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Cepoiu N., Stanica F.

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Preliminary results regarding nursery behaviour of some persimmon cultivars

N. Cepoiu and F. Stanica
Department of Pomology, Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine, B dul Marasti 59, 7131 Bucharest, Romania

SUMMARY – The introduction in Romanian fruit culture of new species and varieties is one of the most important activities of the Pomology Department of the University of Agronomic Sciences and Veterinary Medicine, Bucharest. Recently, persimmon (*Diospyros kaki* L.f.) was included on the list of priorities. This paper presents the nursery behaviour of seven persimmon cultivars: 'Fuyu', 'Hana Fuyu', 'Triumph', 'O'Gosho', 'Rojo Brillante', 'Coroa de Rei', 'Jiro' and one selection, 'CPL', grafted on *Diospyros lotus*. The grafting was done between 17 and 19 April using the growing bud method and the under bark method, after the rootstocks started to grow. After grafting the percent of success was calculated. Scion shoots were pruned during the growing period to obtain an anticipated ramification and later, to stimulate wood preparation for the winter. The scion shoot's ramification angles were enhanced by using a wire ring placed in the centre as support. The measurements and observations suggested that for the 'Rojo Brillante' cultivar both grafting methods can be recommended. 'Fuyu' cultivar showed good results with the growing bud method, as did 'O'Gosho' when the under bark method was used. 'Rojo Brillante' formed the most vigorous plants with multiple anticipate shoots and with a very rich foliar system.

Key words: *Diospyros kaki* L.f., *Diospyros lotus* L., cultivars, grafting, scions growth.

RESUME – *"Résultats préliminaires concernant le comportement en pépinière de certains cultivars de plaqueminier". L'introduction dans la culture fruitière de Roumanie de nouvelles espèces et variétés est l'une des activités les plus importantes du Département de Pomologie de l'Université des Sciences Agronomiques et de Médecine Vétérinaire, Bucarest. Récemment, le plaqueminier (*Diospyros kaki *L.f.) a été incorporé à la liste des priorités. Cet article présente le comportement en pépinière de sept cultivars de plaqueminier : 'Fuyu', 'Hana Fuyu', 'Triumph', 'O'Gosho', 'Rojo Brillante', 'Coroa de Rei', 'Jiro' et une sélection, 'CPL', greffée sur* Diospyros lotus*. Le greffage a été fait entre le 17 et le 19 avril en utilisant la méthode d'écussonnage à oeil poussant et la méthode sous écorce, après que les porte-greffes aient commencé à grandir. Après le greffage, le pourcentage de succès a été calculé. Les pousses de greffons ont été taillées pendant la période de croissance pour obtenir une ramification anticipée, et ensuite pour stimuler la préparation ligneuse pour l'hiver. Les angles de ramification des greffons ont été rehaussés en utilisant comme support un anneau métallique placés centralement. Les mesures et observations suggèrent que pour le cultivar 'Rojo Brillante' les deux méthodes de greffage peuvent être recommandées. Le cultivar 'Fuyu' a montré de bons résultats avec la méthode d'écussonnage à oeil poussant, de même que 'O'Gosho' lorsque l'on a utilisé la méthode sous écorce. 'Rojo Brillante' a formé les plantes les plus vigoureuses avec de multiples bourgeons anticipés et un système foliaire très riche.*

Mots-clés : Diospyros kaki *L.f.,* Diospyros lotus *L., cultivars, greffage, croissance des greffons.*

Introduction

Several trials, regarding the introduction in Romanian fruit culture of subtropical fruit species with deciduous leaves, have been for a long time an important activity of the Pomology Department of the Faculty of Horticulture in Bucharest (Constantinescu, 1957; Cepoiu, 2001). All these trials have become a reality in the last ten years, when exchanges of biologic material have been intensified with countries like Italy, Portugal, Spain, China and the United States. Many collections have been created with newly introduced species and hybrids of *Actinidia deliciosa*, *Asimina triloba*, *Diospyros kaki* and *Zizyphus jujuba.*

In 1995 the first kiwi plantation in Romania was created at S.C. Ostrovit S.A., Ostrov, Constanta County (Stanica and Cepoiu, 1996). Since then, there has been organized collection of Chinese data and, recently, the propagation in nursery of valorous persimmon varieties which will be planted in different ecological conditions within the country.

