

## OBSERVATIONS REGARDING IN VITRO AND IN VIVO ROOTING OF 'MME. LEMOINE', 'CHARLES JOLY' AND 'SENSATION' LILAC CULTIVARS

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### Abstract

The paper's main objective was to compare the efficiency of *in vitro* and *in vivo* rooting of lilac microcuttings belonging to the 'Mme. Lemoine', 'Charles Joly' and 'Sensation' cultivars. The results obtained allow the recommendation of *in vivo* rooting simultaneously with the acclimatization, shortening the rooting time of microcuttings and production cost, which will lead to an improvement of the *in vitro* micropropagation biotechnology of lilac.

**Key words:** lilac, *in vitro*, *in vivo*, rooting %, acclimatizing %

The research regarding the establishment of *in vitro* micropropagation biotechnology of lilac were initiated in 2007, in the Laboratory of Plant Biotechnologies from Pitesti University. From my experience in the field of landscape gardening I observed a high interest for some lilac cultivars, especially for those white and red-purplish inflorescences. The large range of the *Syringa* genus allowed to be chosen into study three genotypes: 'Mme. Lemoine', 'Charles Joly' and 'Sensation', their ecological and ornamental particularities being in concordance with the market requirements (elegant shape, attractive colors, different blooming periods, low temperature resistance, soil adaptability, association with other ornamental species in garden landscaping).

### MATERIAL AND METHOD

The undertaking research followed the highlighting of the factors implicated in the *in vitro* and *in vivo* rooting capacity, simultaneously with acclimatization for the microcuttings of 'Mme. Lemoine', 'Charles Joly' and 'Sensation' cultivars.

**I. For *in vitro* rooting.** At the end of the multiplication phase, the microcuttings belonging to the three cultivars taken into study, bouquets-like, were individualized and fragmented into two nodes microcuttings. As in the multiplication phase, the foliage area was reduced.

In the *in vitro* rooting phase, the trimmed microcuttings were transferred on specific nutrient media (Hildebrandt V. & Harney P.M., 1983; Tomson S. et al., 2007), and in each culture vessel were 25 microcuttings.

The work procedure was ended by marking the culture vessels, their covering with polyethylene protective film and their incubation in

the growing chamber. For *in vitro* rooting of lilac microcutting resulted from the multiplication phase, were tested three variants of nutrient media (Murashige T. & Skoog F., 1962; Linsmaier E.M. & Skoog F., 1965; Lee E.M.C. & De Fossard R.A., 1977).

The experience is trifactorial, 3x3x3 type, totalizing 27 variants (*tab. 1*).

#### Factor A – Genotype (*fig. 1*)

- A.1 - Cultivar 'Mme. Lemoine'
- A.2 - Cultivar 'Charles Joly'
- A.3 - Cultivar 'Sensation'

#### Factor B - Nutrient medium (*tab. 2*)

- B.1
- B.2
- B.3

#### Factor C - Photoperiod

- C.1 - photoperiod 12 hours
- C.2 - photoperiod 14 hours
- C.3 - photoperiod 16 hours.

The acclimatization follows the *in vitro* rooting phase and contains: the preacclimatization and the acclimatization itself.

**II. For *in vivo* rooting-acclimatization.** Groups of the three cultivars microcuttings, from the multiplication phase, were removed from culture vessels, cleaned and washed by the nutrient medium, after which it was proceeded to their individualization. To avoid dehydration, microcuttings remained in water throughout the operation. To stimulate microcuttings' rooting, they were treated with root stimulant for woody species. There were used two rooting substrates: perlite and peat + perlite (1:1). Temperature was maintained at 25 ± 2°C and humidity 80-85%, by covering with polyethylene film. To avoid infections with phytopathogenic agents, were applied fungicide treatments with Topsin 0.1% every three days.

#### Factor A – Genotype

- A.1 - Cultivar 'Mme. Lemoine'
- A.2 - Cultivar 'Sensation'

- A.3 - Cultivar 'Charles Joly'
- Factor B - Nutrient medium**
- B.1 - Perlite
  - B.2 - Peat+Perlit (1:1).

*In vitro* rooting of lilac microcuttings (fig. 2) was influenced by genotype, nutrient medium and photoperiod. Regarding the influence of nutrient media, the best results were obtained by cultivars 'Mme. Lemoine', which recorded a 92.4% of rooting in V2 variant and 89.3% in the V3 variant, on B1 nutrient medium (fig. 3).

