with the fourth year after planting were recorded relatively good production in all combinations. In the third year after planting, in the both combinations, Romanian varieties had a small production due to low temperatures during blooming time. In 2014 (the fourth year after planting) all varieties studied except ‘Carpatin’ variety recorded very good productions.

Statistical analysis of data on production per hectare, using Duncan's multiple range test ( $P \leq 0.05$ ) show that between varieties were significant differences. On average (2012-2014), fruit yields on the 4 plum varieties grafted on 2 rootstocks had a value of 6.89 t/ha, maximum amplitude of variation was 37.37 t/ha, the highest average fruit yields recorded in ‘Tita/Saint Julien’ (37.37 t/ha in 2014 year) and the lower average values all the Romanian varieties grafted on Myrobalan C5 in 2012 year.

Regarding the fruit yield (t/ha), analyzing variation induced by variety to rootstock was found that the lowest average fruit yield was recorded in rootstock ‘Myrobalan C5’ (4.28 t/ha), and the highest average value was recorded for ‘Saint Julien’ rootstock (9.50 t/ha) (Tables 2.a and 2.b).

It is noted that the lowest mean value of fruit yield recorded at ‘Carpatin/Saint Julien’ (2.14 t/ha – mean on three years) and ‘Stanley/Myrobalan C5’ (3.85 t/ha – mean on three years). The greatest fruit yield was recorded in combination ‘Stanley/Saint Julien’ (15.98 t/ha), followed by combination ‘Tita/Saint Julien’ (11.22 t/ha).

In 2014 year, it is observed that the ‘Centenar’ and ‘Tita’ varieties grafted on ‘Saint Julien’ had higher production than the control variety - ‘Stanley’. Also, it is noted that all three Romanian varieties grafted on ‘Myrobalan C5’ had higher production than the control variety - ‘Stanley’.

However, on average on the three years of study, the best production had ‘Stanley’ variety (9.92 t/ha). From Romanian varieties noted ‘Tita’ cv. with 7.90 t/ha. The smallest yield was obtained from the ‘Carpatin’ variety (3.30 tons/hectare) (Table 2.a).

Table 2.a. Yielding capacity of plum cultivars grafted on two rootstocks - Variation induced by the rootstock to the variety

No.	Cultivar	Rootstock	Yield (t/ha)			
			2012	2013	2014	Average
1	Carpatin	Myrobalan C5	0.00	0.44	12.95	4.46
		Saint Julien	0.59	0.91	4.93	2.14
		<b>Average</b>	<b>0.30</b>	<b>0.67</b>	<b>8.94</b>	<b>3.30<sup>b</sup></b>
2	Centenar	Myrobalan C5	0.00	0.23	12.36	4.20
		Saint Julien	1.27	2.77	21.97	8.67
		<b>Average</b>	<b>0.64</b>	<b>1.50</b>	<b>17.16</b>	<b>6.43<sup>ab</sup></b>
3	Tita	Myrobalan C5	0.00	1.46	12.30	4.59
		Saint Julien	0.44	0.52	32.70	11.22
		<b>Average</b>	<b>0.22</b>	<b>0.99</b>	<b>22.50</b>	<b>7.90<sup>ab</sup></b>
4	Stanley (Control)	Myrobalan C5	1.71	4.72	5.13	3.85
		Saint Julien	9.49	21.42	17.03	15.98
		<b>Average</b>	<b>5.60</b>	<b>13.07</b>	<b>11.08</b>	<b>9.92<sup>a</sup></b>

Duncan's multiple range test (P ≤ 0.05)

Table 2.b. Yielding capacity of plum cultivars grafted on two rootstocks - Variation induced by the variety to the rootstock

