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GROWTH AND YIELDING OF THE SEVERAL APRICOT CULTIVARS ON THE 'SOMO' SEEDLING AND VEGETATIVE ROOTSTOCK PUMISELECT®

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Abstract. Since many years the usefulness of different rootstocks has been estimated because of the cropping level, the growth, the physiological incompatibility between scion and rootstock and the mortality of the apricot trees. The Myrobalan, apricot seedlings, 'Wangenheim Prune' plum tree cv. and other rootstocks were evaluated in the earlier investigations. The study on the Lower Silesia area was conducted at the Fruit Experimental Station of the University of Environmental and Life Sciences of Wrocław, in 2006–2011. One year old apricot trees grafted on the Pumiselect® vegetative rootstock were planted in spring of 2006, at a spacing 4.0 × 3.2 m (780 trees per 1 ha), in 4 replications with 3 of 'Bergeron' or 4 of 'Harcot' and 'Hargrand' trees per plot. At the same time the apricot collection was established. Trees of the 9 cultivars were planted at a spacing 4.0 × 4.0 m (625 trees per 1 ha). During the disadvantage weather conditions at the first four years of cropping the significant highest total yield over 40 kg per tree was recorded with 'Harcot' on the Pumiselect® rootstock. The other cultivars did not exceed 30 kg of fruit but all trees characterized the weakest growth in this rootstock. The previous investigation did not clear confirm the usefulness of Pumiselect® as a vegetative apricot rootstock for 'Hargrand' cv. because of the precocious trees decline and too low fruits in case of 'Bergeron' tree. The apricot trees on 'Somo' seedling growth stronger. Taking into account the yield, fruit quality and also the tree health status 'Harcot', 'Heja', 'Karola' and 'Leskora', 'Łańcut' cvs. were recognized as a suitable for commercial orchards on the Lower Silesia area.

Key words: *Prunus armeniaca*, *Prunus pumila*, rootstock, growth, cropping

INTRODUCTION

Myrobalan seedling for the long time was often used as a rootstock for apricot tree in Poland. However, since many years the usefulness of this rootstock has been contested and discussed because of the physiological incompatibility between scion and

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rootstock and the mortality of the trees [Grzyb et al. 1996, Sosna and Licznar-Małańczuk 2012]. In recent years the selective evaluations of the apricot cultivars have been conducted on the Myrobalan seedling yet [Chełpiński et al. 2005, Laskowski 2007] but the *Prunus armeniaca* L. seedlings and also other rootstocks were more often used [Licznar-Małańczuk and Sosna 2005a, 2005b, 2006, 2009, Sitarek and Jakubowski 2006, Sitarek and Bartosiewicz 2011, Szklarz et al. 2011, Sosna and Licznar-Małańczuk 2012].

Sitarek and Bartosiewicz [2011] reported no significant differences of the trunk cross sectional area and the cumulative yield from the trees grafted on the apricot seedling genotype M46 and on the standard Myrobalan rootstock. Performance of 'Sundrop' cv. on 23 rootstocks led to categorize the *Prunus armeniaca* L. 'Zailisky' into the most promising intermediate-sized group of the rootstocks [Knowles et al. 1994]. Apricot trees on the wild *Prunus armeniaca* L. seedlings were the largest in size in the comparison to the trees on the prune *Prunus domestica* L. and the bullace plum *Prunus insititia* L. rootstocks, which obtained the smaller crown volume by 10–15% and 30–50%, respectively [Szalay and Molnár 2004]. In experiment of Son and Küden [2003] apricot seedling rootstocks induced vigorous growth of trees whereas grafted on Myrobalan GF-31 grew more slowly and gave lower yield. The other investigations showed a good compatibility of the *Prunus armeniaca* L. seedlings with the many apricot cultivars and the tree health status was moderate better or the best [Knowles et al. 1994, Szalay and Molnár 2004]. The mortality of trees was lower in relation to apricot grafted on 'Wangenheim Prune' seedling [Grzyb et al. 1996], however as reported Licznar-Małańczuk and Sosna [2005b] was also influenced by the cultivar. The important advantages of the *Prunus armeniaca* L seedlings were also height grafting success in nursery production and a good quality of the maidens than on the other rootstocks [Nasir et al. 2001, Sitarek and Jakubowski 2006]. The observation of the drought tolerance of the wild apricot seedlings showed significant less water requires than in case of the *Prunus domestica* L. and the P*runus insititia* L. rootstocks [Szalay and Molnár 2004].

