THE NECESSITY OF *IN VITRO* PROPAGATION OF MAPLE SPECIES USED IN GARDEN LANDSCAPIND IN ROMANIA

Manuela Elena Concioiu*, Magdalena Duță, Mihaela Ileana Oprea*****

*UȘAMV Bucharest, I.L. Caragiale Pitesti Secondary School
E-mail: manuela.concioiu@hotmail.com
**University of Pitesti
***Salpitflor Green S.A. Pitesti

Abstract
Acer platanoides has many ornamental varieties, easy to propagate by seeds, but mostly by grafting and cuttings. Acer palmatum 'Dissectum Atropurpureum' - the Japanese maple – is a base branched shrub or with short crook trunk. The shoots are hairless and red. The flowers, situated in small corymbs, appear once with the leaves (Posedaru E.A., 2005). The species itself is grown from seed. Only a few strong-growing cultivars are commercially propagated from cuttings. Plants of the dissected and variegated cultivars on their own roots almost always fail to grow into good plants (Gelderen & Oterdoom, 1994). Due to low bud-forming capacity, propagation by grafting and cuttings are difficult to perform, so the micropropagation technique is widely used now took an impressive turn, being used on large scale at international level to obtain propagation material.

Keywords: Acer palmatum, Acer platanoides, landscaping, in vitro initiation, multiplication

1. INTRODUCTION

Maples are known throughout the world for centuries for their many uses: in landscape design, food industry, wood industry, medicine. They have also numerous cultural implications, subject to certain traditions, customs and festivals.
In landscaping, maple trees are recognized by their habitus and foliage, to which it can be added the decorative effects of flowers, fruit and bark. Large specimens the big are used as ornamental trees, solitary or in combination with other species, in alignements, and the small ones in designs of reduced dimensions (squares, Japanese gardens, private gardens with limited area).
Maples are so diverse and popular that many worldwide *arboretums* have kept in special collections known as *Aceretes.* They are also preferred by Japanese people to obtain bonsai of high quality.
For landscapers, growers and gardeners maple plays a key role in landscaping.
Acer genus species are characterized by spectacular shape, being used as trees and shrubs, the flowers appear before the leaves, they have a special designed stem, leaves are showy, of different shapes and colors, the young shoots are red in spring and incredibly beautiful in autumn (Figure 1.1).
To obtain a high decorative effect in the landscape and a sustainable garden design, it requires a thorough and rigorous selection of species, cultivars or varieties of this genus.
For landscaping purposes, maple trees are used in the decoration of public and private gardens, parks, the street alignments or roadsides.
We can see the beauty of *Acer palmatum species* by using the cultivar *Acer palmatum* 'Dissectum Atropurpureum' for different ornamental designs like flower stands, as it is shown in figure 2.

2. MATERIAL AND METHOD

The viable microshoots obtained at the end of the initiation phase of the ornamental varieties, 'Crimson King', 'Drummondii' and 'Globosum', belong to the species *Acer platanoides* (Figure 3) were transferred for the multiplication phase on specific nutrient media for: induction and acceleration of proliferation of axilary budding or multiple axilary shoot (each shoot is a potential plant) and shoot elongation (Badea M.E. & Săndulescu D., 2001).

For the multiplication phase, were established three variants of nutrient medium: MS - Murashige - Skoog (1962), DKW – Driver & Kuniyuki (1984), WPM – Woody Plant Medium - Lloyd and McCown (1981).

Figure 1. ***Maples autumn colors in Baneasa Residential area, Bucharest, 2012 (original)***

Figure 2. ***Acer palmatum 'Dissectum Atropurpureum' in Pitesti private garden (original)***

The same protocol was used for *Acer palmatum* 'Dissectum Atropurpureum' - the Japanese maple. Observations regarding the multiplication rate were noted during the first subculture, with a medium length of 35 days.

For nutrient media preparation were used stock solutions of 10x macroelements, 10x microelements and 100x vitamins. Phytohormones were prepared as 10^{-2} and 10^{-6} diluted solutions. Ferrous sulphate and Na_2EDTA were added as NaFeEDTA, in concentration of 32 mg/l. Were used conic culture vessels (Ø=100mm and h=100mm) for the first subculture, each with 25ml medium/vessel.