No.	Rootstock	Cultivar	Yield (t/ha)			
			2012	2013	2014	Average
1	Saint Julien	Carpatin	0.59 <sup>b</sup>	0.91 <sup>b</sup>	4.93 <sup>c</sup>	2.14
		Centenar	1.27 <sup>b</sup>	2.77 <sup>b</sup>	21.97 <sup>b</sup>	8.67
		Tita	0.44 <sup>b</sup>	0.52 <sup>b</sup>	32.70 <sup>a</sup>	11.22
		Stanley (Control)	9.49 <sup>a</sup>	21.42 <sup>a</sup>	17.03 <sup>b</sup>	15.98
		<b>Average</b>				<b>9.50</b>
2	Myrobalan C5	Carpatin	0.00 <sup>b</sup>	0.44 <sup>c</sup>	12.95 <sup>a</sup>	4.46
		Centenar	0.00 <sup>b</sup>	0.23 <sup>c</sup>	12.36 <sup>a</sup>	4.20
		Tita	0.00 <sup>b</sup>	1.46 <sup>b</sup>	12.30 <sup>a</sup>	4.59
		Stanley (Control)	1.71 <sup>a</sup>	4.72 <sup>a</sup>	5.13 <sup>b</sup>	3.85
		<b>Average</b>				<b>4.28</b>

Duncan's multiple range test (P ≤ 0.05)

### 3.3. Productivity index

The productivity index, calculated like yield (kg/tree) per trunk section area (cm<sup>2</sup>) had an average value of 0.38 kg/cm<sup>2</sup> (in case of ‘Saint Julien’ rootstock), and 0.25 kg/cm<sup>2</sup> (in case of ‘Myrobalan C5’ rootstock), ranging between 0.10 kg/cm<sup>2</sup> at ‘Carpatin/Saint Julien’ combination and 0.65 kg/cm<sup>2</sup> at ‘Stanley/Saint Julien’ combination. From Romanian varieties the highest productivity index had ‘Tita/Saint Julien’ combination (0.41 kg/cm<sup>2</sup>). All Romanian varieties grafted on ‘Mirobolan C5’ had a productivity index higher than the control variety – ‘Stanley’, but in case of ‘Saint Julien’ rootstock, productivity index of Romanian varieties was lower than the control variety – ‘Stanley’ (Fig. 1).

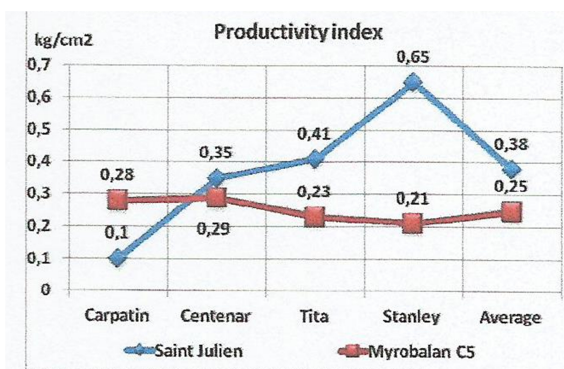


Figure 1. Productivity index of varieties studied (kg/cm<sup>2</sup>)



### 3.4. Fruit characteristics

#### Fruit weight

Regarding the fruit weight (g), analyzing variation induced by variety to rootstock was found that the lowest average fruit weight was recorded in rootstock ‘Myrobalan C5’ (45.44 g), and the highest average value was recorded for ‘Saint Julien’ rootstock (47.77 g), but the differences between varieties grafted on two rootstocks are very small.

It is noted that the lowest mean value of fruit weight recorded at ‘Centenar’ and ‘Stanley’ varieties grafted on both rootstock. The greatest fruits was recorded in combination ‘Tita/Saint Julien’ (55.45 g), followed by combination ‘Carpatin/Saint Julien’ (50.71 g). Statistical analysis of fruit weight, using Duncan’s multiple range test ( $P \leq 0.05$ ) show that between varieties were significant differences of fruit weight. Average fruit weight on the 4 plum varieties grafted on 2 rootstocks had a value of 46.61 g, maximum amplitude of variation is 23.40 g, the highest fruit was recorded in ‘Tita/Saint Julien’ (63.00 g) and the lower average values ‘Centenar/Saint Julien’ (39.60 g). The standard deviation was 5.91 g, and the coefficient of variation (standard deviation/mean, expressed as a percentage) was small to medium (Table 3).

