

# THE INFLUENCE OF PARRAFIN TYPE ON MAIN CHARACTERS REGARDING GRAFTED VINES QUALITY, AT S.C. JIDVEI SRL, TÂRNAVE VINEYARD

## INFLUENȚA TIPULUI DE PARAFINĂ ASUPRA PRINCIPALELOR CARACTERE URMĂRITE PRIVIND CALITATEA VIȚELOR ALTOITE LA S.C. JIDVEI S.R.L., PODGORIA TÂRNAVE

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**Abstract.** Experience was held at S.C. Jidvei S.R.L., using grape varieties Muscat Ottonel and Fetească regală grafted on SO4 rootstock, clone 762. After grafting, cuttings were dipped in three types of paraffin wax: standard, with 8-Chinolinol and with Oxyquinoleină. Using paraffin 8-Chinolinol the variety Fetească regală was obtained the best callusing (3.8), the largest width of the callus (2.62), highest callusing percentage (93.0), best percentage of bud graft starting (82.5) and the best rooting (rooting degree, root diameter). Cuttings buds paraffined with 8-Chinolinol started in vegetation after 7 days after forcing beginning, they needed the shortest forcing period (12 days) and have obtained the best yield of grafted vines (82.8%). At the variants where has used the standard paraffin, studied parameters recorded the worst results.

**Key words:** grafted vines, paraffin, callusing, rooting

**Rezumat.** Experiența s-a desfășurat la S.C. Jidvei S.R.L., folosind ca material biologic soiurile Muscat Ottonel și Fetească regală altoite pe portaltoiul SO4, clona 762. După altoire, butașii s-au parafinat cu trei tipuri de parafină: standard și cu hormonii de calusare: 8-Chinolinol și Oxyquinoleină. Folosind parafina cu 8-Chinolinol la soiul Fetească regală, s-a obținut cel mai bun grad de calusare (3,8), cea mai mare lățime a calusului (2,62), cel mai mare procent de calusare (93,0), cel mai bun procent de pornire a mugurilor altoi (82,5), cea mai bună înrădăcinare (gradul de înrădăcinare, diametrul rădăcinilor). Mugurii altoi parafinați cu 8-chinolinol au pornit în vegetație după 7 zile de la începutul forțării, au avut nevoie de cea mai scurtă perioadă de forțare (12 zile) și s-au obținut cel mai randament de vițe altoite (82,8%). La variantele la care s-a folosit parafina standard parametrilor studiați au fost înregistrate cele mai slabe rezultate.

**Cuvinte cheie:** vițe altoite, parafină, calusare, înrădăcinare

## INTRODUCTION

Plant hurting, as it is in grafting case, determines physiological processes to heal the wound. Wound healing is made by a formations appearance, an

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agglomeration of cells called callus. Callus formation is influenced by many factors: genetics, the presence of stimulants, the nutritional levels of cutting and rootstock, grafting method, the environmental conditions. Callus should be moderate and evenly formed around the point of grafting, if is too abundant, would flowing, pushing up the graft and if is too weak it does not provide good vascularization (Romberger, 1979).

In the callus forming, paraffin has a particularly important role, so that the paraffin, through its composition should not inhibit the formation of new formations. Hunter et al., 2004, indicates that the callus formation, as scar tissue and welding is an inherited physiological trait, so not all varieties are genetically prone to form callus.

The accretion process takes place as far as welding calluses, is followed by the binding of generating areas, which occurs through physiological differentiation of callus cells under influence of the generating areas of partners (Vişoiu et al., 2002).

## MATERIAL AND METHOD

The experiment was conducted in the production complex of grapevine planting material at SC Jidvei SRL. The grape varieties used in the experiment were Ottonel Muscat (Hungary) and Fetească regală (Jidvei). The varieties were grafted on SO4 rootstock, clone 762 (France).

The graft canes preparation, consisted in testing of the buds viability (by transversal sectioning), in disinfecting and trimming in one eye cuttings. Canes rootstock were soaked and disinfected with Cryptonol solution 3.5% and after that the canes have been shaped in cuttings of  $30 \pm 2$  cm length.