Despite of the all advantages of the *Prunus armeniaca* L seedlings, usefulness of this rootstocks resulted in the comparatively smaller growth reduction of apricot trees for the intensive orchards and it involves a necessity of the other rootstocks examination. In Polish climate conditions the evaluation of the *Prunus domestica* L. 'Wangenheim Prune' as a rootstock for the apricot showed appropriate dwarfing of the apricot trees but the number of the dead trees could not be acceptable [Grzyb et al. 1996, Sitarek and Bartosiewicz 2011, Sosna and Licznar-Małańczuk 2012]. Some other investigations were undertaken for evaluation of the *Prunus domestica* L. 'Erunosid' cv. [Sitarek and Jakubowski 2006, Sitarek and Bartosiewicz 2011] and *Prunus pumila* L. (Pumiselect®) [Licznar-Małańczuk and Sosna 2006, 2009] as the rootstock for apricot.

Pumiselect® was easy to propagate by hardwood cuttings [Gudarowska and Licznar-Małańczuk 2006, Nečas et al. 2008, Gudarowska and Szewczuk 2009]. Jacob [1992] showed that the *Prunus pumila* L. rootstock characterized proper dwarfness of the peach and nectarine trees, better yield capacity and also a good anchorage but in very dry vegetation periods the fruit size was reduced by 10–15%. Hudina et al. [2006] reported that the trunk cross sectional area of the peach tree grafted on that rootstock and 'GF 655/2' was significantly lower than on the other rootstocks. This result was similar to

obtained by Szewczuk and Gudarowska [2009]. Peach yield per tree and also per hectare at the density of 1250 peach ha^{-1} was too low up to 6 years after planting and the *Prunus pumila* L. rootstock also affected the small fruit size and the high mortality − 50% of the peach trees [Hudina et al. 2006]. In case of the apricot trees the growth reduction on the Pumiselect® rootstock was observed by Wurm [2007]. However he could not recommend that rootstock because nearly 60% of apricot trees died throughout the 8 year after planting. The first experiment with the *Prunus pumila* L. conducted by Licznar-Małańczuk and Sosna [2006] on the Lower Silesia showed that one year old apricot trees grew much stronger in comparison to the *Prunus armeniaca* L. seedlings. The trees started cropping in the third year after planting and the significantly highest crop per tree and largest fruit were recorded with 'Hargrand' [Licznar-Małańczuk and Sosna 2009].

The aim of this study was the evaluation of several apricot cultivars on the *Prumus armeniaca* L. 'Somo' seedling and the estimation of the 'Bergeron', 'Harcot' and 'Hargrand' cvs. − the most suitable cultivars under the Lower Silesia climatic conditions [Licznar-Małańczuk and Sosna 2005a, 2005b] on the Pumiselect® rootstock.

MATERIAL AND METHODS

The experiment was established at the Fruit Experimental Station of the University of Environmental and Life Sciences of Wrocław, in Samotwór (51º06'12"N, 16º49'52"E). The usefulness possibility of the *Prunus pumila* L. (Pumiselect®) rootstock was evaluated for apricot tree cultivation. One year old trees of 'Harcot', 'Hargrand' and 'Bergeron' cultivars grafted on Pumiselect® vegetative propagated rootstock, were planted in spring 2006 on the Luvisols soil from the sandy loam at a spacing of 4.0 × 3.2 m (780 trees per 1 ha). The experiment was established in a randomized block design in four replications with 3 ('Bergeron') or 4 ('Harcot', 'Hargrand') trees per plot. In the same period of time a collection of nine apricot cultivars grafted on the *Prunus armenica* L. 'Somo' seedlings was also evaluated. There were three to eight trees of each cultivar in the collection. Apricot trees were planted in a spacing of 4 × 4 m (625 trees per 1ha). The cultivar evaluation included: 'Goldrich', 'Harcot', 'Heja', 'Karola' 'Legolda', 'Leskora', Łańcut', 'Veecot' and 'Velkopavlovicka LE 12/2'. All of the trees were trained in the form of an almost natural canopy. Herbicide fallow was maintained in tree rows, with grassy strips between them. Plant protection was carried out in accordance to the current recommendations of the Orchard Protection Program.

