

RESEARCH ON THE GRAFTING AFFINITY OF VARIETY FOR WHITE WINES 'VRANCEA' ON ROOTSTOCKS WITH DROUGHT RESISTANCE

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ABSTRACT

Climate changes have considerably influenced the evolution of the thermal and water regime annually and during the growing season in the viticultural ecosystem of the Odobești vineyard. The use of drought-resistant rootstocks for grafting is one of the solutions to counteract this extreme phenomenon, which is increasingly present in the wine-growing areas of southern Moldova. The present paper presents preliminary results regarding the grafting affinity of the 'Vrancea' white wine grape variety created at RDSVO Odobești, on three rootstocks with drought tolerance obtained in the Romanian viticultural research (Drăgășani 70). M., 'Crăciunel 71 Bl.', 'Ruggeri 140 Vl.'). The rootstock 'Berlandieri x Riparia Sel. Oppenheim 4 –4 Bl.', was taken into the study as a control. The obtained results show a good and very good grafting affinity of the Vrancea variety on the 'Ruggeri 140 Vl.' rootstock.

INTRODUCTION

Grafting affinity is an essential condition in the production of good quality viticultural planting material, while production affinity is the basic requirement for the establishment of new vine plantations with superior technological potential. Scientific research carried out over time has demonstrated once again that in the case of grapevine grafting there is a mutual influence of the grafted partners (Stoian et al., 2004; Köse et al., 2014; Ungureanu et al., 2021). Thus, the rootstock exerts a strong influence on growth (Constantinescu et al., 1966), fertility, resistance to drought, at minimum temperatures, productivity (Martin et al., 1973; Țardea and Rotaru, 2003), as well as oenological potential (Taran et al., 2017). In the context of current climate changes that have led to the significant manifestation of the drought phenomenon in many wine-growing areas (Santos et. al., 2020; Pușcalău et al., 2021), the use of rootstocks with drought resistance is increasingly necessary (Mărculescu et al., 2006). Establishing the most suitable rootstock varieties for grafting newly created vinifera varieties is one of the main objectives for the establishment of new vineyards, justifying current research on establishing the grafting affinity and production affinity of these varieties on different rootstock varieties.

MATERIAL AND METHODS

The research was carried out at RDSVO Odobești during 2022-2023, and the experimental device included four experimental variants, each with three repetitions. The variety for quality white wines 'Vrancea' was obtained at RDSVO

Odobești from the crossing of the hybrid combination ('Traminer'x 'Armaș') with the variety 'Feteasca regală' and approved in 2018 (Fig. 1). The 'Vrancea' vine variety was grafted onto three rootstock clones with drought resistance obtained in Romania: 'Berlandieri x Riparia - Sel. Drăgășani 70 M.' provided by RDSVO Drăgășani, 'Teleki 8 B - Sel. Crăciunel 71 Bl.' provided by RDSVO Blaj and 'Ruggeri 140 – Sel. 59 Vl.' provided by RDIVO Valea Călugărească (Fig. 2). The rootstock 'Berlandieri x Riparia Sel.Oppenheim 4 –clone 4 Bl', the most used for grafting in the Odobești wine growing area was used as a control.



Figure 1. 'Vrancea' variety - young shoot, grape and adult leaf (original)

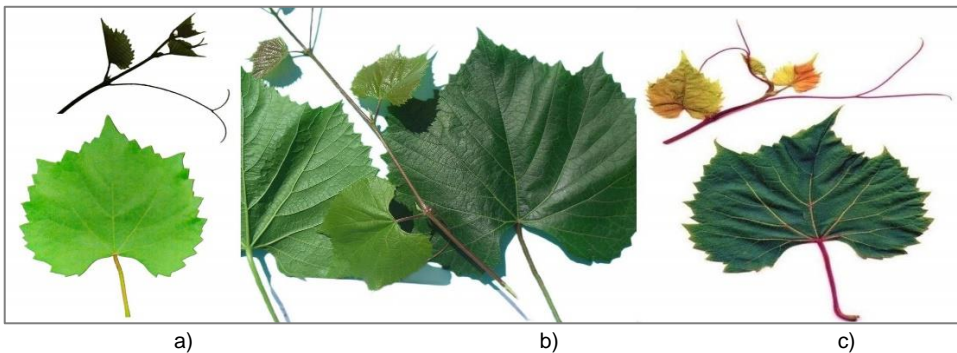


Figure 2. Rootstock cultivars studied: a) 'Sel. Drăgășani 70 M'; b) 'Sel. Crăciunel 71 Bl.'; c) 'Ruggeri 140 – Sel. 59 Vl.'