The work methodology respected the standard protocol regarding aseptic conditions transfer under laminar air flow hood. After explants inoculation on nutrient media, the vessels were incubated in the growth chamber.

The acclimatized premises have adjustable photoperiodism. Illumination was done with white light fluorescent tubes, with an intensity of 2500 lucsi and the photoperiod was set at 14 hours light/24 hours. In order to study maple *in vitro* multiplication capacity was organized a bifactorial experience, having as variable factors genotype and nutrient medium composition, and as constant factor – photoperiod.
The experience is a 4×3 bifactorial, with a total of 12 variants (V.1-V.12), in 3 repetitions (R1, R2, R3), each with cu 2 culture vessels / repetition. In each culture vessel were assigned 3 microshoots from the initiation phase. The study totalized a number of 216 inoculated explants.

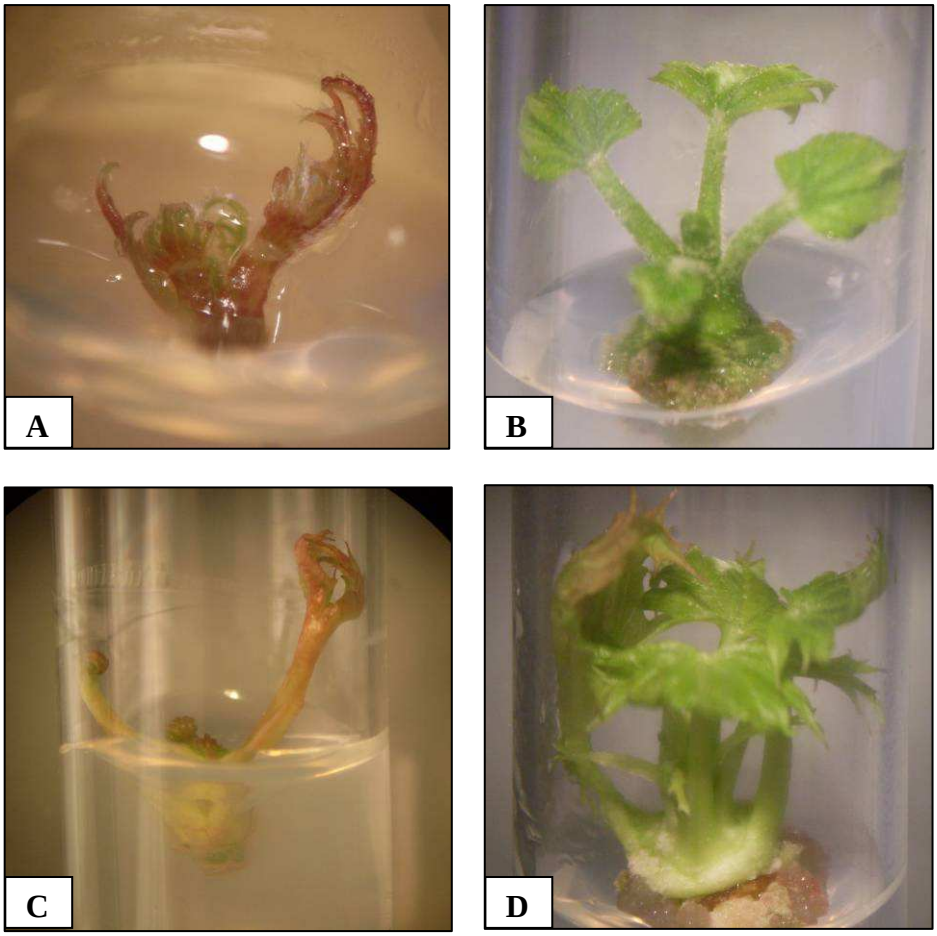


Figure 3. ***Acer explants at the end of in vitro initiation phase: Acer plamatum 'Dissectum Atropurpureum' (A), Acer platanoides 'Globosum' (B), Acer platanoides 'Crimson King' (C), Acer platanoides 'Drummondii' (D) (original)***

Variable factors:

