

Evaluation of some dwarf apple rootstocks

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ABSTRACT: Dwarf apple rootstocks M 9, M 27, Pajam 1, Pajam 2, Jork 9, J-TE-E, J-TE-F, J-TE-G and J-OH-A were evaluated in a trial conducted in an experimental orchard with cultivars Golden Delicious, Gloster and Melrose. The experimental plantation was established in 1990. Data on: yield (kg/tree), yield efficiency (kg/cm²), trunk cross-section area and suckering were recorded during the period 1991–2000. The cumulative yield per tree was highest on Jork 9 and Pajam 2. Trees on Pajam 1 and M 9 also had good productivity. Yield efficiency was highest on Jork 9, followed by M 27 and J-TE-G. Trees on Pajam 2 were most vigorous. The tree size on M 9 was similar like on Pajam 1. Trees on J-TE-E and J-TE-F grew less than those on M 9. The weakest growth was observed on rootstocks M 27 and J-TE-G. Among the tested rootstocks, J-OH-A produced the highest number of suckers. Suckering was more intensive with Melrose followed by Gloster and Golden Delicious.

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

New apple orchards are planted using trees on dwarf or semi-dwarf clonal rootstocks. Among them, M 9 is the most common in the Western and Central European countries. At the present time there are many clones of this rootstock. The new clones of M 9 named Pajam 1 and Pajam 2 were selected in France (MASSERON 1986). Rootstocks Jork 9 (FABY et al. 1986), Burgmer 719, 751, 756, 984 (BAAB 1998), and Supporter 1, 2, 3, 4 (FISCHER 1997), were launched in Germany. Clones T 337, T 338, T 339, and F 56 were propagated in the Netherlands, and KL 19 and KL 29 in Belgium. A range of new rootstocks has also been bred in Poland (JAKUBOWSKI, ZAGAJA 2000).

Currently there is no experience with most of these rootstocks in the Czech Republic. The aim of this work was to test some of the new rootstocks under the climatic and soil conditions of this country, and to specify their influence on the growth and bearing of apple cultivars presently being widely grown here.

MATERIAL AND METHODS

An experimental orchard was established in the Research and Breeding Institute of Pomology at Holovousy in autumn 1990. The rootstocks M 9, M 27, Jork 9, Pajam 1, Pajam 2, J-TE-E, J-TE-F, J-TE-G, and J-OH-A were tested using scion cultivars Golden Delicious, Gloster and Melrose. Rootstocks and cultivars had a virus-tested status. Trees were planted at a spacing of 4.5 m × 2.3 m and were trained as a slender spindle. The experiment was arranged in a randomised block design with five replications of three trees per plot. The driveways were managed as mown grass. Herbicide strips (1.5 m

wide) were placed in the rows of trees. Insect and disease control and fertilization were based on local recommendations for intensive commercial orchards.

The following characteristics were recorded annually: trunk circumference, yield (kg/tree) and number of root suckers (per tree). Root suckers were removed on counting. Using the data collected, the following traits were calculated: trunk cross-section area (cm²) and yield efficiency (kg/cm²). The results were further measured statistically by the analysis of variance.

RESULTS AND DISCUSSION

Among the cultivars tested, Golden Delicious had the highest yields per tree on Pajam 2 and Jork 9 (Table 1). The lowest yield of the cultivar was observed on the standard rootstock M 9. The yield efficiency was highest on Jork 9. On the contrary, trees of Golden Delicious on M 9 were the poorest in their yield efficiency. The growth vigour of the cultivar was highest on Pajam 2. Suckering of Golden Delicious was low on all rootstocks.

The characteristics of Gloster are listed in Table 2. The accumulated yield during the period 1991–2000 was highest on Jork 9. The yield efficiency was also best on this rootstock. Trees of the cultivar on M 9 were also good croppers. On the contrary, the lowest yields were observed in trees on J-TE-E and J-OH-A. However, they had the weakest vigour and a high yield efficiency. Rootstocks Jork 9, Pajam 2, and M 9 were similar in their growth vigour. Suckering was highest on J-OH-A.

In the case of Melrose (Table 3), the highest accumulated yield was on Pajam 2, which grew most vigorously.

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Table 1. Tree size, yield and number of root suckers in Golden Delicious during 1991–2000

Rootstock	Total yield for 1991–2000 (kg/tree)	Trunk-cross section area in 1999 (cm ²)	Yield efficiency (kg/cm ²)	Total number of suckers during 1993–2000
M 9	205.9	54.8	3.8	0.9
Jork 9	240.4	42.7	5.6	1.1
Pajam 1	215.6	51.7	4.2	1.3
Pajam 2	256.0	58.7	4.4	2.4
Dmin (0.05)	19.5	4.6	0.3	

Table 2. Tree size, yield and number of root suckers in Gloster during 1991–2000

Rootstock	Total yield for 1991–2000 (kg/tree)	Trunk-cross section area in 1999 (cm ²)	Yield efficiency (kg/cm ²)	Total number of suckers during 1993–2000
M 9	279.9	51.6	5.4	3.1
Jork 9	325.1	52.2	6.2	1.6
Pajam 1	263.2	48.1	5.5	1.0
Pajam 2	268.0	52.0	5.2	2.1
J-TE-E	219.1	38.9	5.6	2.3
J-OH-A	242.8	42.6	5.7	20.0
Dmin (0.05)	36.2	5.4	0.6	

