

Orchard performance of two plum cultivars on some clonal rootstocks

J. KOSINA

Research and Breeding Institute of Pomology, Holovousy, Czech Republic

ABSTRACT: A plum rootstock trial with Stanley and Cacanska najbolja cvs. was established in spring 1992. The following rootstocks were assessed: MY-BO-1, Myrobalan SE 4043 (both *Prunus cerasifera*), MY-KL-A (*P. cerasifera* × *P. cerasifera* var. *atropurpurea*), Marunke SE 4034 (Ackerman), St. Julien A, Brompton, GF 655/2, GF 1869, GF 1380, GF 43, Damascena SE 4045, Pixy and Myrobalan seedling. Yields, trunk cross-section area, number of suckers and mean fruit weights were evaluated in the orchard in 1993–2003. There were statistically significant differences in trunk cross-section area, yield and yield efficiency between the tested rootstocks. Trees of Stanley were the most vigorous on MY-KL-A, followed by GF 43, GF 1380 and Myrobalan seedling. The weakest growth was recorded on trees grafted on Pixy, then on GF 655/2 and MY-BO-1. With Cacanska najbolja the growth was the strongest on GF 43, followed by Myrobalan seedling, MY-KL-A and Myrobalan SE 4043. The most compact trees were on Pixy and then on GF 655/2 and Marunke SE 4034. The total accumulated yield per tree was the highest with Stanley on MY-KL-A, followed by Brompton and St. Julien A. The cultivar Cacanska najbolja was most productive on Myrobalan SE 4043 and also on St. Julien A. The yield efficiency with both cultivars was the highest on GF 655/2, and the lowest one on GF 1380 (Stanley) or on Myrobalan seedling (Cacanska najbolja). No statistically significant differences between the tested rootstocks were found in fruit size. Suckers were the most prolific on GF 1869, followed by GF 655/2 and Marunke SE 4034. Based on the hitherto experience, the best rootstocks for Stanley seem to be MY-KL-A and MY-BO-1 and for Cacanska najbolja Myrobalan SE 4043 and St. Julien A.

Keywords: plum; rootstock; growth vigour; yield; suckering

The majority of grown plums is still produced on seedling rootstocks, usually Myrobalan seedlings, whereas in the UK, Holland and Scandinavia seedlings or clonal selection of St. Julien are more popular (WEBSTER 1997). At present the most commonly used rootstock for plums in the Czech Republic is Myrobalan seedling (KURKA 2003). This rootstock is popular among nurserymen but in some cases fruit-growers are less satisfied with it (too vigorous growth, inferior precocity, suckering) and therefore they are interested in new clonal rootstocks. A lot of new plum rootstocks were bred abroad (BOTU et al. 1998; HARTMANN 1995; STEHR 2003; STEINBAUER 2000, 2003). Most of them are invigorating and are selected to be resistant to particular soil problems, although a few are dwarfing and more suited to use in high density plantings (WEBSTER 1997). The properties of these new clones have not been verified in the climatic and soil conditions of the Czech Republic yet. Usage of this plant material without orchard tests seems to be hazardous. The aim of this observation was to specify the influence of several Czech and foreign rootstocks on vigour and productivity of two plum cultivars in an orchard.

MATERIAL AND METHODS

An experimental orchard of Stanley and Cacanska najbolja was established in the RBIP Holovousy in spring

1990 using the following rootstocks: MY-BO-1, Myrobalan SE 4043 (both *Prunus cerasifera*), MY-KL-A (*P. cerasifera* × *cerasifera* var. *atropurpurea*), Marunke SE 4034 (Ackerman), St. Julien A, Brompton, GF 655/2, GF 1869, GF 1380, GF 43, Damascena SE 4045, Pixy and Myrobalan seedling. All these rootstocks except Myrobalan seedling were propagated by green cuttings.

Two-year-old trees were planted at a spacing of 6 × 3.4 m. The trees were trained as freely growing hedgerows with a short stem height and the central leader being removed in the fifth year. Every rootstock cultivar-combination was planted in 4 replications with two trees in each. The driveways were managed as mown grass. Herbicide strips (1.5 m) were placed in the rows of trees. Pest and disease control and fertilization follow local recommendations for commercial orchards. The following parameters were evaluated in the period 1993–2003: trunk circumference, yield (kg/tree), fruit size and number of root suckers (per tree). Using the data collected, the following characteristics were calculated: trunk cross-section area (cm²) and yield efficiency (kg/cm²). The results were further processed statistically by the analysis of variance.

