STUDIES ON BIOLOGICAL PECULIARITIES OF GROWTH AND DEVELOPMENT ROOTSTOCK AT DIFFERENT GRAFTING METHODS

STUDII PRIVIND PARTICULARITĂȚILE BIOLOGICE ALE CREŞTERII ŞI DEZVOLTĂRII PORTALTOIULUI LA DIFERITE METODE DE ALTOIRE

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Abstract. *Modernization (improvement) propagation technologies by grafting fruit trees species at the table constitute and is an ongoing concern in the research field, both nationally and internationally. Thus, it requires further research and experiments and after approval of new varieties / rootstocks high value in terms agrobiological to establish the most efficientmethods to increase efficiency work. In this study we proposed modernization of technological sequences on the table and containerization grafting, fruit tree seedlings grafted on different rootstocks and follow the behavior combinations variety / rootstock in the nursery.*
Key words*: table grafting, grafting in "Ω", grafting in "V".*

Rezumat. *Modernizarea (perfecționarea) tehnologiilor de înmulțire a speciilor pomicole prin altoire la masă a constituit şi constituie o preocupare permanentă în domeniul cercetărilor, atât pe plan național, cât şi internațional. Astfel, se impune continuarea cercetărilor şi experimentărilor şi după omologarea unor noi soiuri/portaltoi cu valoare ridicată din punct de vedere agrobiologic pentru a stabili cele mai eficiente metode de lucru pentru creaşterea randamentului la înmulțire. În prezentul studiu ne-am propus modernizarea unor secvențe tehnologice privind altoirea la masă şi containerizare, a materialului săditor pomicol altoit pe diferiți portaltoi şi urmărirea comportării combinațiilor soi/portaltoi în pepinieră.*
Cuvinte cheie: *altoirea la masă, altoirea în "Ω", altoirea în "V".*

INTRODUCTION

Grafting at the table has the advantage that shortens with one year the dates of grafted trees production, allows mechanization for the grafting process reducing the consumption of labor and eliminates the need for specialization for long time (Baciu, 2005). In the production units of grafted trees can be achieved using a continuous flow sheet in which rootstocks and scion branches occur during the growing season, harvested in autumn, is

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maintained and is grafted to the table throughout the rest period (Teodorescu and Neculae, 1998).

A few years ago, worldwide grafting at the table in protected areas are used mainly in walnut, but in recent years, this method was extended to other tree species, considering that it can run in dormant period, ensuring continuous flow of work a limited number of permanent workers (Elfving and Schecter, 1993).

MATERIAL AND METHOD

Like study material were used the varieties: Romus 3, Monica, Stanley and Stella, each one grafted on two rootstocks by three different methods(grafting in "T", "Ω" and "V").

The studies focused the influence of grafting methods on fruit tree seedlings obtained at different tree species.

The experiment was placed in a plot from Raducaneni nursery where was planted rootstocks from apple, pear, plum and cherry at a distance of 0,2 × 0,9 m for grafting method ("T"grafting) and the material grafted at table by two types of joint, first they were perforced (contained, callused and rooted). For each one of species was used two rootstocks which was grafted in August (for"T"grafting) and in March (for table grafting in"Ω"and "V"). In all cases was applied specific technology for nursery, specific agronomic works, phytosanitary treatments, irrigation and in June, fertilization.

The experiment, organized in randomized blocks, with three repetitions, ten tres for each repetition is polyfactorial with three experimental factors studied(4×2×3) resulting 24 variants.

The experimental factors were:

Factor A – species	**Factor B– roothstock**	**Factor C – Grating method**
a1: apple – varietyRomus 3	b1 – high vigor roothstock	c1 – grafting in „T"
a2: pearr – variety Monica	b2 – low vigor roothstock	c2 – grafting in „Ω"
a3: plum – variety Stanley		c3 –grafting in „V"
a4: cherry – varietyStella		

RESULTS AND DISCUSSIONS

1.1 Aspects about tree diameter in different methods of grafting

The mutual interaction between the two symbionts causes changes in the anatomy of hipobiontului but especially the epibiont. For this reason to have a complex image in which the clamping force of the tree grafted and the graft were determined diameter of the tree measured above and below the graft (graft or rootstock diameter) and determining the relationship between the two (Santos, 2004).

At higher values of apple species tree diameter (measured both the scion and the rootstock) were grafted on MM 106 variations recorded in the two methods of grafting at the table to grafting in occultation ("T") (table 1).

Comparing the trees diameter bellow the grafting is found that in use of rootstock with higher vigor (MM 106) as well as small vigor (M 9) together with combination change of both symbionts was an increase in thet hickness

of the rootstock and the scion higher percentagec ompared to the situation in which was grafted inoccultation with latente bud. Regarding the tree above the graft diameter, differences recorded between the two rootstocks grafted variants were statistically significant only at the table grafting variants in"Ω".