The grafting was carried out mechanized in the "omega" system. The forcing of the grafted cuttings was done by the method with total stratification with sawdust and external heating. The planting of the cuttings in the vine nursery was done in linear soil beds made in the spring, on which a drip irrigation hose was placed. To determine the grafting affinity, after forcing and hardening the graft cuttings, the formation of circular callus at the grafting point, the growth of shoots from the grafts and the formation of roots at the base of the rootstock were observed in particular. After harvesting the vines from the nursery, the yield and quality of the seedlings were monitored for each variant of the experiment. The obtained data were statistically processed for analysis of variance using the statistical analysis program FoxPro/LAN 2.0.

RESULTS AND DISCUSSIONS

The analysis of the data obtained after forcing and hardening the grafted cuttings shows that the percentage of grafted cuttings with circular callus at the grafting point was higher in the case of grafting on 'Sel rootstocks. Drăgășani 70 M.' (97.1%) and 'Ruggeri 140 - Sel. 59 VI.' (91.7%) (Table 1).

Table 1

Data obtained from forging and hardening grafted cuttings

Variant	Grafting affinity – parameters (%)		
	Cuttings with circular callus at grafting point	Cuttings with shoots from grafts	Cuttings with roots at the base
'Vrancea'/Sel. Drăgășani 70 M.	97.1	91.3	57.9
'Vrancea'/ Sel. Crăciunel 71 Bl.	76.9	76.9	45.5
'Vrancea'/ Sel. Ruggeri 140 - 59 VI	91.7	91.7	62.9
'Vrancea'/Sel.Opp. 4 – 4 Bl. (control)	67.6	59.8	32.4

Cuttings grafted on rootstocks 'Sel. Crăciunel 71 Bl.', presented a lower callus index (76.9%), a value close to the control rootstock 'Berlandieri x Riparia Sel.Oppenheim 4 – 4 Bl.' (67.7%). After hardening, before planting in the vine school, the average percentage of cuttings with shoots from grafts was higher when using rootstocks 'Ruggeri 140 – Sel. 59 VI.' and 'Sel. Drăgășani 70 M.' (91.7% respectively 91.3%), and smaller on the rootstock 'Sel. Crăciunel 71 Bl.' (76.9%), but above the value recorded by the witness rootstock (59.8%). Regarding the formation of roots at the base of the grafted cuttings, the obtained data demonstrate that the type of rootstock influences both the duration of the rooting period and the number of rooted cuttings. The percentage of grafted cuttings with roots at the base was higher in the variant in which the rootstock 'Ruggeri 140 – Sel 59 VI.' was used for grafting (62.87%) and the rootstock 'Sel. Drăgășani 70 M.' (57.97%). If it was used for rootstock grafting 'Sel. Crăciunel 71 Bl.', 45.5% of cuttings with roots were recorded. The lowest number of rooted cuttings was recorded in cuttings grafted on the control rootstock 'Sel. Oppenheim. 4 – 4 Bl.' (32.3%).

The statistical interpretation of the experimental data obtained after forcing and hardening of the graft cuttings, shows distinctly significant differences regarding the cuttings with circular callus at the grafting point in the case of grafting on 'Sel Drăgășani 70 M.' and 'Ruggeri 140 – Sel. 59 VI.' rootstocks, compared to the control rootstock (Table 2).

Table 2

Cuttings with circular callus

Variant	Cuttings with circular callus at grafting point			
	% vines with circular callus	%	Difference (%)	Significant
'Vrancea'/'Sel. Drăgășani 70 M.'	97.10	143.53	29.45	**
'Vrancea'/'Sel. Crăciunel 71 Bl.'	76.98	113.79	9.33	ns
'Vrancea'/'Ruggeri 140 -Sel. 59 VI.'	91.66	135.49	24.01	**
'Vrancea'/'Sel. Opp.4-4 Bl.' (control)	67.65	100.00	0.00	-
DL (P 5%)		14.5977		
DL (P 1%)		22.1051		
DL (P 0.1%)		35.5112		

In the case of grafting on rootstocks 'Berlandieri x Riparia - Sel. Drăgășani 70 M.', the 'Vrancea' variety did not show significant differences.

Regarding cuttings with shoots from grafts that started to grow, distinctly significant differences compared to the control rootstock were registered in case of grafting on 'Sel. Drăgășani 70 M.' and 'Ruggeri 140 – Sel 59 VI.', and significant differences in the case of grafting on rootstocks 'Sel. Crăciunel 71 Bl.' (Table 3).