In 2006–2011, there were estimated the following parameters: tree growth, full blooming phenology and blooming intensity, harvest time, yield, fruit weight and health status with tree survival, separately for each tree which did not die till to the end of the estimation. Blooming intensity was noted visually in 0−5 scale (0 − tree without flowers; 5 − very abundant flowering tree). The fruit size was estimated as mean weight of 25 fruits per tree. Lack or too little yield did not allow to evaluate fruit size in 2008 and 2011. Trunk cross sectional area (TCSA) was calculated based on a diameter (2006) and a circumference (2011) recorded 30 cm above the soil level. The tree height (h) and the crown width towards north-south (a) and east-west (b) directions were measured in

autumn 2010. The tree crown volume (V) was counted on the base of a cuboid volume, using the formula:

$$V = a \times b \times h$$

The number of died trees was noted every year. The visually health status observations were conducted during the following vegetation periods. The results of the tree bark or wood diseases and peach scab on the fruit susceptibility was showed in 5 point scale: very small, small, medium, big and very big sensitivity.

The results of the experiment with apricot tree on the Pumiselect® rootstock were evaluated statistically, using the analysis of variance. Significant differences of the means were calculated according to the Duncan's test at the confidence level 95%.

RESULTS AND DISCUSSION

The risk connected with the apricot cultivation in the middle-east Europe is a result of the weather conditions in winter and early spring season [Szabó et. al. 1995, Vachůn 2001, Licznar-Małańczuk and Sosna 2005a, Drén et al. 2006]. It was also confirmed by the experiment conducted on the vicinity of Wrocław (tab. 1 and 2). In the first four years of cropping, despite of the used rootstock apricot trees yielded well the only ones.

Table 1. The minimum and the maximum temperatures during the January − April period at the Research Station in Samotwór, in the years 2008−2011 (°C)

Year	Month	Teperature					
		minimum			maximum		
		decade					
		I	II	III	I	II	III
2008	January	-11.0	-3.0	-3.0	8.0	13.0	10.0
	February	-4.5	-8.0	-3.0	11.0	10.0	19.0
	March	-3.5	-3.0	-7.0	15.5	17.0	16.0
	April	-2.0	-0.5	0.0	20.0	20.0	22.5
	May	2.0	1.5	5.0	25.0	29.0	30.0
2009	January	-23.0	-18.0	-4.0	5.0	8.0	10.0
	February	-5.0	-11.0	-11.0	13.0	5.0	9.0
	March	0.0	-1.0	-4.0	15.0	12.0	15.0
	April	-3.0	-0.5	-0.5	27.0	24.0	26.0
	May	0.0	0.0	5.0	28.0	29.0	33.0
2010	January	-16.0	-7.0	-26.0	-1.0	5.0	7.0
	February	-20.0	-16.0	-9.0	6.0	13.0	12.0
	March	-17.0	-6.0	-1.0	12.0	19.0	23.0
	April	-2.0	-1.0	-4.0	19.0	22.0	26.0
	May	6.0	6.0	4.0	30.0	23.0	25.0
2011	January	-11.0	-3.0	-15.0	6.0	12.0	6.0
	February	-12.0	-9.0	-20.0	11.0	9.0	8.0
	March	-9.0	-3.0	-4.0	14.0	22.0	23.0
	April	-1.0	-0.5	2.0	24.0	23.0	26.0
	May	-2.0	3.0	7.0	24.0	31.0	31.0

Table 2. The yielding and crop coefficient index of the several apricot tree cultivars, in the years 2008−2011 (kg·tree^{-1})

	Cultivar	Year				Total 2008−2011	Crop efficiency coefficient (CEC) (kg cm^{-2})
		2008	2009	2010	2011		
Experiment on the Pumiselect® rootstock*	'Harcot'	0.1 a	34.4 b	9.0 b	0.0 a	43.5 b	0.41 a
	'Hargrand'	1.0 b	25.6 ab	0.5 a	0.0 a	27.1 a	0.35 a
	'Bergeron'	0.2 a	18.5 a	10.6 b	0.1 a	29.3 a	0.37 a
Collection on the 'Somo' seedling**	'Goldrich'	0.2	31.1	2.1	0.5	33.9	0.37
	'Harcot'	0.1	16.2	4.8	0.1	21.2	0.26
	'Heja'	0.9	25.7	3.2	0.0	29.8	0.36
	'Karola'	0.0	7.0	9.3	1.1	17.4	0.20
	'Legolda'	0.1	14.3	0.7	0.0	15.1	0.15
	'Leskora'	0.1	30.6	5.5	1.1	37.3	0.34
	'Łańcut'	0.2	19.0	16.0	0.0	35.2	0.23
	'Veecot'	0.4	24.8	5.6	0.0	30.8	0.36
	'Velkopavlovicka LE 12/2'	0.0	3.8	0.5	0.0	4.3	0.07