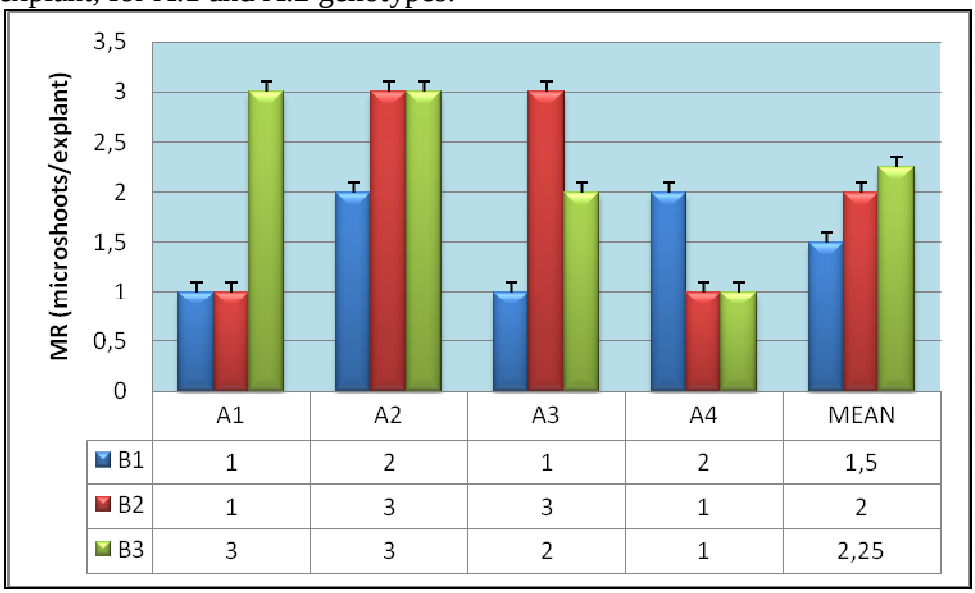
A. Genotype: A.1 – *Acer palmatum* 'Dissectum Atropurpureum'; A.2 – *Acer platanoides* 'Crimson King'; A.3 – *Acer platanoides* 'Drummondii'; A.4 – *Acer platanoides* 'Globosum'.

B. Culture medium: B.1 – MS medium; B.2 – DKW medium; B.3 – WPM medium.

3. RESULTS AND DISCUSSIONS

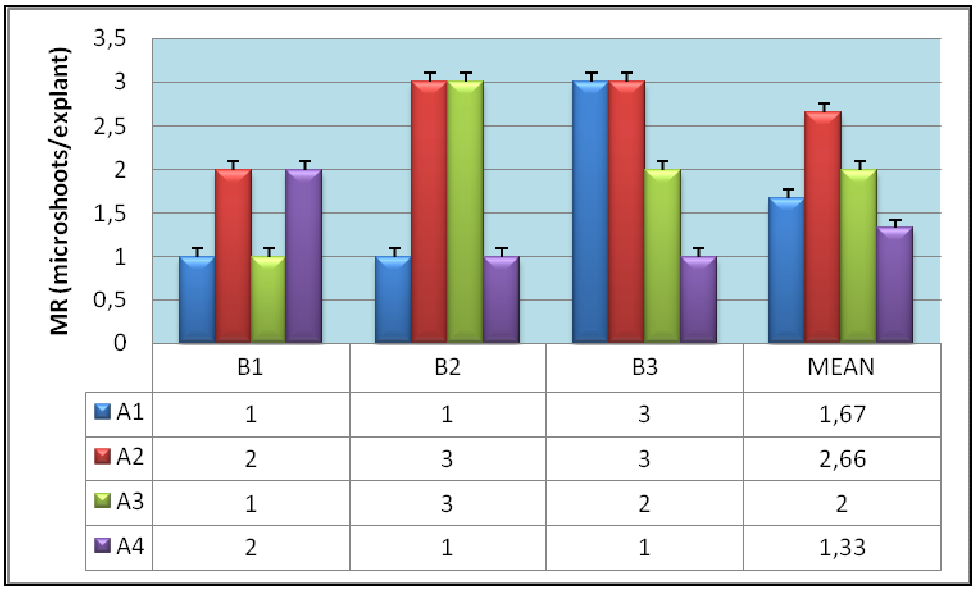
The recorded data are expressed in ratio of multiplication (microshoots/explant) for the first subculture in the multiplication phase.
During the multiplication phase, growth and axilary shoot are influenced by the composition of the nutrient medium and genotype.

