DOI: 10.22620/agrisci.2019.25.005

OPPORTUNITIES FOR PRODUCTION OF PEAR TREES IN ONE-YEAR-OLD NURSERY

Georgi Govedarov

Agricultural University – Plovdiv

E-mail: gigovedarov@abv.bg

Abstract

Studied were the opportunities for one-year production of pear trees from the Cure and Passe Crassane varieties, budded on the quince rootstocks Quince Provence, MA, BA 29 and B 12. For the purpose, the traditional method - a T-budding of a sleeping bud was compared to an accelerated method - a T-budding of an awake bud. It was found that the planted rootstocks were caught very well in both cases. Sleeping bud budding accelerates interception with 2–4 days.

The average duration of capture for a sleeping bud is 21,24 days, and 22,86 days for an awake bud. At both varieties, the buds were the fastest to an interception on BA 29, the percentage was the highest on B 12 and a relatively lower percentage on MA. On the rootstocks, Quince Provence, MA and B 12 buds grafted in the spring intercepted better.

The early spring recovery on a soft motion at quince rootstocks, combined with a high level of agrotechnology, allow being produced standard pear trees for one year in a nursery.

Keywords: Quince rootstocks, Pear variety, accelerated production.

INTRODUCTION

Traditional production of planting material of fruit species usually takes place in two consecutive years (Trachev, 1975; Palmer, 1994; Mitov, 1996).

The opportunities for accelerating this process in different fruit species are related to the term and the way of grafting (Tatarinov, 1984; Palmer, 1994; Ferhatoglu, 1997; Kűden, 1995).

Most often, grafting on the table is used during the rest period, using Omega or English copulation (Palmer, 1994; Ferhatoglu, 1997; Kűden, 1997), or chip budding with a low soft motion of the rootstocks (Kűden, 1995; Arpaci 1998).

The early spring recovery of the low motion in the quince rootstocks used for the pear trees gave us grounds to check the opportunity for producing quality trees in a one-year-old nursery, using the conventional T-budding method.

MATERIALS AND METHODS

The opportunities for production of one-year, fit for planting in a permanent place pear trees of two varieties (Cure and Passe Crassane), grafted onto four quince rootstocks (Quince Provence, MA, BA 29, and B 12) were studied in the experimental field of the Department of Fruit Growing in the village of Brestnik, Plovdiv region.

For this purpose were created two parallel experiments, involving the varieties and rootstocks mentioned above:

Experiment 1 – traditional production - two-year-old cultivation, T-budding of a sleeping bud. Traditional agro-technology was applied.

Experiment 2 – accelerated production - one-year-old cultivation, T-budding of an awake bud. A highly improved agro-technology was applied, which until the formation of a top bud from the graft, contains several times feeding with low doses of nitrogen fertilizer and regular irrigation every 10–15 days.

The rooted shoots used in Experiment 1 were cut out after the natural fall of leaves (December) and planted in the nursery in March, while the shoots used in Experiment 2 had their leaves removed manually, cut out and planted in the nursery in the period from October to November. For Experiment 1, we performed the budding in August, and for Experiment 2 after establishing good soft motion – usually in April.

In both trials, the following indicators were reported: percentage of catching up rootstocks; thickness of the rootstocks after planting and before budding -10 cm above the soil; duration and percentage of captured live buds; growth specifics of both varieties produced by a traditional or accelerated process.

In Experiment 1, as the end of the period of interception, we determined the fall of 70% of the leaf handle after a light touch; while in Experiment 2, we recorded the duration of the interception from the budding until the swelling or drifting of over 70% of the buds. After the trees were removed we noticed the diameter of the rootstock (under the graft), the diameter of the grafter (10 cm above the budding) and the height of the grafter.

The averaged data for the study period was mathematically processed by the dispersion analysis method.

