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The effect of the chemical composition of different nutrient media on micropropagation in pear cultivars Giffard Beurre and Wiliam pear

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ABSTRACT

This study was carried out in the period 2015 – 2016, in laboratory for *in vitro* propagation of the Fruit-Growing Institute – Plovdiv. It has been reported the micropropagation of two pear cultivars – Giffard Beurre and William pear on solid and liquid nutrient media with different chemical compositions. These cultivars are not Incompatibility with quince rootstock. Quince sometimes used as a dwarfing rootstock for pear, but only certain pear cultivars are directly compatible with quince. For example the pear cultivars Old Home, Anjou, Comice, Hardy, Gorham, Flemish Beauty and others are all compatible with quince, but the cultivars Bartlett, Bosc, Seckel, Winter Nelis, and others are not (Westwood, 1993). We used Tissue Culture Methods for pear micropropagation. The results show that the micropropagated plants of both cultures are highly dependent from the composition of the tissue culture nutrient media. The methods can be used for getting a lot of plants on own roots and will not need grafting.

Key words: Nutrient media, micropropagation, *in vitro*, Giffard Beurre, Wiliam pear

Introduction

The pear is valuable fruit crop in our and international market. In the last years the cultivated areas with this culture are significantly reduced. Reasons for this are Fire blight caused by the enterobacterium *Erwinia amylovora* and difficult to produce graft plant propagating material on quince (*Cidonia oblonga*) rootstock. By biotechnological methods can be produce fruit crops plants on own roots. In this case, the grafting is not necessary. The produce plants are free from viruses, with guaranteed varietal authenticity.

The aim of this study is effect of the chemical composition of different nutrient media on micropropagation in pear cultivars Giffard Beurre and William pear.

Materials and Methods

Attempts are reproduced in laboratory for *in vitro* propagation of the Fruit-Growing Institute – Plovdiv in period 2015 – 2016. For source material used plant explants by two pear cultivars – Giffard Beurre and William pear, propagated with micropropagation methods. In order to enhance the multiplication coefficient, the explants was cultivated on three different nutrient media with different

content of Major salts (macronutrients), minor salts (micronutrients), vitamins and plant grow regulators in two different forms (solid and liquid). They cultivated on tissue culture nutrient medium:

1. QL-MS nutrient media-solid, included: macronutrients in (Quoirin & Lepoivre, 1977), micronutrient (Murashige & Skoog, 1962), vitamins (Murashige & Skoog, 1962), BAP 0.5 mg/l, IBA 0.1mg/l, sucrose 30 g/l, agar-agar 5.8 g/l, pH 5.6-5.8;

2. L-S nutrient media solid, included: macronutrients in (Murashige & Skoog, 1962), micronutrients in (Murashige & Skoog, 1962), vitamins (Linsmaier & Skoog, 1965) – BAP 0.5 mg/l, IAA 0.05 mg/l, sucrose 30 g/l, agar-agar 5.8 g/l, pH 5.6-5.8;

3. MS solid, included: macronutrients in (Murashige & Skoog, 1962), micronutrients in (Murashige & Skoog, 1962), vitamins (Murashige & Skoog, 1962), BAP 0.5 mg/l, IAA 0.05 mg/l, sucrose 30 g/l, agar-agar 5.8 g/l, pH 5.6-5.8.

The liquid nutrient media it is with the same chemical ingredients like solid, but without agar:

4. QL-MS nutrient media-liquid, included: macronutrients in (Quoirin & Lepoivre, 1977), micronutrients in (Murashige & Skoog, 1962), vitamins (Murashige & Skoog, 1962), BAP 0.5mg/l, IBA 0.1 mg/l, sucrose 30 g/l, pH 5.6-5.8;

5. L-S liquid nutrient media, included: macronutrients in (Murashige & Skoog, 1962), micronutrients in (Murashige & Skoog, 1962), vitamins (Linsmaier & Skoog, 1965), BAP 0.5 mg/l, IAA 0.05 mg/l, sucrose 30 g/l, pH 5.6-5.8;

6. MS liquid nutrient media, included: macronutrients in (Murashige & Skoog, 1962), micronutrients in (Murashige & Skoog, 1962), vitamins (Murashige & Skoog, 1962), BAP 0.5 mg/l, IAA 0.05 mg/l, sucrose 30 g/l, pH 5.6-5.8.