Grafting was done in omega section, mechanically. After grafting, the cuttings were dipped in three types of paraffin wax: a standard wax and the other two types with callusing hormones: 8-Chinololol and Oxyquinolein. The six obtained variants are the following:

- V1 - Muscat Ottonel / standard paraffin
- V2 - Muscat Ottonel / 8 – chinolololol paraffin
- V3 - Muscat Ottonel / oxyquinolein paraffin
- V4- Fetească regală / standard paraffin
- V5 - Fetască regală / 8 – chinolololol paraffin
- V6 - Fetească regală / oxyquinolein paraffin

The cuttings stratification has been done in boxes with pine sawdust. In the first three days in callusing room the temperature was assured to 32°C , and then the temperature has decreased to 30°C, remaining constant until the forcing end. Over the cycle the cuttings forcing was done in absence of light by covering them with a geotextile fabric over which was placed a 5 cm layer of sawdust. Air humidity was maintained 85%. The experience variants were placed in randomized blocs with repetitions. Thus, for each variant were made three repetitions of 30 grafted vines, resulting 90 cuttings per variant. The following measurements and determinations were made at the end of forcing cycle:

- **callusing degree** (0-4) (Celik, 2000): 0 - no callus, 1 - callus formed in 25%, 2 - callus formed in 50%, 3 - callus formed in 75%, 4 - callus formed at 100%;
- **the callus width** (0-4) (Hamdan, 2010): 0 - less than 2 mm, 1 - between 2,1-5.0 mm, 2 - between 5.1-8.0 mm, 3 - between 8.1-11.0 mm, 4 - more than 11.1 mm;

-**the percentage of callusing cuttings** means the number of grafted cuttings that have well formed callus, circularly, all around the grafting point (I category) per 100;

- **the percentage of grafted buds start in vegetation** means the number of cuttings that have the grafted buds start in vegetation at the end of forcing cycle per 100;

- **the degree of shoots increase** (0-4) (Celik, 2000): 0 - no shoots; 1 - weak formed shoots, with diameters less than 1 mm; 2 - medium size shoots, with diameter between 1.1 to 2.0 mm; 3 - vigorously shoots with diameter from 2.1 to 2.5 mm; 4 - very vigorous shoots, more than 2.5 mm in diameter;

- **rooting degree** (0-3) (Hamdan, 2010): 0 - no formed roots; 1 - formed 1-3 roots, 2 - formed 4-6 roots, 3 - formed more than 7 roots;

- **the roots diameter** (0-2) (Hamdan, 2010): 0 - the root diameter smaller than 1 mm, 1 - diameter from 1.1 to 2.0 mm, 2 - over 2 mm in diameter;

- **yield of grafted vines**: number of grafted cuttings of category I, which have well-defined and formed new parties (callus, shoots, roots), reported at 100;

- **the startup day in vegetation of grafted buds**, was considered when the grafted vines were started in vegetation more than 20%;

- **duration of forcing cycle** - forcing cycle is considered ended when the 95% of grafted buds started in vegetation or even they have the shoots with formed leaves;

Statistical interpretation of experience results was made with Duncan test (Ardelean, 2007).

## RESULTS AND DISCUSSIONS

The callus appearance occurred after three to four days after placing in the forcing chamber of cuttings. In favorable environmental conditions, in presence of hormonal substances and under the influence of the injury excitation, meristematic cells from the section surface, as well the cells in the immediately adjacent layers, begin to dividing extensively and formed callus (parenchymal tissue with undifferentiated cells, a fundamentally new tissue, called wound tissue) (Tangolar, 1996).

Excessive proliferation of new tissue cells (callus) is not beneficial in the welding of the two partners (graft and rootstock) due to unnecessary consumption of reserve substances (carbohydrates). Temperature plays a critical role in callus formation during the forcing, so high temperatures (above 30°C) favor the formation of a fragile callus, easily damaged and the separation of the two partners on further handling.

The experience results show that variant V5 have the best callusing degree (3.8), also the largest callus width (2.62) and the highest callusing percentage (93.0). The results of variant V5 were statistically equal with those of the variant V2. For all studied parameters the worst results were obtained at variant V1 (table 1).

The percentage of startup in vegetation at grafted buds is an indicator at least as important as the previous one, the callusing percentage. After the grafts were introduced in forcing room from the 8 to the 9 day, the growth of graft buds begins. At the end of forcing cycle, in most cases (if the forcing conditions in room are complied), most of the cuttings formed shoots with leaf.

Duration of a forcing cycle is of 12-14 days, so there is no danger to etiolate the growth shoots.

Table 1

**Influence of the paraffin type on callusing degree, shoot growth and rooting**

Variant	Callusing degree (0-4)	Callus width (0-4)	Callusing percentage (%)	Percentage of grafted buds at startup in vegetation (%)	Shoot growth degree (0-4)	Rooting degree (0-3)	Root diameter (0-2)
V1	2.70 e	2.05 d	63.00 e	59.30 e	2.50 d	1.27 c	0.87 c
V2	3.60 ab	2.50 ab	89.30 a	77.00 b	2.80 b	1.58 b	1.03 ab
V3	3.20 cd	2.27 b	75.50 c	69.00 c	2.80 b	1.54 b	0.95 bc
V4	3.10 d	2.22 c	67.30 de	73.00 d	2.80 b	1.54 b	0.93 c
V5	3.80 a	2.62 a	93.00 a	82.50a	3.10 a	1.69 a	1.07 a
V6	3.50 b	2.41 c	80.30 bc	77.30 b	2.70 c	1.72 a	1.10 a
DS 5%	0.30	0.13-0.14	5.00	3.00	0.10-0.20	0.09	0.09-0.10

In vine practice at Jidvei, using SO 4 rootstock, clone 762 for grafting the varieties Fetească regală and Muscat Ottonel, were achieved good results regarding percentage of first quality grafts (95% at Fetească regală and 93% at Muscat Ottonel) (Corbean et al., 2009).