Table 1. Growth specifics of Cure pear variety in accelerated production with the application of simple and highly improved agro-technology

Rootstocks	Diameter of the rootstock (mm)		Diameter of the tree (mm)		Height of the tree (cm)	
	Simple	Highly improved	Simple	Highly improved	Simple	Highly improved
Quince Provence	12,37	12,55	4,32	12,01	33,71	124,99
MA	12,07	13,29	5,75	11,84	37,84	127,00
BA 29	12,82	14,32	7,06	10,85	33,89	136,33
B 12	11,48	12,25	4,63	11,97	34,86	121,21

Table 2. Interception of planted rootstocks and thickness during planting and budding in traditional (tr.) and accelerated (acc.) production

Rootstocks	Percentage of the interception		Thickness during planting (mm)		Thickness during budding (mm)	
	Tr.	Acc.	Tr.	Acc.	Tr.	Acc.
Quince Provence	94,12	87,85	4,80	4,88	9,24	6,08
MA	94,80	89,08	4,83	5,01	9,47	6,12
BA 29	92,34	87,22	4,85	5,09	9,42	6,23
B 12	97,17	91,06	5,01	5,18	10,07	6,42
GD at P = 5%			0,43	0,54	0,57	0,63
1%			0,59	0,69	0,74	0,78
0,1%			0,72	0,84	1,25	1,01

RESULTS AND DISCUSSION

Table 1 presents the data on the growth specifics of the Cure pear variety – accelerated production, depending on the level of applied agro-technology. The differences in the application of simple and heavily improved agro-technology appear mainly in the growth of the graft bud. Exactly as a result of the increased agro-technology, the diameter of the graft in some of the variety roots-tocks combinations is 7–8 mm larger. The same applies to the height of the trees, which doesn't exceed 40 cm in traditional agro-technology,

but when applying better care, the height is already over 120 cm.

Data on the percentage of interception of the rootstocks, their thickness during planting and budding are presented in Table 2.

During both experiments, the percentage of interception of the rootstocks is high, with a slight advantage (5–7%) for traditional production.

We think the reason for this is that we have a better degree of tissue supply and a better-developed root system of the rootstocks after their cut out.

Nevertheless, we think the pad inosculation obtained in the accelerated production (over 85%) is very good.

As for the thickness of the rootstocks used in the planting, no significant differences were observed, since in both experiments the tendency was to choose shoots of comparatively equal thickness to avoid further variations in their development.

The diameter of the graft rootstocks in both experiments differs to a certain extent, and it is very normal that in Experiment 1 they are thicker by about 3 mm.

An interesting tendency was observed when comparing the thickness of the rootstocks in Experiment 2 during planting and budding. It is obvious that the four rootstocks do not stop their thickening during the winter months and it is over 1 mm, which we attribute to the low, but positive temperatures acting in the area of the root system, leading to relative delay, but not stopping of the development of the root and upper part of the rootstocks.

The duration and percentage of interception of the grafted buds are presented in Table 3.

In Experiment 1, the process of interception of the grafted buds occurs within 16-24 days, and the intercepted buds in the four rootstocks are over 70%. As for the duration, the buds grafted onto BA 29 are the fastest, while the interception percentage in B 12 is the highest.

In Experiment 2, the interception occurs within 20–25 days and the intercepted buds are over 75%. The buds grafted onto BA 29 are the fastest again, and the interception percentage is the highest in B 12.

In both experiments, the percentage of interception of grafted buds was comparatively lower in MA. With three of the rootstocks – Quince Provence, MA and B 12, the interception of buds during budding of dormant bud is superior in percentage to the budding of a sleeping bud.

Table 3. Duration and percentage of interception of the grafted buds in pear varieties Cure and Passe Crassane

Rootstocks	Experiment 1 - traditional production				Experiment 2 - Accelerated production			
	min days	max dais	Average days	Percentage of the interception	min days	max days	Average days	Percentage of the interception
Quince Provence	17,63	24,75	21,19	84,00	21,43	26,12	23,76	86,00
MA	18,54	26,34	22,44	73,00	20,97	26,19	23,58	78,00
BA 29	15,47	23,43	19,45	87,00	18,63	23,75	21,19	85,00
B 12	17,92	25,88	21,90	91,00	20,47	25,35	22,91	93,00
GD at P = 5% 1 % 0,1 %			2,08 4,22 7,78				1,88 3,26 6,63	

Table 4. Growth specifics of the Cure pear variety on four rootstocks in traditional (tr.) and accelerated (acc.) production of trees – averaged over the experiment period