Table 3. Fruit weight of plum cultivars grafted on two rootstocks

No.	Rootstock	Cultivar	Fruit weight (g)			Average
			2012	2013	2014	
1	Saint Julien	Carpatin	51.17 <sup>b</sup>	48.80 <sup>a</sup>	52.17 <sup>b</sup>	50.71
		Centenar	43.00 <sup>e</sup>	41.90 <sup>b</sup>	40.97 <sup>d</sup>	41.96
		Tita	53.43 <sup>a</sup>	50.50 <sup>a</sup>	62.43 <sup>a</sup>	55.45
		Stanley (Control)	42.53 <sup>c</sup>	42.83 <sup>b</sup>	43.53 <sup>c</sup>	42.96
		<b>Average</b>				<b>47.77</b>
2	Myrobalan C5	Carpatin	-	42.73 <sup>b</sup>	42.17 <sup>c</sup>	42.50
		Centenar	-	42.07 <sup>b</sup>	41.57 <sup>c</sup>	41.82
		Tita	-	51.07 <sup>a</sup>	56.60 <sup>a</sup>	53.84
		Stanley (Control)	-	43.50 <sup>b</sup>	43.67 <sup>b</sup>	43.59
		<b>Average</b>				<b>45.44</b>
<b>Average</b>					<b>46.61</b>	
<b>Standard deviation</b>					<b>5.91</b>	
<b>Variation coefficient (%)</b>					<b>12.68</b>	

Duncan's multiple range test ( $P \leq 0.05$ )

#### Firmness measurements

Average fruit firmness was 35.10 N/0.10 cm<sup>2</sup>, respectively 3.51 kgf/cm<sup>2</sup>, the lowest average recorded at variety ‘Centenar/Saint Julien’ (27.24 N/0.10 cm<sup>2</sup>) and the highest average was recorded at ‘Stanley/Saint Julien’ (50.42 N/0.10 cm<sup>2</sup>) (Table 4). The differences between the four varieties grafted on two rootstocks regarding flesh firmness were very small and insured statically.

Table 4. Firmness measurements of plum cultivars grafted on two rootstocks

No.	Rootstock	Cultivar	Firmness (N/0.10 cm <sup>2</sup> or kgf/cm <sup>2</sup> )			Average
			2012	2013	2014	
1	Saint Julien	Carpatin	25.70 <sup>b</sup>	22.87 <sup>e</sup>	45.80 <sup>b</sup>	31.46
		Centenar	22.47 <sup>e</sup>	20.27 <sup>e</sup>	38.97 <sup>b</sup>	27.24
		Tita	26.17 <sup>b</sup>	26.70 <sup>b</sup>	36.87 <sup>b</sup>	29.91
		Stanley (Control)	44.03 <sup>a</sup>	43.83 <sup>a</sup>	63.40 <sup>a</sup>	50.42
		<b>Average</b>				<b>34.76</b>
2	Myrobalan C5	Carpatin	-	19.53 <sup>b</sup>	42.43 <sup>b</sup>	30.98
		Centenar	-	19.80 <sup>b</sup>	47.30 <sup>b</sup>	33.55
		Tita	-	20.63 <sup>b</sup>	33.93 <sup>e</sup>	27.28
		Stanley (Control)	-	42.40 <sup>a</sup>	57.47 <sup>a</sup>	49.94
		<b>Average</b>				<b>35.44</b>
<b>Average</b>					<b>35.10</b>	
<b>Standard deviation</b>					<b>13.09</b>	
<b>Variation coefficient (%)</b>					<b>37.30</b>	

Duncan's multiple range test ( $P \leq 0.05$ )

### Fruit soluble solids content

After processing regarding soluble solids content, it was found that there are differences between varieties, but statistically uninsured. Thus, the average soluble solids content was 16.56%, the highest soluble solids content in fruit variety had ‘Carpatin/Saint Julien’ (19.10%) and lowest in variety ‘Stanley/Saint Julien’ (14.82%). It should be noted that all Romanian varieties had more than 16% soluble solids, and of these, ‘Carpatin’ variety had the highest dry matter content (Table 5).