* Means within columns marked with varied letters differ significantly according to the Duncan's test at the confidence level 95%
**Without statistic calculations

Table 3. The full bloom period and the blooming intensity of the several apricot tree cultivars. in the years 2008−2011

	Cultivar	Full bloom period		Blooming intensity (0−5 scale)			
				year			
		the earliest	the latest	2008	2009	2010	2011
Experiment on the Pumiselect® rootstock*	'Harcot'	31.03−17.04	15−27.04	4.0 b	4.6 b	3.1 b	3.1 b
	'Hargrand'	2−16.04	16−26.04	3.8 b	3.4 a	1.1 a	3.9 c
	'Bergeron'	2−13.04	19−27.04	2.6 a	3.2 a	2.7 b	2.7 a
Collection on the 'Somo' seedling**	'Goldrich'	2−16.04	19−26.04	4.0	4.0	2.5	3.0
	'Harcot'	31.03−14.04	15−27.04	3.7	3.6	2.5	2.6
	'Heja'	31.03−14.04	14−23.04	3.5	3.8	2.0	4.0
	'Karola'	1−10.04	13−21.04	3.5	2.5	3.5	2.5
	'Legolda'	5−14.04	19−26.04	3.5	3.0	1.3	2.5
	'Leskora'	2−16.04	19−28.04	4.2	4.2	2.8	3.3
	'Łańcut'	2−12.04	14−22.04	3.5	3.8	3.5	3.5
	'Veecot'	31.03−12.04	14−26.04	4.5	4.0	3.3	4.0
	'Velkopavlovicka LE 12/2'	4−15.04	19−27.04	2.5	2.5	1.0	2.5

Explanation see Table 2

Similar to the Hungarian experiment of Szabó et. al. [1995] too high temperatures on January or February in 2008 and 2010 decreased the buds frost resistance on the Lower Silesia area. It conducted to the flower bud injures during the secondary decrease of the temperature. This phenomenon was very clear observed in the third year of the cropping (2010) during the low temperature period in March when the minimum temperature dropped drastically to minus 17°C. In case of many cultivars it affected the lowest blooming intensity in comparison to the other years (tab. 3). The only 'Harcot' on the Pumiselect® rootstock and the separate cultivars on 'Somo' seedling ('Karola', 'Łańcut' and 'Veecot') had the blooming intensity about 3.0. Next year the blooming was better and varied from 2.5 to 4.0 but especially low yield or even a lack of crop were noted. The part of buds were injured by the winter frost but also in this year the fruitlets were damaged by the spring frost at the first days of May. The only three cultivars grafted on 'Somo' seedling: 'Karola', 'Leskora' and furthermore 'Goldrich' issued a little bit more resistant of the fruit sets in comparison to other ones. Similar results with 'Leskora' was noted by Vachůn [2001].

Table 4. The mean fruit weigh of the several apricot tree cultivars. in the years 2009−2010 (g)

	Cultivar	Year		Mean 2009−2010
		2009	2010	
Experiment on the Pumiselect® rootstock*	'Harcot'	53 b	51 b	52 b
	'Hargrand'	40 a	70 c	51 b
	'Bergeron'	43 a	36 a	40 a
Collection on the 'Somo' seedling**	'Goldrich'	71	65	68
	'Harcot'	56	55	56
	'Heja'	41	51	46
	'Karola'	48	38	43
	'Legolda'	46	39	43
	'Leskora'	47	65	56
	'Łańcut'	36	41	39
	'Veecot'	41	49	45
	'Velkopavlovicka LE 12/2'	61	43	52

Explanation see Table 2

Alburquerque et al. [2004] observed that flower production, flower quality, ovule development and fruit sets level on the apricot trees seemed to be more influenced by genetic component of cultivar than subsequent years weather variability. It was also showed on the Lower Silesia, in 2008–2011, under the disadvantage conditions for apricot trees. The total yield of 'Harcot' cv. on the Pumiselect® rootstock exceeded 40 kg per tree. It was significant higher in relation to 'Hargrand' and 'Bergeron' cvs which produced the yield 27 and 29 kg, respectively. Among the cultivars grafted on the 'Somo' seedling: 'Goldrich', 'Heja', 'Leskora' 'Łańcut' and 'Veecot' were recognized as the best yielded − about or over 30 kg per tree. These cultivars had also the highest

crop efficient coefficient. It was similar or even higher in case of the Pumiselect® used, especially 'Harcot' cv. (0.41 kg·per tree). Medium level of total yield and also less crop efficient coefficient was recognized for 'Harcot' and 'Karola' on the 'Somo" seedling in comparison to best cropped cultivars.