Rootstocks	Diameter of the rootstock (mm)		Diameter of the tree (mm)		Height of the tree (cm)	
	Tr.	Acc.	Tr.	Acc.	Tr.	Acc.
Quince Provence	18.90	11.90	15.17	11.25	136.65	117.72
MA	18.49	12.19	14.82	10.86	136.10	124.81
BA 29	18.41	12.81	13.25	10.48	124.96	121.18
B 12	18.48	11.98	13.89	10.97	132.89	122.58
GD at P = 5%	3.51	1.14	2.39	1.19	13.83	17.26
1 %	5.07	1.64	3.44	1.80	19.87	26.15
0,1 %	7.45	2.41	5.06	2.90	29.33	42.03

Table 5. Growth specifics of the Passe Crassane pear variety on four rootstocks in traditional (tr.) and accelerated(acc.) production of trees – averaged over the experiment period

Rootstocks	Diameter of the rootstock (mm)		Diameter of the tree (mm)		Height of the tree (cm)	
	Tr.	Acc.	Tr.	Acc.	Tr.	Acc.
Quince Provence	18.90	11.90	13.48	10.54	110.86	103.85
MA	18.49	12.19	12.90	10.32	110.83	105.08
BA 29	18.41	12.81	12.43	9.80	104.83	104.53
B 12	18.48	11.98	13.06	10.31	108.22	104.30
GD at P = 5%	3.51	1.14	1.67	0.55	14.04	6.68
1 %	5.07	1.64	2.40	0.83	20.17	10.11
0,1 %	7.45	2.41	3.52	1.31	29.68	16.26

The data on the growth specifics of the Cure and Passe Crassane pear varieties on four rootstocks in both experiments are presented in Table 4 and Table 5 respectively. In both tables, the values for the diameter of the rootstock are the same because of the recording of all budding rootstocks, and not separately for each variety.

In both the Cure and Passe Crassane pear variety there are no proven differences between the separate rootstocks for the diameter and the height of the trees, both in the traditional and the accelerated production and from the grafted buds have developed normal and plantable trees.

In both experiments can be seen that the trees grafted on BA 29 have remained relatively the thinnest and the shortest. The trees from the Cure pear variety are thicker and higher than those of the Passe Crassane pear variety, which confirms that under equal other conditions, the Cure has stronger growth (Lichev, etc. 2012).

CONCLUSIONS

1. The better tissue supply and better-developed root system give priority to the interception percentage of the rootstocks in traditional production (around 95%), but over 85% of interception of the rootstocks in the accelerated method is also considered very good.

2. The process of interception of grafted buds is 2-3 days shorter in the traditional production. The average duration of interception is 21,24 days in the traditional and 22,86 days in the accelerated method.

3. The interception in Experiment 2 is slightly better, but in both attempts, it is over 73%.

4. In the two-year and one-year-old nurseries are not found proven differences in the thickness and height of the trees, associated with the different rootstock used.

5. The accelerated production of pear trees on quince rootstocks produces results only at a significantly higher level of applied agro-technology in the one-year nursery.

REFERENCES

Lichev, V., 2012. Pomologiya. Academichno izdatelstvo na Agrarnia Universitet – Plovdiv.

Mitov, P., G. Pepelyankov, D. Dyakov, 1996. Ovoshtarstvo, Academichno izdatelstvo na VSI – Plovdiv.

Tatarinov, A., V. Zuev, 1984. Pitomnik plodovh I yagodnih kultur. Rosselhozizdat. Moskva.

Trachev, D., M. Yoncheva, Sp. Ivanov, D. Trifonov, 1975. Podlozhki za ovoshtnite durveta I proizvodstvo na posaduchen material, Plovdiv.

Arpaci, S., Aksu O., Tekin H., 1998. Determination of the best suitable grafting method on different pistachio rootstocks. Acta Hort. 470, pp. 443–446.

Ferhatoglu, Y., 1997. The studies on the effect of potting and Omega grafting in relation to a different time on graft taking the percents of some stinging walnut varieties. Acta Hort. 442, pp. 303–308.

Kűden, A., Kaska N., 1995. Extension of budding period of apples using chip budding, t-budding and English grafting. Acta Hort. 409, pp. 125–132.

Kűden, A., Ctűlen H., 1997. Propadation of apples, pears and plums by grafted cuttings. Acta Hort. 441, pp. 231–236.

Palmer, J. W., Gibbs H., Lupton G., Cashmore W., Tustin S. J., 1994. The Effect of In-Line Spacing on Nursery Tree Quality of Pears on BA 29 and Quince C. Acta Hort. 367, 278–278.