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COMPARISON OF THE GROWTH OF SELECTED SEEDLINGS OF ROOTSTOCKS FOR PEACH AND PLUM

Summary. The experiment was conducted in the years 2006-2008. In a nursery production the growth of seedlings of four rootstocks for peach trees: 'Minnesota', 'Hui-Hun-Tao', 'Syberian C', 'Rakoniewicka' and the growth of three seedlings for plum trees: *Prunus tomentosa*, 'Wagenheim Prune' and *Prunus cerasifera* was compared. A strong vigour of growth was observed for the rootstocks: 'Rakoniewicka', 'Hui-Hun-Tao' and *Prunus cerasifera*. The vigour of growth obtained for the rest of the considered rootstocks was not so high. All seedlings were well-rooted with the exception of 'Syberian C' and *Prunus cerasifera*. The seedlings of 'Syberian C' had a worse compatibility with the norm in comparison with the rest of the rootstocks taken into account.

Key words: seedlings of rootstocks, peach, plum, growth

Introduction

In the nursery production there is still a search going on for rootstocks that propagate easily and that give seedlings of good quality. At the same time it is important that they weaken the vigour of growth of fruit trees. Such a condition is not fulfilled by so far known rootstocks for peach and plum trees. 'Rakoniewicka' seedling and 'Hui-Hun--Tao' rootstocks used in peach production grow very strongly. Also, *Prunus cerasifera*, commonly used in plum production, makes the trees grow too fast. Of course, such rootstocks as 'Syberian C' and 'Wagenheim Prune' are known, however, they also have their disadvantages.

To compare the vigour of growth of the above mentioned rootstocks with less known ones: 'Minnesota' seedling and *Prunus tomentosa* the experiment was conducted.

Material and methods

The studies were carried out in the Experimental Station in Baranowo, in the years 2006-2008. The experiment was set up in random blocks design, in four replications, with 100 seedlings (there were 400 seedlings in each combination). The seeds of seedlings were sown in 40 × 2 cm spacing. 'Minnesota' seedling was compared with 'Rakoniewicka' seedling, 'Hui-Hun-Tao' (*Prunus kansuensis* Rehd.), 'Syberian C' and *Prunus tomentosa* (Thunb.) was compared with *Prunus cerasifera* (Ehrh.) and 'Wagenheim Prune'. The rootstocks were not irrigated, except for the year 2008 when the nursery was irrigated twice, because of a drought. Agro-technical practices followed commercial nursery guidelines. Chemical pest and disease control was carried out in accordance with the current recommendations of the Orchard Protection Programme. During the cultivation of rootstocks no herbicides were used.

Measurements of height (cm) and diameter (mm) of root collar and observation of number of roots were conducted in autumn 2006-2008. The compatibility of these parameters with the norm was also checked.

The statistical analysis of the obtained data was carried out with the application of one-factor variance analysis, separately for each kind of rootstocks (plum and peach), using Duncan's test, with probability level $\alpha = 0.05$.

Results and discussion

Among the studied rootstocks for peach trees the highest were those of 'Rakoniewicka' and 'Hui-Hun-Tao' seedlings. The lowest one-year-old plants were obtained for 'Syberian C' seedling. A medium height was observed for the rootstock of 'Minnessota' seedling (Table 1).

No significant difference in the diameter of root collar was found for all peach rootstocks (Table 1).

The root system of rootstocks for peach trees was differentiated. Stronger growing rootstocks: 'Rakoniewicka' and 'Hui-Hun-Tao' had the biggest number of roots.

Table 1. The growth of four seedlings rootstocks for peach (average from 2006-2008)
Tabela 1. Wzrost czterech siewek podkładek dla brzoskwini (średnia z lat 2006-2008)

Rootstock	Height (cm)	Diameter of root collar (mm)	Number of roots	Compatible with norm (%)
'Rakoniewicka'	94.8 c	8.6 a	8.0 b	99.1 b
'Hui-Hun-Tao'	93.0 c	8.5 a	9.1 b	99.8 b
'Syberian C'	74.2 a	8.4 a	5.9 a	85.5 a
'Minnesota'	83.1 b	8.1 a	7.2 ab	99.3 b

The means followed by the same letters in columns do not differ at $\alpha = 0.05$.

The least roots were calculated for rootstock of 'Syberian C' seedling. 'Minnesota' seedling had a medium number of roots (Table 1).

Analysing the results of growth parameters it can be concluded that 'Minnesota' seedling grows weaker than 'Rakoniewicka' and 'Hui-Hun-Tao' seedlings but stronger than 'Syberian C'.

The results of the three above mentioned parameters of seedling growth influenced their compatibility with the norm. A stronger growing rootstocks: 'Rakoniewicka', 'Minnesota' and 'Hui-Hun-Tao' seedlings met the requirements of the norm in a higher percentage than 'Syberian C' rootstock (Table 1). The compatibility of the rootstocks for peach trees with the norm confirms that 'Minnesota' seedling, like 'Rakoniewicka' and 'Hui-Hun-Tao' seedlings, is characterised by a high efficiency in a nursery.

