ROOTSTOCK INFLUENCE ON THE WELL BALANCED VEGETATIVE AND YIELDING CAPACITY OF MERLOT GRAPE VARIETY GROWN IN VALEA CALUGAREASCA VITICULTURAL CENTRE

INFLUENȚA PORTALTOIULUI ASUPRA ECHILIBRULUI VEGETATIV ŞI PRODUCTIV AL SOIULUI MERLOT ÎN CENTRUL VITICOL VALEA CĂLUGĂREASCĂ

ION M., BRÎNDUŞE ELENA, ŞERDINESCU A., PÂRCĂLABU LILIANA
Research and Development Institute for Viticulture and Enology
Valea Călugărească

Abstract. *The research works carried aimed at establishing the parameters which are appropriate for the relationship system involving vinifera variety ~ rootstock partner ~ soil ~ climate ~ potential crop ~ grape as a raw material for the winemaking process ~ wine, as a background for finding out some scientific evidence in which the rootstock partner achieve the vigor ~ quantity ~ quality optimum for the Merlot variety.*

Were used roostoocks belonging to the species Vitis vinifera (RG clon 93) as well as hybrid Berlandieri x Riparia (8 B, 5 BB, 2 C, SO 4-4, 125 AA, 57 D, 26 C, 71 C), Berlandieri x Rupestris (140 Ru) and Vinifera x Berlandieri (41 B).

The interaction between the rootstock partner and the Merlot variety were complex, influencing the whole practical physiological and biochemical activity from plant with more or less evidently about the vegetative growing, fertility and productivity of the vine and quality yields.

From the analysis index using for the assessing the vegetative-productive balance (Ravaz index, growth-yield balance index, cm^2 leaf area/gram crop weight ratio) result that rootstocks 26 C and 140 Ru in the combination of graft with the Merlot variety have insured an quantitative and qualitative harvest.

Rezumat. *Cercetările efectuate au vizat parametrizarea sistemului de relații soi vinifera ~ portaltoi ~ sol ~ climă ~ strugure materie primă pentru vinificare ~ vin, ca bază pentru fundamentarea unei soluții ştiințifice în care prin partenerul portaltoi să se realizeze optimul vigoare~cantitate~calitate la soiul Merlot.*

Au fost folosiți portaltoi aparținând speciei Vitis riparia (R G clon 93) precum şi hibrizi Berlandieri x Riparia (8B, 5BB, 2C, SO4-4, 125 AA, 57D, 26C, 71C), Berlandieri x Rupestis (140 Ru) şi Vinifera x Berlandieri (41 B).

Interacțiunea dintre partenerul portaltoi şi soiul Merlot din combinația de altoire a fost complexă, influențând practic întreaga activitate fiziologică, şi biochimică din plantă cu repercusiuni mai mult sau mai puțin evidente asupra creşterilor vegetative, fertilității şi productivității butucilor şi calității producției de struguri;

Din analiza indicatorilor folosiți pentru aprecierea echilibrului vegeto-productiv (indicele Ravaz, indicele echilibrului vegetativ, raportul cm^2 suprafață foliară/ g strugure), a rezultat că portaltoii: 26C şi 140 Ru în combinația de altoire cu soiul Merlot au asigurat o relație optimă între creştere şi rodire cu efecte benefice asupra proiectarii recoltei cantitative şi calitative de struguri.

Knowing for each vinifera variety, the relationships which established between growth and yield presents a different importance in the modern viticulture The research works developed and winegrowing practice demonstrated that rootstock exercised an important influence about quality grapes, affecting the yield level through vigor confered of the vinifera variety. For this reason the quanitative-qualitative relation isn't unique, she albe to be changed by the rootstock partner (Pouget, 1987).

MATERIAL AND METHOD

The research works carried out in ecological stationary located in Valea Calugareasca vineyard within 1998-2004 by using Merlot variety grafted on a large range of roostocks with a different genetic provenance. Were used rootstocks belonging to the species Vitis riparia (R G clon 93) as well as hybrid Berlandieri x Riparia (8B, 5BB, 2C, SO4-4, 125 AA, 57D, 26C, 71C), Berlandieri x Rupestis(140 Ru) and Vinifera x Berlandieri(41 B).

The climatic conditions of Valea Călugărească vineyard were characterised within 1998-2004 by rich helyothermic resources on the relative background of deficient resources which ensured good conditions for obtaining high quality yields.

The mollic vertic reddish brown soil in the ecological stationary units presents physico-chemical characteristics which are favourable for the grapevine crop.

The vines were planted at a distance of 2 x 1 m. The training system was Spurred Cordon.

The following observations and determinations were made: intensity of the main physiological processes in the vine (photosynthesis, transpiration, respiration), by using an automatic analyser (LCA 4), the content in chlorophyll and carotenoid pigments in leaves, fertility and productivity of the vine, grape production (average weight of one grape, number of grapes/vine, yield, sugar content, acidity).

The relationship established between growth and production were exprimates by synthetic index: Ravaz index, (the ratio yield/pruning weight), growth-yield balace index (the ration between pruning weight x 100/grape yield + pruning weight (Maccarone and Scienza, 1996), leaf area productivity representing ration between the leaf area (cm^2) and the grape yield (g).

RESULTS AND DISCUSSIONS

Due to the fact that in a grafting combination the metabolic functions are distributed between two different genotypes, their interaction influences also on the intensity of the physiological processes developing in the plant (Table1).

The photosynthetic activity was more intense in case of Merlot variety in combination with 26C (5.44 µmol $CO_2/m^2/s$) and 125AA (5.30 µmol $CO_2/m^2/s$). The lowest values of the photosynthesis process intensity were registered in case of Merlot variety in combination with 41B (4.12 µmol $CO_2/m^2/s$) and 8B (4.22 µmol $CO_2/m^2/s$).

The respiration process intensity oscillated within relatively reduced limits, between 2.22 µmol $CO_2/m^2/s$ (125AA) and 3.01 µmol $CO_2/m^2/s$ (57D).

The intensity of the transpiration process ranged in between the limits of 3.06 mmol $H_2O/m^2/s$ (8B) and 4.12 mmol $H_2O/m^2/s$ (140 Ru, 125 AA).

Table 1

Intensity of the physiological processes in case of the Merlot variety, according to the rootstock (mean values for the flowering and veraison stages)

Rootstock	Photosynthesis intensity $\mu molsCO_2/m^2/s$	Respiration intensity $\mu molsCO_2/m^2/s$	Transpiration intensity $mmols\ H_2O/m^2/s$
93RG	4.43	2.11	4.07
140 Ru	4.66	2.78	4.12
41 B	4.12	2.98	3.88
5BB	4.76	2.83	3.99
SO4-4	4.60	2.57	3.71
71 C	4.30	2.56	3.25
2C	4.71	2.50	3.39
26 C	5.44	2.45	3.49
8B	4.22	2.73	3.06
57 D	4.29	3.01	3.77
125 AA	5.30	2.22	4.12
Mean	4.62	2.61	3.71

The research works showed that the leaf content in chlorophyll pigments registered higher values in case of Merlot variety in combination with 41 B (368.08 mg/100 g), 125 AA (367.36 mg/100 g) and 26 C (365.98 mg/100 g), and least in case of the combinations with rootstocks: 140 Ru (321. 40 mg /100 g) and 71 C (326. 43 mg /100 g). The carotenoid pigments content oscillated in between 7. 65 mg/100 g (8 B) and 18. 30 mg /100 g (5 BB)(Table 2).

Table 2

Influence of the rootstock partner on the leaf content in chlorophyll pigments (mean values for the flowering and veraison stages)

Rootstock	Chlorophyll „a" mg/100 g	Chlorophyll„ b" mg /100 g	Total chlorophyll pigments mg /100 g	Carotenoid pigments mg/100 g	Ratio Chlorophyll/ Caroten
93RG	265,68	73,72	339,40	14,43	27,18
140 Ru	217,75	103,66	321,40	15,84	19,68
41 B	285,31	82,77	368,08	13,92	28,07
5BB	270,81	88,33	359,14	18,30	24,92
SO4-4	275,70	71,85	347,54	9,09	39,76
71 C	255,54	70,89	326,43	8,74	37,29
2C	266,28	72,10	338,38	11,09	30,90
26 C	283,83	82,16	365,98	9,17	42,55
8B	260,67	93,73	354,39	7,65	45,98
57 D	263,40	70,54	333,94	11,90	30,09
125 AA	279,99	87,37	367,36	8,14	45,46
Mean	265.91	81.56	347.46	11.66	33.81

The ratio between chlorophyll and carotenoid pigments registered higher values in case of Merlot variety in combination with 8 B (45. 98) and 26 C (42. 55) and the lowest values were registered in case of Merlot variety in combination with 140 Ru (19. 68).

The differentiated influence induced by the rootstocks parteners on the physiological and biochemical processes in the grapevine differently influenced on on the productivity of the grapevines and the quality of the grape yield (Table 3). In respect of the grape yield, the greatest yields were obtained in case of the 26 C rootstock (2,60 Kg/vine). The rootstocks had a moderate influence on the average weight of a bunch, with except for 93 RG rootstock which induced the highest value. From among the rootstock parteners, the greatest value of the relative productivity index was registred in case of 26 C rootstock.

Tabelul 3

Influence of the rootstocks parteners on the productivity of the grapevines on the quality indexes of the grape yield

Rootstock	Yield Kg/vine.	Average weight of a bunch g	Absolute productivity index	Relative productivity index	Sugar g/l	Total acidity g/l H_2SO_4
93RG	2,25	89	141	86	221	3,7
140 Ru	2,40	89	146	92	217	3,7
41 B	2,17	105	156	83	218	3,9
5BB	2,37	90	149	91	218	3,8
SO4-4	2,24	101	159	86	213	3,7
71 C	2,32	105	153	89	219	3,6
2C	2,19	112	159	84	213	3,7
26 C	2,60	106	158	100	219	3,9
8B	2,14	100	151	82	215	3,8
57 D	2,09	98	151	80	219	3,6
125 AA	2,41	122	168	93	216	4,1
Mean	2.29	102	154	88	217	3.8

The rootstock parteners belonging to the hybrid Berlandieri x Riparia had a different behavior, achieving as much maximum quantitative (26C) quotient and minimum quantitative (57D), the other rootstocks presenting the intermediate values.The 41B rootstock, supposed as improvig the yield grapes (Constantinescu and colab., 1967) influenced in negativ sense the yield grapes to the Merlot variety, registering a less productivity level that 93RG rootstock.The 5BB rootstock, upmost in the winegrowing plantations, inducted a productive level around the average rootstocks using in experimentation, but less that 26 C rootstock.

The sugar accumulation in grapes depended in a little measure of rootstocks used in the graft combinations.The rootstocks which induced the highest sugar content were 93 RG, 26 C, 71 C and 57 D.

The rootstocks had a moderate influence on the acidity.

Grapevine rootstocks can have a significant influence on the optimisation of the vine's growth and fructification.The Ravaz index oscillated between 5,7 (2 C and 41 B) and 7,5(26 C), the results obtained being concordantly with results aquired of Betiga(2003). Among grapevine rootstocks used in the combinations of

graft with the Merlot variety is remarked 26 C which inducted a moderate vigor and a very productive level (fig.1.).

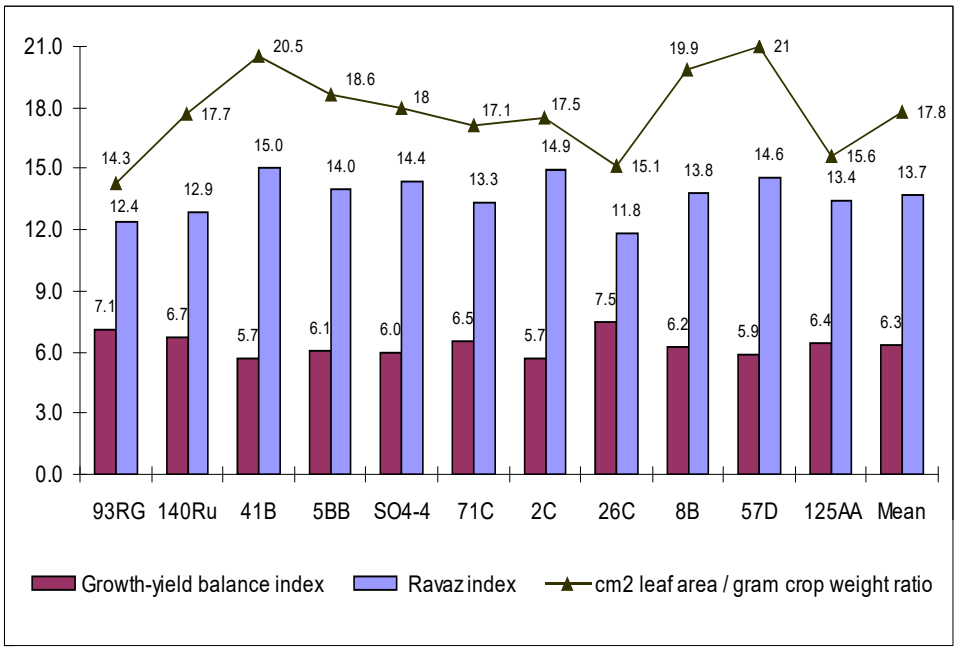

Fig. 1. Influence of the rootstocks parteners on the vine's growth and fructification

The growth-yield balance index, reprezenting the ratio between pruning weight x 100 / grape yield + pruning weight showed the percent contribution on the vegetative part to the whole production. After this index in the Merlot variety case emphasized the following rootstocks: 26 C (11, 8), 93 RG (12, 4) and 140 Ru (12, 9). The greatest growth-yield balance index values were obtained in case of the following rootstocks: 41 B (15, 0), 2 C (14, 9) and 57 D (14, 6). which inducted the low productive potential.

For Merlot variety the cm^2 leaf area / gram crop weight ratio required for optimal level of 26 C, 125 AA, 93 RG and 140 Ru rootstocks (fig. 1).

CONCLUSIONS

The experimented grapevine rootstocks had a differentiated influence on the physiological and nutritional processes in grapevine, implied in the quantitative and qualitative building up of the grape yield.

The analysis of the results obtained emhasized that 26 C and 140 Ru rootstocks in the combination of graft with the Merlot variety induced an high physiological and biochemical activity, assuring an optimum relation between growth and fructification with profitable effects on projection of quantitative harvest and qualitative of grapes.

In report with 5BB rootstock, upmost in the winegrowing plantations from our country, these rootstocks achieved an equilibrium between growth and fructification and may be recommended for establishing a new winegrowing plantations in Valea Calugareasca vineyard.

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