INFLUENCE OF BIOTIC AND ABIOTIC FACTORS ON THE MULTIPLICATION RATE OF QUINCE

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Abstract - A series of exploring experiences within each stage of the in vitro culture was necessary because of the complexity of the pursuing aspects and because of lacking information in the specific literature. We studied the in vitro multiplication capacity of the quince tree function of the nutritive medium structure, genotype and vegetation stage of the biological material we drew explants from.

Keywords - in vitro biotechnology, nutritive medium, prelevation moments, quince.

I. INTRODUCTION

In vitro multiplication stage can be considered the flagship of in vitro biotechnology plant that makes their performance to be the most spectacular time of planting material. In vitro multiplication capacity is expressed by the multiplication rate, based on the number of adventitious offshoot obtained from an explant (offshoot/explant). Multiplication rate is an indicator which varies from species to species and even from within its cultivar to cultivar, ranging between 2R3 offshoot and 30R40 offshoot/explant. Therefore, knowing the rate of multiplication is absolutely mandatory when used in vitro multiplication industrial-scale production plant. By knowing the multiplication rate on determine the number of subcultures function of number of plants scheduled to occur in a given period.

II. PROBLEM FORMULATION

Variable factors:
A. Cultivar:
   A.1 – Moldovenesti
   A.2 – Aromate
   A.3 – Aurii
B. Nutritive medium:
   B.1 - Murashige&Skoog (1962)
   B.2 - Fossard (1977)
   B.3 - Lepoivre (1977)
   B.4 - Woody Plant Medium (1981)
C. Prelevation moments:
   C.1 – November- starting vegetative pause
   C.2 – February- out of vegetative pause

Specificity tested nutritive medium for in vitro multiplication of varieties of quince, is that they be composed AG3 (1 ml/L), BAP (10 ml/L), ANA (2ml/L) in all nutritive medium.

III. PROBLEM SOLUTION

In vitro multiplication capacity function of nutritive medium, for different cultivars:
The statistical interpretation of the results shows that at the average effect the higher average rate of 10.2 is obtained by nutritive medium B.2. Differences from all other nutritive mediums are provided statistical (Figure 1).

![Figure 1](image-url)

A value close to 9.2 of multiplication rate is recorded in the nutritive medium B.1, where average differences over all other nutritive medium are also statistically assured. B.3 nutritive medium resulted in obtaining a lower multiplication rate of 7.7, the differences being statistically assured from other graduations of B factor. Lowest multiplication rate value of 4.2 was obtained on B.4 medium, the value being significantly lower compared to all other nutritive mediums. Analyzing the interaction of factors B x A (nutritive mediums x cultivar) can be seen that the mode of action of factor B is different for all cultivars. Thus, the nutritive medium B.2, Moldovenesti cultivar recorded the highest rate of multiplication of 12, differences from all other nutritive mediums are provided statistical average.
Next lower rate of multiplication was obtained on nutritive medium B.3 of 11, with differences statistically assured. The lowest rates of multiplication were carried out on nutritive mediums B.1 and B.4 with values of 10.3 and 8 respectively. For Aromate cultivar, the highest multiplication rate is 6 and is carried out on nutritive medium B.3, differences from all other nutritive mediums are provided statistical average. The lowest multiplication rate is recorded on B.4 nutritive medium (2), value being significantly lower compared to other nutritive mediums. Aurii cultivar best results were obtained on nutritive medium B.2.

On this nutritive medium the multiplication rate is 13, differences from all other nutritive mediums are provided statistical average. Follows the order, multiplication medium B.1 with a multiplication rate of 12 and B.3 with 6, with differences statistically assured. The lowest multiplication rate (2.5) is recorded on B.4 nutritive medium, the value being significantly lower compared to all other nutritive mediums.

**In vitro multiplication capacity function of cultivars, for different nutritive mediums:**

The results obtained in vitro multiplication of quince cultivars filled literature in this field. Thus, the interpretation of experimental data obtained shows that although differences between the cultivars studied belong to the same species and are in vitro multiplied on the same nutritive medium, the differences between them are in some cases from simple to double (Figure 2).

Statistical interpretation of the influence of cultivar on the multiplication rate shows that for average effect of nutritive medium, the highest multiplication rate of 10.4 has Moldovenesti cultivar, differences from other two cultivars were statistically assured (Figure 2). It is followed by the Aurii cultivar with a multiplication rate level of 8.4 and differences from other cultivars are statistically assured. On the last place on the multiplication rate is Aromate cultivar with an average of 4.6 offshoots/explant, the value being significantly lower compared with the other values.