To the six variants resulting from the interaction of variety x paraffin, the statistic significance of differences show that V5 had the best starting percentage (82.5%), at significant difference from the variants V2 (77.3%) and V6 (77.3 %). The worst results were obtained in V3 (69.0%) and V1 (59.3%), significantly lower than all variants.

The degree of shoots formation is not very high (maximum value is equal to 4) which means that no matter of type paraffin is used, the varieties did not have an excessive development and so it can be appreciated that grafting material produced, will behave well in nursery vine. Once again, the variant V5 had the best results in regard to form shoots (3.10) followed at significant difference by V2 (2.80). The shoots formed were weakest at variant V1 (2.50) (table 1).

In the experience, no variant had the vigorous roots that exceed 2.0 mm diameter. The best rooting was at variant V5 (1.69 – rooting degree, 1.07 - roots diameter), followed by the variant V2 (1.58 – rooting degree, 1.03 – roots diameter). The worst results of rooting were at variant V1 with the lowest number of roots (1.27) and the most fragile roots (0.87) (table 1).

In new technologies for production of grapevine planting material, the forcing cycle duration is shorter, from 14 to 15 days (Corbean et al., 2009), compared to classical methods when the cycle duration is between 18 to 21 days (Pop, 2010). This is very important, from organizational and economically perspective, because are reduced the production costs, in particular the heating expenses. Creating the favorable environmental conditions stimulates the emergence of new the formations: callus, shoots and roots.

Regarding the influence of the three types of paraffin on the startup in vegetation at grafted buds, it is noted that buds graft from Fetească regală variety paraffined with 8-Chinolol induce earliness of this character (table 2). Thus, cuttings paraffined with 8-Chinolol started in vegetation after the 7th day of forcing, while if is used the standard paraffin or the paraffin with Oxyquinolein, the cuttings have started a day later. The most delayed variant was V1, which start after 9.03 days of the forcing cycle.

Table 2

**Influence of the paraffin type regarding the startup in vegetation at grafted buds, the duration of forcing cycle startup and the grafted vines yield**

Variant	The day of startup in vegetation at grafted buds (days)	Duration of forcing cycle (days)	Grafted vines yield (%)
V1	9.03 a	15.50 a	55.70 e
V2	7.03 c	12.40 c	76.70 b
V3	8.07 b	14.30 b	68.70 c
V4	8.07 b	15.10 ab	64.60 d
V5	7.03 c	12.00 c	82.80 a
V6	8.03 b	13.00 c	77.30 b
DS 5%	0.26-0.28	1.20	2.00

The differences significance on the six variants, resulting from the interaction variety x paraffin type, highlights the variant V5 (12 days), with the shortest forcing period at all variants. The variant V5 (12.0 days) is statistically equal to variants V2 (12.4 days) and V6 (13.9 days). The longest forcing cycle duration was to the variant V1 (15.5 days), at significant difference compared to all variants.

The yield of grafted vines after forcing cycle was the best at variant V5 (82.8%), followed at significant difference by the variants V6 (77.3%) and V2 (76.7%). The lowest values of grafted vines yield were to the variants that used standard paraffin V4 (64.6%) and V1 (55.7%).

## CONCLUSIONS

1. The startup in vegetation of grafted buds and the shoots growth, in light absence did not affected the quality of grafted vines.

2. The callusing capacity is almost equal at the two varieties analyzed (Fetească regală and Muscat Ottonel) and the paraffin type used had a decisive influence in the callus forming (callusing degree, the callus width, the callusing percentage).

3. It can be concluded that the best results for all the analyzed parameters have been obtained to variant V5, followed at a significant difference by variant V2. The worst results were recorded to variant V1 (Muscat Ottonel / standard paraffin).

4. The paraffin with 8-chinolinal favored an early start of grafted buds in the forcing room, at both varieties: Fetească regală and Muscat Ottonel. This thing has consequences regarding the economic benefits (reducing energy costs and labor force) but also in terms of the planting material quality.

5. Regarding the experience at the Jidvei, the forcing cycle was shorter (12.2 days) than the classical method (18-21 days) at the variant where is used 8-Chinolinal paraffin to both varieties: Fetească regală and Muscat Ottonel.

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