The results obtained in the present experiment for the rootstocks for peach trees confirmed earlier opinions of other authors (YADAVA and DOUD 1978, HOŁUBOWICZ 1999, JAKUBOWSKI 2002, RADAJEWSKA 2005, WILCZAK 2006). First of the above mentioned authors proved a meaningful usefulness of 'Syberian C' rootstock in an orchard. Peach trees growing on 'Syberian C' rootstock were characterised by longevity and high frost resistancy. JAKUBOWSKI (2002) found out that a weaker growth of 'Syberian C' rootstock originates in a susceptibility of its root system to nematodes and genetic conditions of this species. He says that seedlings of 'Syberian C' reach the diameter 7-10 mm very rarely. Also in the present experiment 'Syberian C' rootstock grew the weakest of all the rootstocks in a seedling nursery. HOŁUBOWICZ (1999) and ŚWIERCZYŃSKI and STACHOWIAK (2009) observed a smaller vigour of growth of peach trees on the rootstock of 'Minnesota' seedling in comparison with 'Rakoniewicka' and 'Hui-Hun-Tao' seedlings. RADAJEWSKA (2005) described and characterised the rootstock of 'Minnesota' seedling as a medium growing one. In the present experiment, however, this rootstock grew strongly. WILCZAK (2006) observed a strong growth of peach maiden trees on 'Hui-Hun-Tao' rootstock. Similarly, a strong growth of just the rootstock was observed in the present experiment. JAKUBOWSKI (2002) and RADAJEWSKA (2005) state that 'Rakoniewicka' seedlings grow strongly and give a big vigour of growth to peach trees growing on them. It was confirmed in the present experiment.

The height of rootstocks for plum trees was much differentiated. The highest ones were *Prunus cerasifera* rootstocks and the lowest were 'Wagenheim Prune' seedlings. *Prunus tomentosa* plants were of medium height (Table 2).

Table 2. The growth of three seedlings rootstocks for plum (average from 2006-2008)
Tabela 2. Wzrost trzech siewek podkładek dla śliwy (średnia z lat 2006-2008)

Rootstock	Height (cm)	Diameter of root collar (mm)	Number of roots	Compatible with norm (%)
Prunus cerasifera	69.4 c	7.0 b	5.4 a	96.1 ab
'Wagenheim Prune'	44.0 a	6.8 b	9.4 b	93.2 a
Prunus tomentosa	56.2 b	5.7 a	11.4 b	99.3 b

The means followed by the same letters in columns do not differ at $\alpha = 0.05$.

The results of trunk diameter of rootstocks showed that the value of this parameter for *Prunus tomentosa* seedling was significantly lower in comparison with the rest two considered rootstocks (Table 2).

Much higher number of skeleton roots was found for *Prunus tomentosa* and 'Wagenheim Prune' than for *Prunus cerasifera* (Table 2).

The obtained parameters of growth of rootstocks for plum trees differentiated their compatibility with the norm. The highest percentage of compatibility was obtained for *Prunus tomentosa* and the lowest for 'Wagenheim Prune' (Table 2).

The results of growth of rootstocks for plum trees obtained in the present experiment confirm the opinions of many authors. 'Wagenheim Prune' rootstock is commonly considered as the one that weakens the growth of plum trees (GRZYB 1993, ROZPARA and GRZYB 1994, GRZYB and KOLBUSZ 1998, SZYMCZAK et AL. 1998).

Similarly, *Prunus tomentosa* rootstock was classified as a rootstock that weakens the vigour of growth of plum trees (BERNHARD and MESNIER 1975, TRET'YAK 1975, HELTON 1976, VAN OOSTEN 1979, WEBSTER 1980, TU et AL. 1996, KARICHEV and YANKOVA 1999, ŚWIERCZYŃSKI 2001). It is specially confirmed by the height of the *Prunus tomentosa* rootstock obtained in the present experiment. Additionally, this rootstock has many roots, which raises its nursery value.

Prunus cerasifera, on the other hand, grows too strongly, which was also found earlier by other authors (ROZPARA and GRZYB 2001, SOSNA 2004, ŚWIERCZYŃSKI and STACHOWIAK 2009). That fact was also confirmed in the present experiment.

Conclusions

1. The experiment revealed that the rootstock of 'Minnesota' seedling grows weaker than 'Rakoniewicka' and 'Hui-Hun-Tao' seedlings but stronger than 'Syberian C'.

2. 'Syberian C' was characterised by lower percentage compatibility with the norm.

3. *Prunus tomentosa* rootstock was characterised by a weaker growth in comparison with *Prunus cerasifera* and by a bigger number of skeleton roots.

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PORÓWNANIE WZROSTU WYBRANYCH SIEWEK PODKŁADEK DLA BRZOSKWINI I ŚLIWY

Streszczenie. Doświadczenie przeprowadzono w latach 2006-2008. W produkcji szkółkarskiej porównano wzrost siewek czterech podkładek dla brzoskwini: 'Minnesota', 'Hui-Hun-Tao', 'Syberian C' i 'Rakoniewickiej' i trzech podkładek dla śliwy: wisienki kosmatej, Węgierki Wangenheima i ałyczy. Zaobserwowano silny wzrost podkładek: 'Rakoniewickiej', 'Hui-Hun-Tao' i ałyczy. Średnio silny wzrost wykazała reszta rozpatrywanych podkładek. Dobrze ukorzenionymi podkładkami były wszystkie podkładki z wyjątkiem 'Syberian C' i ałyczy. Siewki 'Syberian C' miały gorszą zgodność z normą w porównaniu z pozostałymi rozpatrywanymi podkładkami.

Słowa kluczowe: siewki podkładek, brzoskwinia, śliwa, wzrost

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