Materials and methods

The objectives of the research carried out by the Pomology Department were to follow up and to analyse the behaviour of some persimmon varieties (*Diospyros kaki* L.f.) regarding:

(i) The ratio of successful grafting using the growing bud method and the under bark method (Baldini and Scaramuzzi, 1982).

(ii) The vigour and capacity of anticipated ramification of persimmon varieties with different origins.

(iii) The foliar system formation and development for different cultivars.

(iv) Different types of shoots (normal and anticipated) and different leaf positions on the shoot.

For this study seven varieties were used: 'Fuyu', 'Triumph', 'O'Gosho', 'Rojo Brillante', 'Hana Fuyu' (Bellini, 1982), 'Coroa de Rei', 'Jiro' and a Chinese local population – 'CPL'. As rootstock, two-year-old *Diospyros lotus* seedlings, planted at 1×0.25 m distance, were used.

The grafting was done between 17 and 19 April, when the rootstock bark was relatively easily detached using the growing bud method and the under bark method. After the successful grafting, the scion shoots were pruned, when they exceeded 40 cm in length, in order to obtain an anticipated ramification and crown augmentation. The rootstock and scion shoots were bound to a trellis to prevent the scion breaking at the grafting point.

When the anticipated shoots exceeded 40 cm in length, they were also pruned to fortify and to stimulate wood preparation for the winter.

The tree nursery is located on a brown-reddish forestry soil. During the growing period the soil was cultivated and irrigated. In autumn, after the growing had stopped, biometric measurements were performed regarding: (i) the rootstock and scion diameter at the grafting point; (ii) the length of the normal and anticipated shoots; and (iii) the leaf area on the tree and on the shoot, depending on the insertion point.

Results and discussion

The influence of grafting method upon the scion success (Table 1) shows that for the 'Rojo Brillante' variety both the growing bud method (60.3% success) and the bark method (84.3% success) were satisfactory. Relatively similar results were obtained with the 'O'Gosho' variety.

Table 1. Effect of the grafting method on the scion success (%)

Variety	Success of the grafting method (%)	
	Growing bud	Under bark
Fuyu	54.7	41.9
Triumph	31.9	50.0
O'Gosho	54.9	73.6
Rojo Brillante	60.3	84.3
Hana Fuyu	55.1	24.1
Coroa de Rei	63.0	42.8
Jiro	58.4	48.2
CPL	60.4	44.4
Average	54.8	51.1

'Fuyu', 'Hana Fuyu', 'Coroa de Rei' and 'Jiro' varieties and the 'CPL' clone, gave a greater success ratio with the growing bud method (54.7-63.0%), while the 'Triumph' variety with the under bark method (50.0%).

The study of the grafting point on the growing bud method shows relatively small differences in diameter between the scion and the rootstock (Table 2). This proves a very good grafting compatibility between the two species.

Table 2. Growing potential of the *Diospyros kaki* varieties grafted through the growing bud method on *Diospyros lotus* seedlings

Variety	Rootstock diameter (mm)	Scion diameter (mm)	Ratio Ø rootstock/ Ø scion	Number of normal shoots on scion	Total shoots length (cm)
Fuyu	18.1	11.5	1.57	2.6	146.1
Triumph	19.3	11.8	1.63	2.5	156.1
O'Gosho	17.2	12.7	1.35	2.6	129.4
Rojo Brillante	18.4	12.1	1.52	2.2	140.2
Hana Fuyu	18.1	12.4	1.45	2.3	151.4
Coroa de Rei	17.3	12.8	1.35	2.5	161.3
Jiro	18.1	12.6	1.43	2.4	152.6
CPL	18.2	12.3	1.47	2.1	160.1
Average	18.08	12.23	1.47	2.4	149.6

The number of anticipated ramifications is relatively small and the total length of the shoots is at maximum 161.3 cm. Normally, with the grafting through the under bark method, the shoot's growth starts earlier and this fact stimulates growth both at the scion and at the rootstock (Table 3). However, the ratio between the two symbionts is relatively constant.