The notes and recorded data emphasized that on a constant level of the photoperiod at 14 hours and the same indole-butyric acid concentration as growth regulator, nutrient media, MS, DKW and WPM respectively, and genotype had a great influence.
From the interaction of nutrient medium with genotype (AxB) it shows that in the first subculture of the multiplication phase, the genotypes A.1, A.2 and A.3, respectivly *Acer palmatum* 'Dissectum Atropurpureum', *Acer platanoides* 'Crimson King' (Figure 6) and *Acer platanoides* 'Drummondii', had the highest multiplication rate (Figure 4).
Looking at the culture media, the B.3 graduation (V3, V6, B9 and V12 variants) had the highest multiplication rate (Figure 5), with 3 microshoots/explant, thus WPM culture medium was recommended for multiplication phase.
The lowest performance had the explants multiplied on the MS medium, with only 1 microshoot/explant, for A.1 and A.2 genotypes.



	A1	A2	A3	A4	MEAN
B1	1	2	1	2	1,5
B2	1	3	3	1	2
B3	3	3	2	1	2,25

Figure 4. ***Multiplication rate for subculture 1, depending on culture medium for different genotypes***



	B1	B2	B3	MEAN
A1	1	1	3	1,67
A2	2	3	3	2,66
A3	1	3	2	2
A4	2	1	1	1,33

Figure 5. ***Multiplication rate for subculture 1, depending on genotype for different culture media***

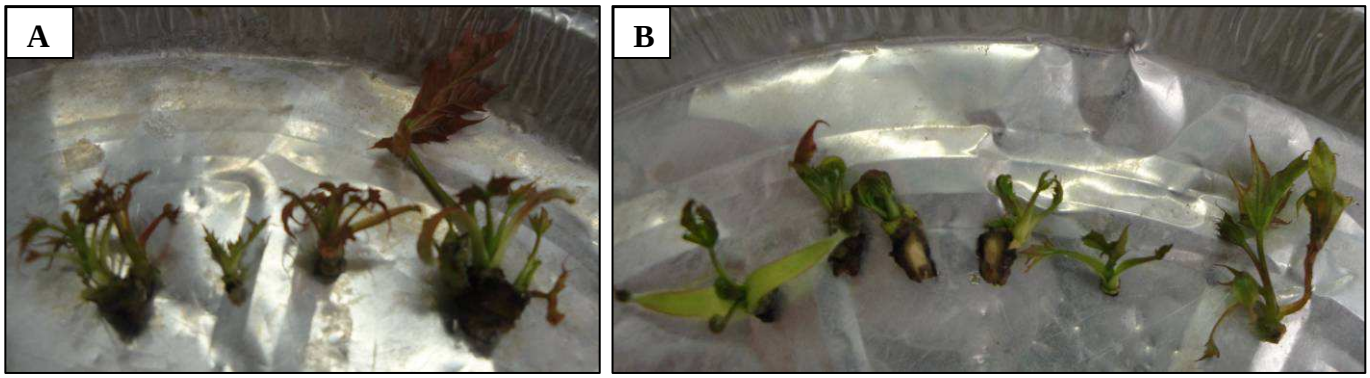


Figure 6. ***Acer platanoides 'Crimson King''s micromultiplication aspects: microshoots at the end of initiation phase (A) and microshoots individualisation and shortning (B) (original)***

4. CONCLUSIONS

The results regarding the multiplication phase of *Acer palmatum* 'Dissectum Atropurpureum' and *Acer platanoides* 'Crimson King', *Acer platanoides* 'Drummondii' and *Acer platanoides* 'Globosum', *Kanzan"* varieties led to the following conclusions:

- for the first subculture of the multiplication phase, the genotypes *Acer palmatum* 'Dissectum Atropurpureum', *Acer platanoides* 'Crimson King' and 'Drummondii' had the best in vitro behavior;
- regarding the nutrient medium, the highest rates of multiplication (3 microshoots/explant) were achieved using DKW and WPM media.

5. REFERENCES

Badea M.E. & Săndulescu D. (2001) Biotehnologii vegetale. Fundatia Biotech Bucuresti, Bucuresti

Gelderen D.M. van, de Jong P.C., Oterdoom H.J. (1994) Maples of the world. Timber Press Inc., Portland, Oregon

Posedaru E.A. (2005). Plante ornamentale recomandate pentru amenajarea spațiilor verzi din România, Arboricultură ornamentală, Editura Universității din Pitești, Pitesti, pag. 81-86