Mean fruit weight of the 'Harcot' and 'Hargrand' cv. on Pumiselect® rootstock was significant higher in comparison to 'Bergeron' (tab. 4). The best fruit quality of 'Hargrand' cv. on the different rootstocks was confirmed by the other experiment [López and Brunton 2000, Jakubowski 2006, Sosna and Licznar-Małańczuk 2012]. Apricot fruit of 'Bergeron' cv. obtained the only 40 g mean weigh. The small fruit of the 'Bergeron' cv. on the same rootstock was confirmed by Wurm [2007] who noted 34–47 g. of weight between fourth and sixth year of cropping, whereas in the Lower Silesia it varied from 36 to 43 g (the second and the third year of yielding). Mean fruit weight of the 'Harcot' cv. on 'Somo' seedling was higher (56 g) and it was a result of lower cropping level in relation to the Pumiselect® rootstock. The highest mean fruit weight on the 'Somo' seedling was noted for 'Goldrich' apricot (68 g) what confirmed earlier research data obtained by Jakubowski [2006]. The opposite result showed 'Łańcut' cv. (39 g) and it is in agreement with the evaluation study on the Myrobalan by Laskowski [2007].

Table 5. The growth and mortality of the several apricot tree cultivars. in the years 2006−2011

	Cultivar	Trunk cross-sectional area (cm^2)			Height of tree 2010 (m)	Canopy volume 2010 (m^3)	Number of planted and dead trees up to the end of 2011
		spring 2006	autumn 2011	increase 2006–2011			
Experiment on the Pumiselect® rootstock*	'Harcot'	1.74 b	106.14 b	104.40 b	3.0 b	25.5 b	16 (6)
	'Hargrand'	0.88 a	75.34 a	74.46 a	2.4 a	14.2 a	16 (8)
	'Bergeron'	1.13 ab	82.30 a	81.17 a	2.8 ab	21.1 b	12 (3)
Collection on the 'Somo' seedling**	'Goldrich'	2.19	90.42	88.23	3.4	31.6	4 (3)
	'Harcot'	1.36	82.13	80.77	3.3	36.6	8 (1)
	'Heja'	1.10	83.86	82.76	3.3	49.7	5 (3)
	'Karola'	1.04	86.70	85.66	3.2	29.2	3 (2)
	'Legolda'	0.84	105.61	104.77	3.6	42.5	6 (4)
	'Leskora'	1.21	109.89	108.68	3.3	41.7	5 (2)
	'Łańcut'	0.90	85.54	84.64	3.2	41.4	5 (3)
	'Veecot'	0.93	86.86	85.94	3.0	28.1	3 (1)
	'Velkopavlovicka LE 12/2'	1.89	57.18	55.29	2.5	16.7	3 (2)

Explanation see Tabele 2

Similar to the investigation of Wurm [2007] the estimated cultivars on the Pumiselect® rootstock characterized the weakest growth (tab. 5). The height of trees up to the end of 2010 was lower then 3 m and the canopy volume varied between 14.2 and 25.5 m^3. However 'Harcot' cv. proved to be the most vigorous cultivar, what was also confirmed by the significant higher increase of the trunk cross sectional area. The cultivars on the

'Somo' seedling growth stronger. The canopy volume of 'Harcot', 'Heja', 'Legolda', 'Leskora' and 'Łańcut' cvs exceed 35 m^3 and trees of many cultivars were higher than grafted on Pumiselect® rootstock. The used 'Somo' cv. as a rootstock confirmed a stronger growth of the apricot trees on the *Prunus armeniaca* L. seedlings [Son and Küden 2003, Szalay and Molnár 2004, Sitarek and Bartosiewicz 2011, Szklarz et al. 2011].