Table 3. Growing potential of the *Diospyros kaki* varieties grafted through the under bark method on *Diospyros lotus* seedlings

Variety	Rootstock diameter (mm)	Scion diameter (mm)	Ratio Ø rootstock/ Ø scion	Number of normal shoots on scion	Total shoots length (cm)
Fuyu	28.2	16.8	1.67	3.1	291.3
Triumph	29.3	15.4	1.90	2.5	220.1
O'Gosho	27.6	16.1	1.71	3.0	250.2
Rojo Brillante	29.8	18.2	1.63	3.2	310.1
Hana Fuyu	23.5	18.1	1.29	2.1	150.2
Coroa de Rei	25.1	21.3	1.17	4.3	301.4
Jiro	25.6	16.4	1.56	4.2	320.5
CPL	25.3	17.2	1.47	3.8	340.6
Average	26.8	17.4	1.55	3.68	273.0

The biometric measurements show that the total length of the shoots from the trees grafted under bark was 1.82 cm and was greater than the growing bud grafting.

Foliar system development was reduced in the trees grafted through the growing bud method and especially in 'Rojo Brillante', 'O'Gosho' and 'Hana Fuyu' varieties (Table 4).

Table 4. Foliar system development on the trees grafted through the growing bud method

Variety	New formed shoots				Total leaf area (cm^2/tree)
	Normal		Anticipated		
	No.	Leaf area (cm^2)	No.	Leaf area (cm^2)	
Fuyu	2.8	176.1	5.3	86.4	262.5
Triumph	3.1	167.2	5.8	72.5	239.7
O'Gosho	2.9	171.1	4.1	68.4	239.5
Rojo Brillante	3.2	150.4	4.6	75.8	226.2
Hana Fuyu	2.9	159.2	6.2	79.2	237.4
Coroa de Rei	2.6	165.3	5.1	98.4	263.7
Jiro	3.0	173.1	4.5	85.2	258.3
CPL	2.8	167.9	4.0	62.1	230.0
Average	2.9	166.2	4.9	78.5	244.7

With the under bark method, the foliar system was better developed in 'Rojo Brillante' and the 'CPL' clone (Table 5) and more reduced in 'Fuyu' and 'O'Gosho'.

Table 5. Foliar system development on the trees grafted through the under bark method

Variety	New formed shoots				Total leaf area (cm^2/tree)
	Normal		Anticipated		
	No.	Leaf area (cm^2)	No.	Leaf area (cm^2)	
Fuyu	2	196.2	4	38.2	234.4
Triumph	2	210.4	4	81.6	292.0
O'Gosho	2	170.5	5	75.2	245.7
Rojo Brillante	2	246.2	3	96.1	342.3
Hana Fuyu	1	253.1	4	66.2	319.3
Coroa de Rei	3	190.2	6	75.3	265.5
Jiro	3	215.6	7	54.2	269.8
CPL	2	230.1	5	99.4	329.5
Average	2.1	214.0	4.7	73.2	287.3

According to Table 6, we can see that the foliar system is better developed in the middle third of the normal and anticipated shoots (40.5% and 46.3%) and not so developed in the inferior third (22.7% and 23.2%). Certain uniformity of the foliar system along the normal shoots was observed in 'Rojo Brillante' and the anticipated shoots of the 'Hana Fuyu' variety.

Conclusions

The studied *Diospyros kaki* varieties had good behaviour with regard to grafting on the *Diospyros lotus* rootstock (with a few exceptions), giving a success ratio of the growing bud grafting of 54.8% and the under bark grafting of 51.1%.

'Rojo Brillante' and 'O'Gosho' varieties assured the highest scion success ratio using the under

bark grafting method (84.3% and 83.6% respectively). The 'Rojo Brillante' variety assured a uniform development of the foliar system for all the length of the normal shoots, and the 'Hana Fuyu' variety for the anticipated shoots.

Table 6. Ramification of the scion shoots on persimmon trees grafted through the under bark method

Variety	New formed shoots on scion (%)					
	Normal			Anticipated		
	Lower 1/3	Middle 1/3	Upper 1/3	Lower 1/3	Middle 1/3	Upper 1/3
Fuyu	25.4	49.9	24.7	21.9	44.6	33.5
Triumph	21.4	47.1	31.5	30.9	46.0	23.1
O'Gosho	22.8	39.8	37.4	17.6	49.1	33.3
Rojo Brillante	32.1	38.5	29.4	24.7	50.7	24.6
Hana Fuyu	23.9	40.9	35.2	30.3	36.3	33.4
Coroa de Rei	19.9	35.0	45.1	18.4	57.3	24.3
Jiro	19.4	34.9	45.7	18.0	50.0	32.0
CPL	16.4	38.3	45.3	23.8	36.2	40.0
Average	22.7	40.5	36.8	23.2	46.3	30.5

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