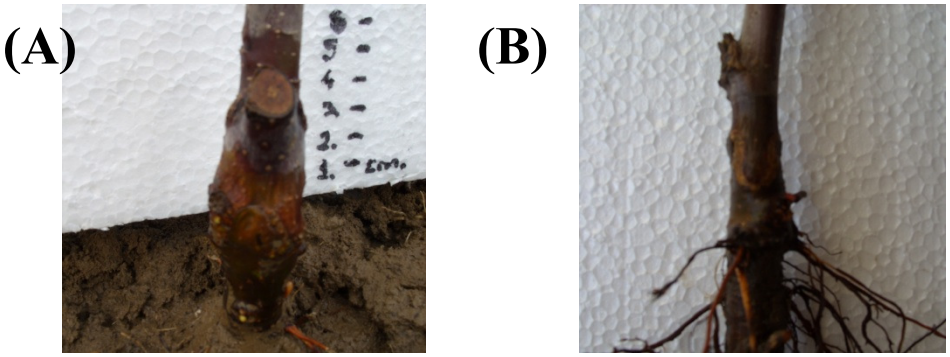

Fig.1 -Apple variety “Romus 3” on roothstock MM106, grafting in “Ω”-(A); grafting in “V” (original)

On pear as in apple species was observed the same trend of increasing diameter trees with using grafting in the table.

Also, there was a clear difference between variants grafted on different rootstocks, values recorded in the case of grafting on rootstocks franc Harbuzesti surpassing ones due to variants grafted on quince (table 1).

Grafting on quince resulted in a decrease of up to 11%, of the diameter of the rootstock grafted version "V" from the control in the case of a reduction of 10.5% graft of this indicator values.Positive differences were reported for grafting in the "Ω" to control and to the grafting of the "V" both above and below the graft (table 1).

In plum, higher values of trunk diameter variations were recorded in grafted on *Prunus cerasifera,* which may be due to the higher vigor of this rootstocks (table 1).

The variants grafted on *Prunus domestica* rootstock grafting methods on the table did not affect significantly the diameter trees under or above the graft, causing a significant decrease of this indicator most of all above the grafting, respectively 1.07 mm (grafting in”Ω”) and 1.62 mm (grafting in "V"). In contrast, the variants grafted on *Prunus cerasifera* values of these indicators were significantly decreased both scion and rootstock diameter just grafting in "V" that was performed grafting (tab.1.1).

It was also observed that grafted on *Prunus domestica* variants have a higher degree of uniformity in respect of the diameter trees (both the scion and the rootstock) to variants grafted on *Prunus cerasifera*.

Table 1

The average diameter of the trunk at speciesa pple, pear, plum and cherry

Variety/ Roothstock	Roothstockdiameter (mm)						Graftdiameter (mm)					
	V1 = „T”	V2 = „Ω”	V3 = „V”	DL 5% (mm)	DL 1% (mm)	DL 0,1% (mm)	V1 = „T”	V2 = „Ω”	V3 = „V”	DL 5% (mm)	DL 1% (mm)	DL 0,1% (mm)
Romus 3/ MM 106	25,72$^{(Mt)}$	28,99 ^{xxx}	26,32	0,82	1,33	2,55	17,21$^{(Mt)}$	24,64^{xxx}	18,36	1,52	2,44	4,51
Romus 3/ M9	22,44$^{(Mt)}$	27,43 ^{xxx}	25,62 ^{xxx}	0,83	1,44	2,64	16,36$^{(Mt)}$	22,15^{xxx}	17,53	1,11	1,81	3,42
Monica/ Harbuzesti	17,36$^{(Mt)}$	18,44	17,67	1,12	1,94	3,53	14,57$^{(M)}$	16,36 ^{xx}	15,40 ^{x}	0,64	1,03	1,95
Monica/ Quincetype A	15,34$^{(Mt)}$	16,45	14,75	1,07	1,87	3,48	12,89$^{(Mt)}$	13,10	12,27	1,79	3,12	5,73
Stanley/ P. Franc	14,28$^{(Mt)}$	13,37	13,12	1,33	2,12	3,87	12,40$^{(Mt)}$	11,33 ^{0}	10,78 ^{00}	0,88	1,46	2,84
Stanley/ P.cerasifera	18,55$^{(Mt)}$	19,23 ^{x}	17,51 ^{00}	0,39	0,67	1,29	16,55$^{(Mt)}$	17,54 ^{x}	15,23 ^{00}	0,85	1,25	2,50
Stella/ IPC1	16,49$^{(Mt)}$	18,31^{xxx}	19,17 ^{xxx}	0,54	0,94	1,65	14,21$^{(Mt)}$	15,81	15,24	1,40	2,38	4,42
Stella/ Mahaleb	19,47$^{(Mt)}$	20,63 ^{xx}	19,70	0,74	1,08	2,04	17,37$^{(Mt)}$	16,53 ^{0}	14,87 ^{00}	0,77	1,17	2,33

In contrast to other species, the species cherry trees values larger diameter (measured at the level of the scion and rootstock) were determined at the variants grafted on the *Prunus mahaleb*, while trees grafted on the IPC1were recorded lowest values of this indicator (table 1).