## RESULTS AND DISCUSSIONS

Table 1

**Experimental Variants for *in vitro* rooting phase**

VARIANTA	% PLANTE ÎNRĂDĂCINATE	VARIANTA	% PLANTE ÎNRĂDĂCINATE
V.1: A.1, B.1, C.1	93,2 E	V.15: A.2, B.2, C.3	67,3
V.2: A.1, B.1, C.2	92,4	V.16: A.2, B.3, C.1	66,1 E
V.3: A.1, B.1, C.3	89,3	V.17: A.2, B.3, C.2	65,0
V.4: A.1, B.2, C.1	89,3 E	V.18: A.2, B.3, C.3	57,0
V.5: A.1, B.2, C.2	87,2	V.19: A.3, B.1, C.1	89,3
V.6: A.1, B.2, C.3	82,4	V.20: A.3, B.1, C.2	87,5
V.7: A.1, B.3, C.1	60,0 V	V.21: A.3, B.1, C.3	82,0
V.8: A.1, B.3, C.2	63,4 V	V.22: A.3, B.2, C.1	90,7
V.9: A.1, B.3, C.3	48,2 V	V.23: A.3, B.2, C.2	90,2
V.10: A.2, B.1, C.1	78,4 E	V.24: A.3, B.2, C.3	87,0
V.11: A.2, B.1, C.2	75,1	V.25: A.3, B.3, C.1	52,4
V.12: A.2, B.1, C.3	70,8	V.26: A.3, B.3, C.2	50,0
V.13: A.2, B.2, C.1	74,4 E	V.27: A.3, B.3, C.3	42,1
V.14: A.2, B.2, C.2	74,1		

\* vV – vitrified; \*E – etiolated;

Table 2

**The composition of nutrient media tested for *in vitro* rooting**

COMPOSITION	ROOTING		
	B1	B2	B3
MS Macro	1/2n	1/2n	1/2n
MS Micro	1/2n	1/2n	1/2n
MS Vitamine	N	-	-
LS Vitamine	-	N	N
NAA (mg/l)	0,5	-	-
IBA (mg/l)	-	0,6	1
G <sub>3</sub> A (mg/l)	-	0,1	0,1
NaFe EDTA (mg/l)	5	32	32
Dextrose (g/l)	20	30	30
Agar (g/l)	7	7	7
Activated charcoal (g/l)	-	0,3	0,3



Figure 1 Lilac cultivars: 'Charles Joly' (left), 'Mme. Lemoine' (center), 'Sensation' (right) (original)



Figure 2 In vitro rooting of lilac microcuttings (original)

Both variants of nutrient media had in their composition naphthyl-acetic acid, in a concentration of 0,5 mg /l. Note that, in the version V2 the rooting process was developed in 14 hours photoperiod, and in the V3 variant in 16 hours photoperiod. For a photoperiodism under 12 hours, the same cultivar showed a rooting percentage of 93,2%, but microcuttings showed the etiolation phenomenon (fig. 4).

On B2 nutrient medium, 'Sensation' was noted with a rooting percent between 87,0 and 90,7, in the presence of indole-butyric acid, at a concentration of 0.6%. Shortening the lighting to 12 hours influenced favorably the microcuttings' rooting of this cultivar (fig. 5).

Increasing the concentration of indole-butyric acid from 0.6 mg/l on B2 medium at 1.0 mg/l on B3 medium, did not stimulate the microcuttings rooting, as it was evidenced by the results.

In the process of *in vivo* rooting (fig. 6.) the rooting substrate of perlite favorably influenced 'Mme. Lemoine' and 'Sensation' cultivars rooting, the values obtained being of 93% for 'Mme. Lemoine' and 91.7% for 'Sensation' (tab. 3, fig. 7).

*In vivo* rooted plants were transferred to pots ( $\Phi = 8\text{cm}$ ) of mixed peat and perlite for forcing (fig. 8).

## CONCLUSIONS

Summarizing the reported findings, the conclusions were:

- The best *in vitro* rooting results were obtained by the cultivars 'Mme. Lemoine' and 'Sensation', with the values of 92.4% and 90.7%.
- Auxins NAA (0.5 mg/l) and IBA (0.6 mg/l) had a determinant role in triggering and sustaining the rhizogenesis process, within certain levels.
- Reduced production costs by using a photoperiod of 12 hours, with high efficiency, than a photoperiod of 14 and 16 hours for the rooting of 'Sensation's microcuttings.
- Shortening the rooting time by replacing the *in vitro* rooting phase with the *in vivo* one simultaneously with acclimatization, for the microcuttings harvested from multiplication phase, on perlite substrate.