Table 6. The fruit harvest time and the health status of the several apricot tree cultivars. in the years 2008−2011

	Cultivar	Fruit harvest time		Peach scab fruit susceptibility	Tree bark and wood diseases susceptibility
		the earliest	the latest		
The very early and early cultivar	'Karola'	1.07	17.07	small	small
	'Leskora'	1.07	14–17.07	small	medium
	'Goldrich'	6.07	14–24.07	small	big
	'Harcot'	7.07	14–31.07	very small	medium
	'Heja'	7.07	24–31.07	small	small
The medium cultivar	'Łańcut'	14.07	24–31.07	small	medium
	'Veecot'	20.07	24–31.07	big	medium
	'Velkopavlovicka LE 12/2'	23.07	24–31.07	small	medium
The late cultivar	'Hargrand'	21.07	6–13.08	small	medium
	'Bergeron'	22.07	4–6.08	big	medium
	'Legolda'	27.07	4–6.08	small	big

The precocious decline of apricot trees under the Lower Silesia condition was very high. Up to the end of the sixth years after planting the highest percent of dead trees on Pumiselect® rootstock was observed with 'Hargrand' – 50%, the lowest one with 'Bergeron' – 25%, which agrees with previous experiment on the *Prunus armeniaca* L. rootstock reported by Vachůn [2002]. The differential precocious decline of apricot trees was recognized on the 'Somo' seedling. Based on the tree bark and wood diseases and peach scab fruit susceptibility as the best the only 'Karola' and Heja' cvs were recognized (tab. 6). The health status of 'Veecot' and 'Bergeron' fruits were very low, the opposite result was noted with 'Harcot'.

CONCLUSIONS

1. Yield of the apricot trees was primarily determined by weather conditions but also influenced by genetic component of cultivar affected the winter and spring frost sensibility of the buds, flower and fruit sets.

2. Taking into account the yield, fruit quality and also tree health status 'Harcot', 'Heja', 'Karola', 'Leskora' and 'Łańcut' − cvs. on 'Somo' seedling were recognized as a suitable for apricot commercial orchards.

3. The preliminary results showed the usefulness of Pumiselect® as a dwarf vegetative rootstock only for the 'Harcot' cv., further intensive searching should be undertaken to estimate impact of this rootstock on fruit weigh increment of the 'Bergeron' cv. and elimination of the precocious decline of the 'Hargrand' trees.

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WZROST I PLONOWANIE KILKUNASTU ODMIAN MORELI NA SIEWCE 'SOMO' I PODKŁADCE WEGETATYWNEJ PUMISELECT®

Streszczenie. Od wielu lat jest prowadzona ocena przydatności różnych podkładek dla moreli pod względem siły wzrostu drzew, poziomu owocowania, zgodności fizjologicznej z podkładką oraz ich zamierania. W wcześniejszych eksperymentach badano ałyczę, siewki moreli, odmianę śliwy Węgierka Wangenheima i inne. Doświadczenie na Dolnym Śląsku prowadzono na terenie Stacji Badawczo-Dydaktycznej UP w latach 2006–2011. Jednoroczne drzewka moreli na wegetatywnej karłowej podkładce Pumiselect® wysadzono wiosną 2006 r. w rozstawie 4,0 × 3,2 m (780 drzew na 1 ha), w czterech powtórzeniach. Na każdym poletku oceniano 4 morele odmian 'Harcot' lub 'Hargrand', a w przypadku odmiany 'Bergeron' tylko 3 drzewa. W tym samym czasie wysadzono kolekcję 9 odmian moreli na siewce odmiany 'Somo', w rozstawie 4,0 × 4,0 m (625 drzew na 1 ha).

Podczas niekorzystnych warunków pogodowych w okresie pierwszych czterech lat owocowania moreli istotnie większy plon z drzewa – ponad 40 kg – uzyskano dla odmiany 'Harcot' na podkładce Pumiselect®. Plon pozostałych odmian nie przekroczył 30 kg. Wszystkie drzewa charakteryzowały się słabym wzrostem. Wstępna ocena podkładki Pumiselect® dla moreli nie potwierdziła możliwości jej zastosowania dla odmiany 'Hargrand' ze względu na dużą śmiertelność drzew oraz drobnienie owoców w przypadku drzew 'Bergeron'. Drzewa moreli na siewce 'Somo' rosły silniej. Ze względu na plonowanie drzew, jakość owoców i zdrowotność moreli za najbardziej przydatne do nasadzeń towarowych na terenie Dolnego Śląska uznano odmiany: 'Heja', 'Harcot', 'Karola', 'Leskora' i 'Łańcut'.

Słowa kluczowe: *Prunus armeniaca*, *Prunus pumila*, podkładka, siła wzrostu, owocowanie

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