Cultivated micro plants are placed in a growth-chamber at 22 – 24°C, photoperiod 16 / 8 h. light / dark. The plants were sub-culturing fresh culture medium 20 – 25 days after date recording.

Results

An analysis comparing the results from the investigate nutrient medias MS (solid and liquid), QL-MS (solid and liquid) and LS (solid and liquid) it was indicated for the both of pear cultivars William pear and Giffard Beurre the best results for multiplication have been received on QL-MS nutrient media solid. For Giffard Beurre lowest results were obtained on MS solid nutrient media and the plants cultivated on L-S liquid media from first to third passage is unchanged (Figure 1).

For William pear the lowest results was obtained on LS liquid media and the number of plants on LS solid, MS solid and MS liquid are unchanged in the three passages (Figure 2).

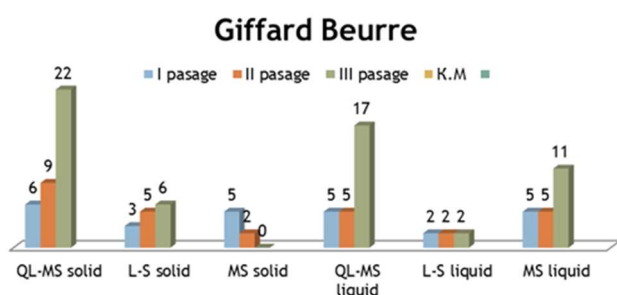


Figure 1. Multiplication in passage on different culture media of Pear cultivar Giffard Beurre.

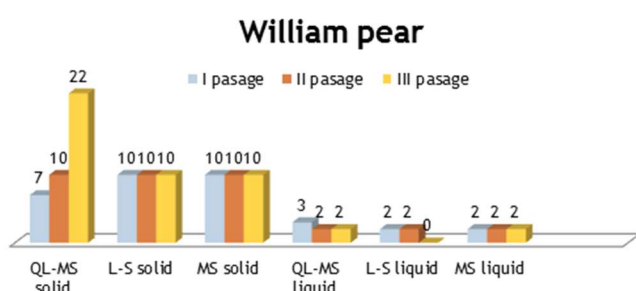


Figure 2. Multiplication in passage on different culture media of Pear cultivar William pear.

Discussion

Micropropagation protocols have been published, beginning in the late 1970's, for over 20 cultivars of pear, including the major *Pyrus communis* cultivars, but also several Japanese cultivars of *P. pyrifolia* (Burm. f.) Nakai (Bhojwani et al., 1984). While many studies have concentrated on the influence of plant growth regulators, the influence of the nutrient medium has received less attention. Most studies have used MS (Murashige & Skoog, 1962) medium without modification. Only a few of the studies made comparisons among several nutrient media (Nedelcheva, 1986) found that shoot proliferation of 'Bartlett' was the greatest on a medium devised by QL (Quoirin & Lepoivre, 1977) in comparisons with MS medium. In contrast, (Baviera et al., 1989) obtained better shoot proliferation of 'Conference' on MS than QL. In our case, the best results we have on QL-MS solid nutrient media for the both of pear cultivars, William pear and Giffard Beurre. This media is modified of the major QL (Quoirin and Lepoivre, 1977) and MS (Murashige & Skoog, 1962) nutrient media for tissue culture.

Conclusion

Out of the studied conducted in laboratory for *in vitro* propagation of the Fruit-Growing Institute – Plovdiv was established that the *in vitro* plants of pear cultivars Giffard Beurre best results for micropropagation *in vitro* is nutritive medium QL-MS solid. For William pear highest results was recorded plants cultured on QL – MS solid tissue cultures nutrient media. That can be used for obtaining *in vitro* plants. Incompatibility of some pear cultivars with quince rootstock, *in vitro* methods can eliminated that problems by plants production on own roots. In this case the grafting it is not necessary.

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