3 In

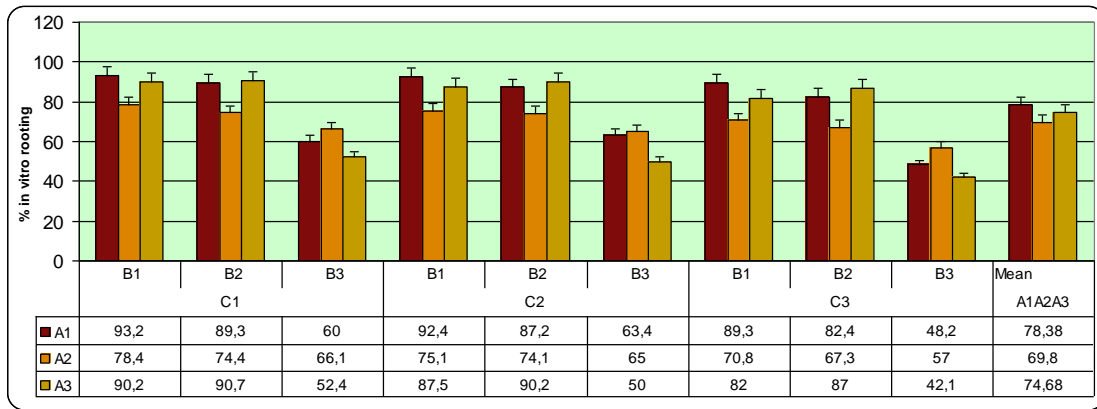


Figure vitro

rooting percent depending on cultivar, for different nutrient media

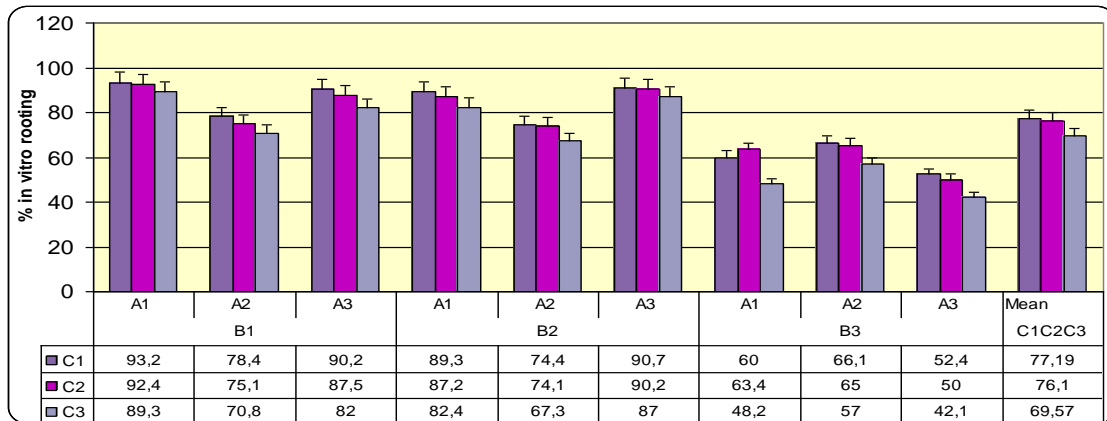


Figure 4 In vitro rooting percent depending on photoperiod, for different cultivars

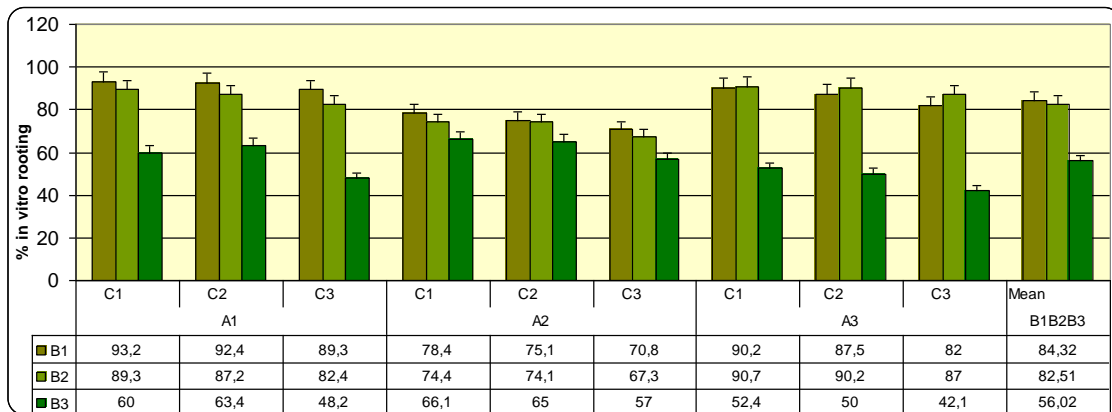


Figure 5 In vitro rooting percent depending on nutrient medium, for different photoperiod



Figure 6 In vivo rooting of lilac on perlite (original)

Table 3  
Expression of *in vivo* rooting capacity of lilac microcuttings

VARIANT	% ROOTED PLANTS
V1: A.1, B.1	93
V1: A.1, B.2	89
V1: A.2, B.1	91,7
V1: A.2, B.2	90
V1: A.3, B.1	88,2
V1: A.3, B.2	88

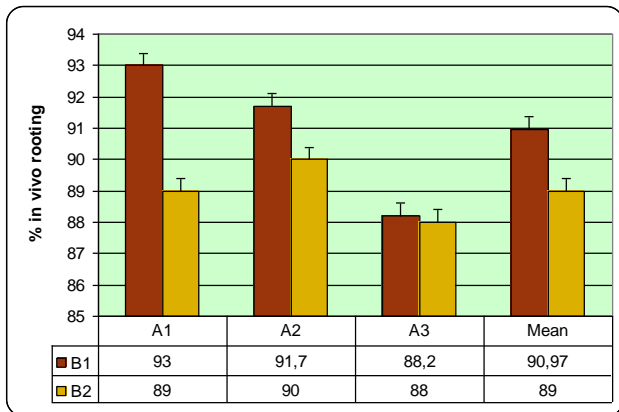


Figure 7 *In vivo* rooting percent depending on substrate, for different cultivar



Figure 8 *In vivo* rooting vitroplants on substrate of peat and perlite (original)

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