Table 3. Tree size, yield and number of root suckers in Melrose during 1991–2000

Rootstock	Total yield for 1991–2000 (kg/tree)	Trunk-cross section area in 1999 (cm ²)	Yield efficiency (kg/cm ²)	Total number of suckers during 1993–2000
M 9	232.0	50.0	4.6	13.7
Jork 9	265.3	49.8	5.3	2.0
Pajam 1	236.9	51.8	4.6	6.2
Pajam 2	275.1	62.2	4.4	10.3
J-TE-E	204.3	39.9	5.1	15.3
J-OH-A	159.1	33.1	4.8	49.4
J-TE-F	186.8	30.4	6.1	22.2
J-TE-G	166.9	28.8	5.8	0.2
M 27	151.9	25.2	6.0	0.5
Dmin (0.05)	18.1	6.6	0.6	

High yields were also observed on Jork 9 and Pajam 1. Their growth was also vigorous. All rootstocks bred in the Czech Republic (J-TE-E, F, G, and J-OH-A) grew more weakly than M 9. The weakest of all the rootstocks was M 27. Practically the same growth vigour was also observed in J-TE-G. Both these rootstocks had the highest yield efficiency. Suckering of the cultivar was much higher than with the other two. The most suckers were produced by J-OH-A, then by J-TE-F, J-TE-E and M 9. On the contrary, the suckering was very low with trees on M 27 and J-TE-G.

Most of the results presented above from this rootstock evaluation are similar to those presented in other countries (BULATOVIĆ-DANILOVICH, PERRY 1996; MONNEY, RIESEN 1996; LINNEMANNSTÖNS 1998; MÖLLER 1999). The tested rootstocks Jork 9, Pajam 1 and Pajam 2 showed better yield parameters among all cultivars tested in comparison with the standard rootstock M 9. The Czech rootstocks J-TE-E and J-TE-F showed weaker growth vigour than M 9. Among the Czech series of clonal rootstocks, J-OH-A is the worst one with regard to the number of suckers and moderate productivity only.

References

- BAAB G., 1998. Apfelunterlagen Gestern und Heute. Erwerbsobstbau, 40: 162–169.
- BULATOVIĆ-DANILOVICH M., PERRY R., 1996. Klonske podloge za jabuku tipa M 9. Jugosl. Vočar, 30: 115–116, 209–216.
- DVOŘÁK A., 1983. Pěstitelská charakteristika nově vyšlechtěných podnoží řady J-TE-E. Sbor. Progresivní směry v ovocnářské výrobě. Hradec Králové, 8.–10. 9. 1981. Holovousy, Praha, VŠÚO, SZN: 117–133.
- FABY R., CLEVER M., TIEMANN K.H., 1986. Freigabe der Apfelunterlage „J9“. Mitt. OVR, 41: 392–399.
- FISCHER M., 1997. Neue Apfelunterlagen aus Dresden-Pillnitz. Besseres Obst, 2: 11–12.
- JAKUBOWSKI T., ZAGAJA S.W., 2000. 45 years of apple rootstocks breeding in Poland. Acta Hort., 538: 723–727.
- LINNEMANNSTÖNS L., 1998. Unterlagenprüfung bei Apfel. Obstbau, 23: 322–326.
- MASSERON A., 1986. Deux nouvelles sélections de Paradis Jaune de Metz, porte greffe du Pommier Pajam 1 (Lancep) Pajam 2 (Cepiland). Rev. Hort., 265: 36–37.
- MÖLLER O., 1999. Leistungsvergleich von M 9-Klonen. Obst u. Gtn., 11: 410–412.
- MONNEY P., RIESEN W., 1996. Porte-greffe du pommier. Rev. Suisse Vitic. Hortic., 28: 319–324.

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Hodnocení některých slabě vzrůstných jabloňových podnoží

ABSTRAKT: V pokusné výsadbě byly hodnoceny slabě vzrůstné jabloňové podnože M 9, M 27, Pajam 1, Pajam 2, Jork 9, J-TE-E, J-TE-F, J-TE-G, J-OH-A s odrůdami Golden Delicious, Gloster a Melrose. Pokus byl založen v roce 1990. Během doby hodnocení (1999–2000) byly zjišťovány tyto údaje: výnos ovoce, plocha průřezu kmene a množství kořenových výmladků. Celkový výnos ovoce byl nejvyšší na podnožích Jork 9 a Pajam 2. Dobře plodily i stromy na Pajam 1 a M 9. Specifická plodnost (kg/cm²) byla vysoká u podnoží Jork 9, M 27, J-TE-G. Stromy na podnoží Pajam 2 rostly nejbujněji. Podobná vzrůstnost jako u M 9 byla u podnože Pajam 1. Stromy na J-TE-E a J-TE-F rostly slaběji než na M 9. Nejslabší růst byl na M 27 a J-TE-G. Kořenové výmladky tvořila nejvíce podnož J-OH-A. Stromy odrůdy Melrose tvořily více podrostu než stromy odrůd Golden Delicious a Gloster.

Klíčová slova: jablono; podnož; intenzita růstu; výnos; podrost

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