Table 5. Fruit soluble solids content of plum cultivars grafted on two rootstocks

No.	Rootstock	Cultivar	Fruit soluble solids (%)			
			2012	2013	2014	Average
1	Saint Julien	Carpatin	19.90 <sup>a</sup>	19.17 <sup>a</sup>	18.23 <sup>a</sup>	19.10
		Centenar	17.10 <sup>b</sup>	17.83 <sup>a</sup>	16.03 <sup>b</sup>	16.99
		Tita	16.90 <sup>b</sup>	16.07 <sup>b</sup>	16.23 <sup>b</sup>	16.40
		Stanley (Control)	14.40 <sup>c</sup>	14.90 <sup>b</sup>	15.17 <sup>b</sup>	14.82
		<b>Average</b>				<b>16.83</b>
2	Myrobalan C5	Carpatin	-	15.83 <sup>b</sup>	18.00 <sup>a</sup>	16.92
		Centenar	-	17.57 <sup>a</sup>	15.80 <sup>b</sup>	16.69
		Tita	-	16.50 <sup>b</sup>	16.40 <sup>b</sup>	16.45
		Stanley (Control)	-	14.83 <sup>c</sup>	15.37 <sup>b</sup>	15.10
		<b>Average</b>				<b>16.29</b>
<b>Average</b>						<b>16.56</b>
<b>Standard deviation</b>						<b>1.59</b>
<b>Variation coefficient (%)</b>						<b>9.60</b>

Duncan's multiple range test ( $P \leq 0.05$ )

## 4. Conclusions

The trees of the majority cultivars grafted on ‘Saint Julien’ rootstock came into bearing in the second year after planting, but production was very low, and those cultivars on ‘Myrobalan C5’ rootstock in the third year. Beginning with the fourth year after planting were recorded relatively good production in all combinations.

The vigour of all cultivars grafted on ‘Saint Julien’ rootstock was weaker than those grafted on ‘MyrobalanC5’.

Regarding the fruit weight (g), was found that the lowest average fruit weight was recorded in rootstock ‘Myrobalan C5’ and the highest average value was recorded for ‘Saint Julien’ rootstock, but the differences between varieties grafted on two rootstocks are very small and insured statistically.

Regarding fruits firmness and soluble solids content, the differences between the four varieties grafted on two rootstocks were very small and insured statistically.

## References

- Blažek, J., Pištěková, I., 2009. Preliminary evaluation results of new plum cultivars in a dense planting. Hort. Sci. (Prague), 36, 2009 (2): 45–54.
- Blažek, J., Pištěková, I., 2012. Initial results from the evaluation of plum cultivars grown in a very dense planting. Acta Horticulturae 968 - Proceedings of the II<sup>nd</sup> Eufrin Plum and Prune Working Group Meeting, Craiova, Romania, p. 99-108.
- Boyan, G.E., Norton, J.D. and Pitts, J.A., 1995. Establishment, growth and foliar nutrient content of plum trees on various rootstocks. Hort Sci. 117: 377–379.
- Butac, M., Chitu E., Sumedrea D., Militaru, M., 2014. Evaluation of some plum cultivars in a high density system. Fruit Growing Research, vol. XXX, Pitesti, Romania.
- Kaufmane, E., Rubauskis, E., Skrivele, M., 2007. Influence of different rootstocks on the growth and yield of plum cultivars. Acta Horticulturae 734. Proc. VIII<sup>th</sup> IS on Plum and Prune, Norway, p. 387–391.