RESULTS AND DISCUSSION

The growth vigour and yield of the cultivar Stanley are presented in Table 1. The most intensive growth was re-

Supported by the Ministry of Agriculture of the Czech Republic, Project No. QD 1408.

Table 1. Vegetative growth and cropping of Stanley on different rootstocks during 1992–2003 (planted in spring 1990)

Rootstock	Total yield for 1993–2003 (kg/tree)	Trunk cross-section area (cm ²)	Yield efficiency in 2004 (kg/cm ²)	Total number of suckers during 1993–2003	Fruit weight (g)
MY-KL-A	505	211	2.4	0	33.0
Brompton	447	178	2.5	56	36.0
St. Julien A	425	175	2.4	3	36.5
MY-BO-1	414	167	2.5	8	33.0
Myrobalan sg.	408	199	2.1	4	32.5
Marunke SE 4034	397	180	2.2	130	35.0
GF 43	393	209	1.9	4	34.5
GF 655/2	391	135	2.9	129	35.5
Damascena SE 4045	350	180	1.9	90	36.0
GF 1869	331	178	1.9	290	40.0
GF 1380	322	208	1.5	30	37.0
Pixy	263	124	2.1	7	36.0
Dmin. (0.05)	45	19	0.5		

corded in the trees grafted on rootstocks MY-KL-A, GF 43, GF 1380 and Myrobalan seedling. The least growth intensity was observed in GF 655/2 and Pixy. Interesting was the weak growth of generative rootstock MY-BO-1, which was propagated vegetatively. The total yield, as harvested from one tree during the period from 1992 to 2003, was highest in combination with MY-KL-A, Brompton, and St. Julien A. The lowest yield was observed where the trees were growing on Pixy and GF 1380. The trees grafted on GF 655/2, MY-BO-1 and Brompton rootstocks showed highest yield efficiency, whereas the lowest one was observed in GF 1380. The best fruit size was on GF 1869 rootstock. Smaller fruits were observed at richly bearing trees on MY-KL-A and MY-BO-1. Contrary to findings of STEHR (2003) trees on Pixy had a good fruit size and our results are consistent with observations by SOSNA (2002).

Rootstocks GF 1869, Marunke SE 4034, GF 655/2 and Damascena SE 4045 showed extreme sucker occurrence, whereas MY-KL-A, St. Julien A, GF 43, and Myrobalan seedling produced hardly any suckers. HARTMANN (1995), SOSNA (2002) and STEINBAUER (2000, 2003) reported high suckering of GF 655/2.

The Cacanska najbolja (Table 2) grew most intensively on GF 43 and Myrobalan seedling. On the contrary, the least growth vigour was shown by Pixy, GF 655/2 and Marunke SE 4034. Total yield for 1992–2003 was highest on Myrobalan SE 4043, St. Julien A and GF 655/2. The lowest yield was observed in Pixy and Myrobalan seedling. Trees planted on GF 655/2 and Marunke SE 4034 rootstocks had the highest yield efficiency. The lowest yield efficiency was observed when this cultivar was growing on Myrobalan seedling. No significant differences in fruit size were found out between the tested rootstocks.

Table 2. Vegetative growth and cropping of Cacanska najbolja on different rootstocks during 1992–2003 (planted in spring 1990)

Rootstock	Total yield for 1993–2003 (kg/tree)	Trunk cross-section area (cm ²)	Yield efficiency in 2004 (kg/cm ²)	Total number of suckers during 1993–2003	Fruit weight (g)
Myrobalan SE 4043	449	279	1.6	11	33.5
St. Julien A	421	262	1.6	5	35.0
GF 655/2	406	232	1.8	170	31.0
MY-KL-A	404	280	1.4	1	34.0
GF 43	403	297	1.4	5	33.0
Marunke SE 4034	401	234	1.7	123	35.5
GF 1869	382	252	1.5	348	36.0
GF 1380	380	274	1.4	27	36.5
Myrobalan sg.	347	290	1.2	3	32.0
Pixy	253	167	1.5	9	32.0
Dmin. (0.05)	34	23	0.4		

The sucker occurrence was highest, analogous to Stanley, on GF 1869, GF 655/2 and Marunke SE 4034. Only sporadic sucker occurrence was recorded in MY-KL-A and Myrobalan seedling. Due to high suckering of GF 1869, GF 655/2, Damascena SE 4045, Marunke SE 4034 the use of these clones by fruit growers is limited.

References

- BOTU I., ACHIM G., BADEA J., 1998. Behaviour of some plum rootstocks in the Romania's conditions. Proc. VI. International Symp. on Plum and Prune Genetics, Breeding and Pomology. Acta Hort., 478: 229–237.
- HARTMANN W., 1995. Unterlagen bei Pflaumen und Zwetschen. Obstbau, 8: 390–394.
- KURKAM., 2003. Pěstované podnože hlavních ovocných druhů v ovocných školkách. Zahradnictví, 9: 10–11.
- SOSNA I., 2002. Growth and cropping of four plum cultivars on different rootstocks in south western Poland. J. Fruit Orn. Plant Res., X: 95–103.
- STEHR R., 2003. Neues zu Unterlagen und Sorten bei Pflaumen und Zwetschen – Teil I Unterlagen. Mitt. OVR, 58 (3): 74–82.
- STEINBAUER L., 2000. Zwetschenunterlagen im Vergleich. Besseres Obst., 45 (1): 7.
- STEINBAUER L., 2003. Zwetschenunterlagen in Prüfung: Mehr versprochen als gehalten. Besseres Obst., 48 (9): 16–17.
- WEBSTER A.D., 1997. A review of fruit tree rootstock research and development. Proc. 6. Int. Symp. on Integrating Canopy, Rootstocks and Environmental Physiology in Orchard Systems. Acta Hort., 451: 53–73.

Received for publication May 18, 2004

Accepted after corrections June 30, 2004

Růst a výkonnost dvou odrůd slivoní ve výsadbě na různých vegetativních podnožích

ABSTRAKT: Na jaře 1992 byl založen pokus s vegetativními podnožemi slivoní. V kombinaci s odrůdami Stanley a Čačanská najbolja byly zkoušeny následující podnože: MY-BO-1, Myrobalán SE 4043, MY-KL-A, Marunke SE 4034, St. Julien A, Brompton, GF 655/2, GF 1869, GF 1380, GF 43, Damascena SE 4045, Pixy, semenáč myrobalánu. Mezi testovanými podnožemi byly statisticky významné rozdíly u plochy průřezu kmene, výnosu a specifické plodnosti. Odrůda Stanley rostla nejsilněji na podnožích MY-KL-A, GF 43, GF 1380, semenáč myrobalánu. Nejslabší růst stromů byl na Pixy, GF 655/2 a MY-BO-1. Odrůda Čačanská najbolja rostla nejsilněji na podnožích GF 43, semenáč myrobalánu, MY-KL-A a Myrobalán SE 4043. Nejmenší stromy byly na Pixy, GF 655/2 a Marunke SE 4034. U odrůdy Stanley byl nejvyšší celkový výnos za období 1992 až 2003 na podnožích MY-KL-A, Brompton a St. Julien A. Odrůda Čačanská najbolja nejlépe plodila na Myrobalánu SE 4043 a St. Julien A. Nejvyšší specifická plodnost obou odrůd byla na podnoži GF 655/2, nejnižší na GF 1380 (u odrůdy Stanley) a u odrůdy Čačanská najbolja na semenáči myrobalánu. Mezi zkoušenými variantami nebyly zjištěny statisticky významné rozdíly ve velikosti plodů. Produkce kořenových výmladků byla vysoká u obou odrůd na podnožích GF 1869, GF 655/2 a Marunke SE 4034. Podle dosavadních výsledků se ukazují pro odrůdu Stanley nejlepší podnože MY-KL-A, MY-BO-1 a pro odrůdu Čačanská najbolja podnože Myrobalán SE 4043 a St. Julien A.

Klíčová slova: slivoň; podnož; intenzita růstu; výnos; podrůstání

Corresponding author:

Ing. JOSEF KOSINA, CSc., Výzkumný a šlechtitelský ústav ovocnářský Holovousy, s. r. o., Holovousy 1,
508 01 Hořice v Podkrkonoší, Česká republika
tel.: + 420 493 692 824, fax: + 420 493 692 833, e-mail: kosina@vsuo.cz
