

# MINI-CUTTING PROPAGATION- A NEW WAY FOR PROPAGATION SEMI-SHRUBS

Melinda ÚJVÁRI<sup>1</sup>, GÁBOR SCHMIDT<sup>2</sup>

<sup>1,2</sup>Corvinus University of Budapest, Faculty of Horticultural Sciences, Department of Floriculture and Dendrology, 1118 Budapest, Villányi st. 35-43, Hungary

**Abstract:** Aim of our trial was propagation using mini-cuttings in dormancy period of semi-shrubs: *Buddleia davidii* 'Fascinating', *Lavandula angustifolia* 'Dwarf Blue' and *Santolina chamaecyparissus*. For mini-cuttings were utilized *Buddleia* mini-shoots (0.5 -1.0 cm) typical in winter on branches, *Lavandula* axillary mini-shoots (1.0-1.5 cm) and *Santolina* 1.5-2.0 cm long shoots were utilized. Cuttings were treated with four types of rooting hormones produced by "Bios" Research and Production Centre Cluj-Napoca, Romania, i.e., Radi-Stim powder 1, 2, 3 and 0.5% S<sub>2</sub> solution and two types of rooting hormones from Hungary, named: Incit-5 and B<sub>2</sub> rooting powders. The results were compared with untreated control. The cuttings were inserted in plastic trays with mixture of perlite and sand (1:1), than placed in cold greenhouse. Assessments included measurements on: proportion of rooted cuttings (%), numbers of roots on rooted cuttings and mean length (cm) of cuttings. The trials have shown that during dormancy period these three semi-shrubs can be successfully propagated using mini-cuttings. Tested rooting hormones favoured the rooting level of mini-cuttings, the numbers of roots/cutting and the length of roots. For *Buddleia* mini-cuttings the best rooting results can be reached with Radi-Stim 3. For *Lavandula* mini-cuttings can be recommended Incit-5 and for *Santolina* Radi-stim 2.

## INTRODUCTION

The aim of the present study was to explore the rooting possibilities in dormancy period in a cold greenhouse of mini-cuttings of three species: *Buddleia davidii* 'Fascinating', *Lavandula angustifolia* 'Dwarf Blue' and *Santolina chamaecyparissus* which throughout the vegetative season usually propagate by cuttings. This research try to analyze the effect of six types of rooting hormones on *Buddleia* and *Lavandula* mini-cuttings and one rooting powder for *Santolina* mini-cuttings.

*Buddleia davidii* „Butterfly Bushes” is one of the hundreds of different species of *Buddleia*. It is the favorite and the most common species *Buddleia* is rooted from cuttings easily and this can be taken at any time of the growing season.

Butterfly bushes are extremely easily propagated from softwood cuttings in June without any rooting powder (93.3%) and 100% with Radi-Stim 2 powder. (Újvári 2003)

Stiljinovic (1989) had treated softwood cuttings between 26 May and 16 June with 0.1, 0.3 and 0.6 % Biokor (NAA). The cuttings were introduced in peat and sand 1:1 mixture. They were placed under plastic tunnel. Biokor treatments increased shoot and root growth but had no significant effect on rooting % of cuttings. The best results were obtained with *Buddleia davidii* when it was treated with 0.6% Biokor.

Újvári (2003) studied the possibility of propagation of *Buddleia davidii* in two period (October and March) and analyzed the effect of Radi-Stim powder and 0.5% S<sub>2</sub> rooting solution on *Buddleia* rooting. The best rooting results in both periods (October and March) was obtained with Radi-Stim No. 2.

J. Van Bragt (1976) immersed shoot cuttings of *Lavandula* in a solution of auxin in water. This treatment gave better rooting than the commonly used method of dipping the basal part of the cutting in a powder mixture containing auxin.

From August to October is the best period to obtain optimal rooting of lavender cuttings regardless of the rooting treatments. Hormones enhance out-of-season rooting. (Nicola, 2003)

IBA is the most effective rooting compound for different lavender cultivars. (Zlatev, 1990)

The rooting of lavender cuttings could be improved under intermittent mist with bottom heat. (Schmidt, 1991)

Not all rooting treatments are effective for *Lavandula angustifolia* cuttings. (Újvári, 2003)

Softwood or semihardwood cuttings of lavender could be rooted with good results all year round, if the shoots in summer are not too soft, or in winter they are not frozen. Most responsive are the end of June - middle of September made softwood cuttings which don't need rooting treatments. (Schmidt, 1991 and 1996)

Softwood or semi-hardwood cuttings of lavender cotton (*Santolina chamaecyparissus*) can be rooted with good results all the time, excepting the intensive shoot growing period. (Schmidt, 1991). If the foliage are not damaged in winter time, *Santolina* can be propagated successful in February-March using leafy or even leafless parts of shoots. (Zaharia, 1997)

Hormone treatments for *Santolina* cuttings are not necessary, but 0.2 % NAA or 0.4% IBA could be advantageous/favourable. Rooting time could be two weeks on 22-25°C or more on lower temperature. (Schmidt, 1996)

## MATERIALS AND METHOD

The experiments were carried out at the cold greenhouse of Corvinus University of Budapest, Department of Floriculture and Dendrology. *Santolina* mini-cuttings were taken on 21<sup>st</sup> November, *Buddleia* on 13<sup>th</sup> December and lavender mini-cuttings on 14<sup>th</sup> December from stock plants. For Butterfly Bush mini-cuttings (0.5-1.0 cm) mini-shoots from branch were utilized. Axillary mini-shoots of lavender (1.0-1.5 cm) which appear in wintertime were collected and immediately prepared as mini-cuttings. 1.5-2 cm long *Santolina* shoots were used for the propagation. (Figure 1) Mini-cuttings were treated with six different types of rooting hormones. Four rooting hormones produced by "Bios" Research and Production Centre Cluj-Napoca, