RESEARCH REGARDING THE INFLUENCE OF ROOTING SUBTRATE IN FERTILE POTS ON YIELD OF GRAFTED VINES, AT S.C. JIDVEI S.R.L, TÂRNAVE VINEYARD

CERCETĂRI PRIVIND INFLUENŢA SUBSTRATULUI DE ÎNRĂDĂCINARE IN GHIVECE NUTRITIVE, ASUPRA RANDAMENTULUI DE VIŢE ALTOITE LA S.C. JIDVEI S.R.L., PODGORIA TÂRNAVE

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Abstract. *At SC Jidvei S.R.L., the biological material used in the experience was represented by Fetească regală grape variety grafted on rootstock SO4, clone 762. For rooting of the grafted vines were used three variants of mixtures: A - 50% forest ground, 30% red peat, 15% sand, 5% conifer sawdust, B - 60% of forest ground, 25% black peat, 10 % sand, 5% conifer sawdust, C - 70% forest ground, 15% sand, 15% conifer sawdust. At variant B has been registered the largest percentage of primordial roots at grafted vines (25%), as well the highest rooting percentage (81.1). The biggest increases at grafted vines, expressed by the length and diameter of shoots, have been obtained at variant B and at variant C were recorded the lowest shoots increases. At variant B has been obtained the highest percentage of quality grafted vines (91.5%) and also at this variant were recorded the lowest losses (6.1% vines entered in vegetation and dried after that and 1.5% vines unstarted in growth).*

Key words: grafted vines, fertile pots, nutritive substrate, peat, sand, sawdust

Rezumat. *Materialul biologic folosit în experienţa de la S.C. Jidvei S.R.L. este reprezentat de soiul Fetească regală altoit pe portaltoiul SO4-762. Pentru înrădăcinarea viţelor altoite s-au utilizat trei variante de amestec: A - 50% pământ de pădure, 30% turbă roşie, 15% nisip, 5% rumeguş de conifere; B - 60% pământ de pădure, 25% turbă neagră, 10% nisip, 5% rumeguş de conifere; C - 70% pământ de pădure, 15% nisip, 15% rumeguş de conifere. Varianta B a înregistrat cele mai mari procente de viţe la care au apărut primordiile rădăcinilor (25%) şi cele mai ridicat procent de înrădăcinare (81,1). Cea mai mare vigoare de creştere a viţelor altoite (lungimea şi diametrul lăstarilor) a fost obţinută la varianta B, iar cele mai reduse creşteri au fost înregistrate la varianta C. La varianta B s-a obţinut cel mai mare procent de viţe altoite înrădăcinate de calitate (91,5) şi s-au înregistrat cele mai mici pierderi (6,1% viţe pornite în vegetaţie şi uscate, respectiv 1,5% viţe nepornite în vegetaţie).*

Cuvinte cheie: viţe altoite, fertil-pot, subtrat nutritive, turbă, nisip, rumeguş

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INTRODUCTION

The rooting of grapevine planting material in controlled environment rooms, used for filling gaps in vineyards or for the establishment of new vineyard, was initiated in Germany in the early 1930's (Becker et al. 1970). Later, the method has been acquired, improved and promoted in France, where it passed to the production of grafted vines in pots made of cardboard, the method called *"en cartonnage"* (Guillot, 1977). Since 1977, the Barbier company began the producing grafted vines in nutrient pots from pressed peat, of tapered shape with 10 cm height, using a mixture of 60% peat, 20% sand, 20% ground (Board, 2005).

In Romania, after the studies carried out was reached to the optimum values regarding the shape, size and material of the nutrient pots and also to the mixtures composition and rooting planting method (Grecu, 1983). At SCPVV Iaşi, the best results, from point of view of the rooting mixture for filling pots, were obtained with a mixture 25% sand, 50% peat and 25% ground. In exchange, at I.C.V.V. Valea Călugărească the best results (70% yield of quality vines) were obtained with a mixture composed of 33% peat, 33% compost and 33% river sand (Pop, 2010). At Jidvei, have been obtained good results (75% yield of quality vines) at rooting cuttings in polyethylene bags using a mixture of 20% ground, 25% sand, 40% peat and 15% compost (Grecu and Comşa, 1986).

MATERIAL AND METHOD

The experience was carried out at S.C. JIDVEI S.R.L., in complex of grafting and of planting material production. The biological material used was Fetească regală variety (Jidvei) grafted on rootstock SO 4, clone 762 (France). After grafting and forcing, the grafted vines have been acclimatized in tunnel greenhouses.

Vines rooting were done in pots of pressed cardboard, Fertil-Pot type, with 7/9 cm size. For rooting of grafted vines were used three types of nutrient mixtures. The diference between types of nutrient mixtures, consist in using from different quantities of each component for nutrient mixtures: forest soil, peat, sawdust and sand. The pH correction of nutrient mixture was made with calcium carbonate.

A - 50% forest ground, 30% red peat, 15% sand, 5% conifer sawdust;

B - 60% forest ground, 25% black peat, 10% sand, 5% conifer sawdust;

C - 70% forest ground, 15% sand, 15% conifer sawdust.

For each variant were rooted 10,000 grafted vines. At each variant were 10 repetitions with 1000 vines each.

In the first week after planting in tunnel greenhouses, the temperature is maintained at 25-30°C and after this period, the temperature decreases to 20-22°C. In first two weeks, until the first leaves appearances, the air hygroscopicity was around 85% and then 60%. The nutrient mixture humidity is maintained at an optimal humidity level by weekly watering (28-30% weight of rooting mixture).

Pests and diseases combating were done by carrying out of weekly treatments with the products of contact and systemic. The radicular and foliar fertilization was done with hydrosoluble fertilizer based NPK and with micronutrients. After around 3-4 weeks of fortifying, were removed all rootstock shoots and have been pinched the rest of shoots. During vines rooting the following observations and determinations have been made:

- the weight at each variant to the pots with nutrient mixture,

- percentage of primordial roots,
- percentage of roots out from pot,
- the length (cm) and diameter (mm) of the shoots, measured above the first leaf to the shoots, with electronic caliper,
- percentage of quality grafted vines (I, II and III vines quality),
- percentage of vines entered in vegetation and dried then,
- percentage of vines unstarted on growth %,
- percentage of grafted vines which can be used for planting.

The statistical interpretation of experimental data was performed by analysis of variance, using "t test" (Ardelean, 2007).

RESULTS AND DISCUSSIONS

The results were negative for the three variants of the mixture after testing the nutrient mixture samples to detect the nematodes from *Longidoridae* and *Globera* families.

Variant C had the bigger pots weight, because the percentages of ground (70%) and sand (15%) were higher than variants A and B. After statistical processing of data, the values assured statistic were recorded to all the three variant, with significant positive differences compared to the experience average (282.17 g), considered as control.

Table1

Influence of pots with nutrient mixture regarding the rooting of grafted vines

Nutrient mixture variant	The mean weight of fertile pots with nutrient mixture, g	Root appearance after 10 days %	Root output from Fertile Pots %		
			After 15 days	After 25 days	After 30 days
A (forest ground, red peat, sand, sawdust)	247.90^{o} ± 2.16	18.30^{oo} ± 1.13	19.40* ± 0.48	50.30^{o} ± 1.68	75.30* ± 1.54
B (forest ground, black peat, sand, sawdust)	274.70$^{(o)}$ ± 4.04	24.30* ± 0.90	23.20* ± 0.63	66.00^{ns} ± 1.26	81.10* ± 1.50
C (forest ground, sand, sawdust)	323.90* ± 6.86	15.90^{o} ± 1.17	12.50^{ns} ± 0.56	41.10^{ns} ± 0.75	58.10^{ns} ± 1.39
Experience average	282.17 ± 6.42	19.50 ± 0.89	18.18 ± 0.88	52.47 ± 2.04	71.50 ± 1.99

The content in nitrogen and organo-mineral materials of soil mixtures had favored positively the rooting of vines cuttings. The values recorded, at all three variants of soil mixtures, were statistically assured compared with the experience average (19.5%). Among these, B variant had the highest percentage of vines with primordial roots (almost 25%). Variant C, to which it was used only forest soil, sand and sawdust, had not registered satisfactory results, rooting percentage being only of 15.9% (table 1).

Regarding the percentage of roots out from nutrient pots was studied their rate growth. Pots were thinning to avoiding the thickening and interpenetration of roots, after which appreciation was done the rooting percentage (%). Variant B had the best rooting percentage after planting: 23.2% after 15 days; 66.0% after 25 days 66.0 and 81.1% after 30 days. At all the three moments of observations, to variant C, average values obtained were not assured statistically.

As regard the shoots length, measured after 20, 25 and 30 days, for the all three variants were obtained values, positive and negative, statistically assured, compared with experience averages (15.97; 18.18 respectively 25.53 cm). Variant B, but also the experience average, has presented statistically significantly higher values compared to variants A and C, in all three moments to measuring of the length and diameter shoots (table 2).

Table 2

Growth vigor of the grafted vines

Variant	Shoot lenght cm			Shoot diameter mm		
	20 th day	25 th day	30 th day	20 th day	25 th day	30 th day
A (forest ground, red peat, sand, sawdust)	15.10^{oo} ±0.87	19.30^{oo} ± 1.05	25.10^{oo} ± 0.77	2.21** ± 0.12	3.39^{oo} ± 0.05	4.09^{oo} ± 0.24
B (forest ground, black peat, sand, sawdust)	18.20* ± 0.79	24.20* ± 1.30	30.20* ± 1.25	2.22** ± 0.19	3.77* ± 0.07	4.81* ± 0.12
C (forest ground, sand, sawdust)	14.60^{o} ± 0.86	16.90^{o} ± 0.80	21.30^{o} ± 1.40	2.13^{oo} ± 0.14	3.13^{o} ± 0.15	3.83^{o} ± 0.08
Experience average	15.97 ± 0.55	18.18 ± 0.88	25.53 ± 0.94	2.19 ± 0.09	3.43 ± 0.07	4.24 ± 0.12

The shoots diameter, at the second internode, doubled within 10 days since the first classification for all variants. The obvious increase in diameter was at variant B, where the diameter increased from 2.22 mm, after 10 days, to 4.81 mm, after 30 days. At the experience end, shoots diameter to all the three variants has different values, with limits ranging between 3.83 mm (variant C) to 4.81 mm (variant B), on which the deviation of shoots diameter were significantly higher compared to the experience average. To the variant C, shoots diameter of grafted vines have less than 4 mm, so these vines were not classified in the quality standard (table 3).

During rooting period, on 20, 25 and 30 days after planting in nutrient pots, were made three rankings of grafted vines. At classifying, the grafted vine must have at least: 15 cm length of shoots, 2 mm of shoots diameter and the roots must to be out of pots.

According to table 3, at the first vines clasification, the variants B and A have recorded significantly higher results, of 83.10% respectively of 80.40%, than

the experience average of 77.73% grafted vines, in quality standard. In the same time, the variant C value (69.70%) was significantly below to experience average. Surprisingly, at the second and the third classification, variant C had higher percentages (7.30% and 3.80% standard grafted vines), compared to variants A and B, but also compared to the experience average (6.10% and 3.07%).

Table 3

Quality of grafted vines obtained in Fertile Pots

Variant	First ranking % 20th day	Second ranking % 25th day	Third ranking % 30th day	Vines entered in vegetation and dried then, %	Vines unstarted on growth, %	Quality grafted vines %
A (forest ground, red peat, sand, sawdust)	80.40* ± 1.42	4.40^{o} ± 0.56	2.20^{o} ± 0.25	12.20* ± 0.25	2.20** ± 0.25	86.20** ± 1.73
B (forest ground, black peat, sand, sawdust)	83.10* ± 1.68	6.60** ± 0.69	3.20** ± 0.66	6.10^{ns} ± 0.48	1.50^{0} ± 0.22	91.50** ± 0.22
C (forest ground, sand, sawdust)	69.70^{o} ± 2.15	7.30** ± 0.42	3.80*** ± 0.59	18.80* ± 1.34	2.40*** ± 0.34	77.40^{oo} ± 1.63
Experience average	77.73 ± 1.46	6.10 ± 0.39	3.07 ± 0.32	12.37 ± 1.07	2.03 ± 0.17	85.03 ± 1.33

A major criterion concerning the rooting of grafted vines on different nutritive substrates is the percentage of vines entered in vegetation and dried then. At variant B was recorded the lowest percentage of vines entered in vegetation and dried then (6.1%) compared to variants A (12.2%) and C (18.8%), which had significantly higher percentages compared to the experience average (12.37%).

After data processing, from table 3, it can see a high variability between the examined character averages (grafts unstarted in vegetation), and between the examined character and the experience average. It is noted that the values recorded in variants A (2.2%) and C (2.4%) are superior the experience average (2.03%). The variant B had the lowest percentage of grafts unstarted in vegetation (1.5%), the value being below the experience average. In this case, the results showed a great influence of the substrate on entering in vegetation of the grafted vines.

Regarding the best percentage of quality grafted vines (20 cm minimum shoots length and at least 4 mm shoots diameter at the second internode), were recorded differences distinct significantly higher than experience average (85.03%) at variants A (86.2%) and B (91.5%), on which it was used peat in composition of the nutritive mixture. The variant C (77.4%) had the worst results, below the experience average.

CONCLUSIONS

1. As regard the rooting of grafted vines, variant B presented the best percentage of rooting in Fertil - Pots (81.10%).

2. Measurements made on shoots (length and diameter) have showed that the best results were obtained at variant B (black peat), followed by variant A (red peat) and the worst results were to variant C (forest soil, sawdust and sand).

3. To the first classification of grafted vines have been recorded results significantly higher than the experience average (77.73%) at the variants B (83.1%) and A (80.4%), while the variant C value (69.7%) was significantly below compared to the experience average.

4. At variant B (black peat) was registered the lower rate of the grafts that entering in vegetation and dried then (6.1%), the smaller percentage of grafts unstarted in vegetation (1.5%), but also the best percentage of quality grafted vines (91.5%).

5. Recommendations: The use of the Fertile Pots has the following advantages:

- favors a fast roots growth,
- an uniformity of vines growing,
- high yields of quality grafted vines,
- an undisturbing vines roots at planting,
- a easy removal of any impurities,
- a reduced cost by shortening of the growing season,
- a superior exploitation of land surface,
- a better control of environment conditions,
- a reducing the cost of planting material.

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