Analyzing the interaction between factors A x B (cultivar x nutritive medium) it was observed that the Aurii cultivar carried out the highest rate of multiplication (13) on nutritive medium B.2 and the differences from the other two cultivars are statistically assured. With a value below the multiplication rate (12) is Moldovenesti cultivar. The lowest multiplication rate (5,5) is observed at Aromate cultivar.

Cultivars under study had a good attitude on B.1 nutritive medium, with a maximum rate of multiplication of 12, registered at Aurii followed by Moldovenesti cultivar with 10.3 offshoots/explant, the differences being statistically assured. On this nutritive medium, the Aromate cultivar has the lowest multiplication rate (5), the differences being statistically assured.

Cultivars under study had a good attitude on B.3 nutritive medium, with values of multiplication rate of 11 offshoots/explant at Moldovenesti and 6 offshoots/explant at others, the differences being statistically assured. The lowest results are registered on B.4 nutritive medium.

**In vitro multiplication capacity function of nutritive medium, for different prelevation moments of explants:**

Between nutritive medium, that is most important abiotic factor and prelevation moments of explants is an interaction undeniable. Analyzing the interaction between the nutritive medium and average effect of prelevation moments of explants shows that the nutritive medium B.2 influences most the multiplication rate.

The highest multiplication rate is carried out on nutritive medium B.2 of 10,16, with differences statistically assured from the other nutritive mediums. It is followed by B.1 and B.3 with a multiplication rate of 9,16, respectively, with differences statistically assured. The lowest multiplication rate values in the interaction between those two factors is made on B.4 medium of 4,16. Making an analysis between the two factors, shows that the nutritive mediums affect multiplication rate equally to both graduations of prelevation moments of explants (Figure 3).

Statistical interpretation of the influence of nutritive medium B.2, this being 10,66 for out of vegetative pause (February), differences from the other nutritive mediums are statistically assured.

Follow the multiplication rate influenced by the nutritive medium B.1, for the same prelevation moments of explants worth 9,66 and it is statistically assured.

Multiplication rate determined by the nutritive medium B.3 is 8 and the lowest rate of multiplication is performed by B.4, this being 4,33.

The maximum multiplication rate achieved according to the nutritive medium for the starting vegetative pause (November) is 9,66 on B.2.

Follow the multiplication rate influenced by the nutritive medium B.1 for the same prelevation moments worth 8,55 and B.3 with 7,33, differences being statistically assured.

The lowest multiplication rate, for this prelevation moments is recorded on the nutritive medium B.4 of 4, the value being significantly lower compared to other values of nutritive mediums.

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**Figure 2**

*In vitro* multiplication rate (number of offshoot/explant) function of cultivars for different nutritive mediums
In vitro multiplication rate (number of offshoot/explant) function of nutritive mediums for different prelevation moments

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<td>B4</td>
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* Test Duncan (P<0.05)

In vitro multiplication capacity function of prelevation moments of explants, for different nutritive medium:

Particularly interesting is the interaction between factors C x B (prelevation moments x nutritive medium).

The two levels of prelevation moments have low influence for the four nutritive mediums and consequently, for their average. Regarding prelevation moments, for average effect Regarding the influence of prelevation moments for the average effect of nutritive mediums shows that the multiplication rate values are similar: 8.16 at the out of vegetative pause and 7.41 at the starting vegetative pause (Figure 4).

Analyzing the interaction between prelevation moments of explants and nutritive mediums shows that the trend is maintained.

The highest values of the multiplication rate of 10.66 is obtained out of vegetative pause, against 9.66 at the beginning of vegetative pause, for the same nutritive medium (B.2).

Differences between the two prelevation moments of explants are statistically assured (Figure 4). The greatest value of the multiplication rate, for out of vegetative pause, on the nutritive medium B.1 is 9.66 against 8.55, the value recorded in the same nutritive medium to starting vegetative pause (November).

Worst results were obtained for both periods of prelevation moments on nutritive medium B.4, where the influence of prelevation moments of explants on nutritive mediums is reduced.

For quince, the version with best result for the Aurii cultivar has been on nutritive medium B.2.

We confirm that the nutritive medium in the multiplication process is very important.

Valuable results of the multiplication rate were obtained out of vegetative pause (February).
• The results confirmed that cultivar is the most important biotic factor in the in vitro multiplication of plants. Broth with the same three species studied had a different behavior with different levels of purpose in multiplication rate.
• Within the same nutritive medium conditions, the 3 studied cultivars behaved differently ending in different levels of multiplication rate. The cultivar influence was also obvious while interacting with the explants drawing time.

REFERENCES