Table 3.
Cuttings with shoots from grafts started to grow for 'Vrancea' grape cultivar

Variant	Cuttings with shoots from grafts started to grow			
	% vines with shoots	%	Diference (±%)	Significant
'Vrancea'/'Sel. Drăgășani 70 M.'	91.30	152.68	31.50	**
'Vrancea'/'Sel. Crăciunel 71 Bl.'	76.98	128.73	17.18	*
'Vrancea'/'Ruggeri 140-Sel. 59 VI.'	91.66	153.28	31.86	**
'Vrancea'/'Sel. Opp.4-4 Bl.' (control)	59.80	100.00	0.00	-
DL (P 5%)	14.0157			
DL (P 1%)	21.2238			
DL (P 0.1%)	34.0953			

The variance analysis regarding the percentage of cuttings with roots at the base of the rootstock established very significant differences in the case of grafting on 'Sel. Drăgășani 70 M.' and 'Ruggeri 140 – Sel 59 VI.' rootstocks, and significant differences in the case of grafting on 'Sel. Crăciunel 71 Bl.' compared to control rootstock 'Sel. Oppenheim 4 – 4 Bl.' (Table 4).

Table 4
Cuttings with roots at the base of the rootstock, after hardening

Variant	Cuttings with roots at the base of the rootstock, after hardening (%)			
	vine with roots	%	Diference (±%)	Significant
'Vrancea' / 'Sel. Drăgășani 70 M.'	57.97	179.20	25.62	***
'Vrancea' / 'Sel. Crăciunel 71 Bl.'	45.45	140.49	13.10	*
'Vrancea' / 'Ruggeri 140 -Sel. 59 VI.'	62.87	194.34	30.52	***
'Vrancea' / 'Sel. Oppenheim 4-4 Bl.' (control)	32.35	100.00	0.00	-
DL (P 5%)	9.9608			
DL (P 1%)	15.0835			
DL (P 0.1%)	24.2312			

The basic criterion that determines the establishment of grafting affinity is the yield and quality of the grafted vines (Fig 3). The data presented in table 6 confirm the fact that in the combined graft/rootstock interaction, the best results were obtained in the case of grafting on the rootstock 'Ruggeri 140 – Sel. 59 VI.' (62.4%) followed by the rootstock 'Sel. Drăgășani 70 M.' (43.5%) and the lowest on the Sel

rootstock. Crăciunel 71 Bl. (24.7%), close to the value of the witness rootstock 'Sel. Oppenheim 4 – 4 Bl.' (21.5%).



Figure 3. Grafted vines and planting in the vine nursery

The statistical interpretation of the experimental data obtained after classification the grafted vines, shows distinctly significant differences for the rootstock "Ruggeri 140 - Sel. 59 VI.", with an increase of grafted planting material of 40.8%, compared to the control rootstock ('Sel. Oppenheim 4 – 4 Bl.') and significant differences for the rootstock 'Sel. Drăgășani 70 M.', with an increase in grafted planting material of 21.9%, compared to the control rootstock. (Table 8).

Table 5.

The yield of planting material obtained after classification the vines

Variant	Yield obtained in the vine nursery %	%	Diference (±%)	Significant
'Vrancea' x 'Sel. Drăgășani 70 M.'	43.48	201.95	21.95	*
'Vrancea' x 'Sel. Crăciunel 71 Bl.'	24.68	114.63	3.15	ns
'Vrancea' x 'Ruggeri 140 -Sel. 59 VI.'	62.37	289.69	40.84	**
'Vrancea' x 'Sel. Oppenheim 4-4 Bl.' (control)	21.53	100.00	0.00	-
DL (P 5%)		17.1550		
DL (P 1%)		25.9776		
DL (P 0.1%)		41.7322		

CONCLUSIONS

Preliminary research on establishing the grafting affinity of the 'Vrancea' variety in interaction with the three rootstocks with drought resistance demonstrated the existence of significant differences compared to the control rootstock.

The variety 'Vrancea' presented distinctly significant differences in terms of the percentage of graft cuttings with circular callus at the grafting point and the percentage of shoots starting to grow from the graft, in the case of grafting on 'Sel. Drăgășani 70 M.' and 'Ruggeri 140 – Sel. 59 VI.' rootstock.

Also, very significant differences were recorded compared to the control rootstock for the percentage of cuttings with roots at the base of the rootstock in the case of grafting on 'Sel. Drăgășani 70 M.' and 'Ruggeri 140 – Sel. 59 VI.' rootstock.

The cultivar for white wines 'Vrancea' showed distinctly significant and significant differences in the case of grafting on the rootstock 'Ruggeri 140 – Sel 59 VI.', respectively on the rootstock 'Sel. Drăgășani 70 M.'.

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