Analyzing the variation of this indicator in this species was a trend for reduction of its values to the values scion on rootstock grafting rootstock from *Prunus mahaleb*. Although the variants grafted on IPC1, diameter below the graft showed lower values compared to those determined for the variants grafted on *Prunus mahaleb*, it is found that if vegetative rootstock grafted to mass variations recorded significant differences compared to control.

Regarding graft diameter, where grafting was performed on generative rootstock was a decrease in this indicator values were used when grafting on the table instead the trees grafted on rootstocks vegetative state was diametrically opposed, values of this indicator reduced by 10.5% (from grafted variant Ω) and 11.68% (the variant grafted in "V") (table 1).

1.2 Ratio between the diameter graft and the rootstock

The ratio of the diameter of the scion and rootstock is used in literature as an important indicator in evaluating the success of grafting.A report diameter graft / rootstock diameter with values as close to one, indicates a welding and optimal vascularization of the two partners, ensuring normal growth and development subsequently grafted tree.

Regarding the ratio of the diameter of the scion and the rootstock (both measured at 2 cm from the area of grafting) can say that it varied according to species and grafting methods applied (Figure 1).

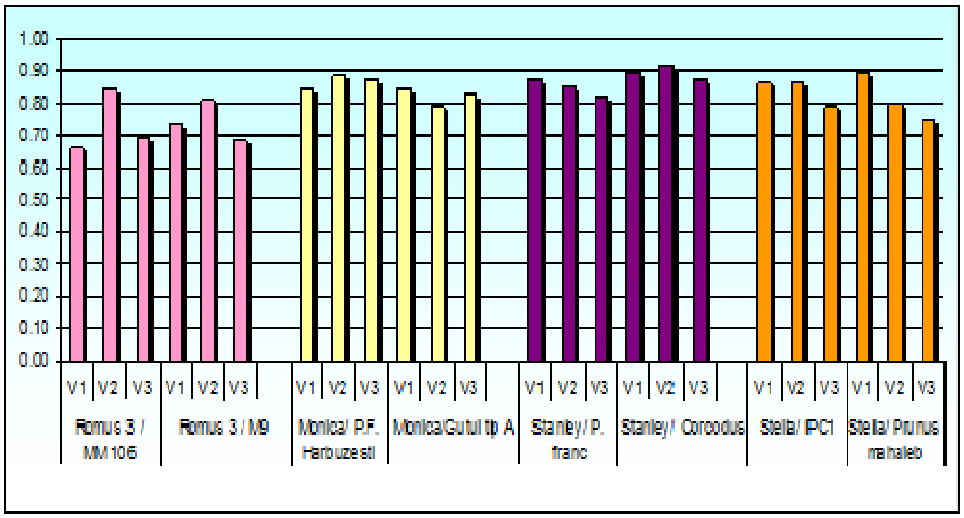

Fig.1- Ratio between diameter graft/diameter rootstock at some tree species using different grafting methods(V1=”T”; V2=”Ω”; V3=”V”)

Increasing the thickness of the rootstock at a rate faster than the scion subunit caused a report to all variants. Pear species (Monica / Quince), plum (Stanley / PF) and cherry grafted on the table, caused a slight decrease in the ratio from field grafted variants (control). It is also possible that in the area of the graft to be some malfunction that prevents assimilate transport to graft thereby limiting growth.

The values of the ratio between the graft and the rootstock diameter increased with the use of "Ω" grafting method, which is up to version Stanley / *Prunus cerasifera*, Monica / PF Harbuzesti, Romus 3 / MM106 and Romus 3 / M9 (Figure 1).

A comparative analysis of the four species can be seen that the influence of grafting methods on the value ratio diameter graft / rootstock diameter is proportional to the vigor rootstock.

CONCLUSIONS

Tree diameter varies with the use of different methods of grafting.This is considered normal, because combining the two symbionts in various forms, causes callus grafting better or less good.

Grafting at the table welding and lead to a better vascularization in variants grafted on rootstocks higher than those at which grafting was performed on smaller rootstocks.

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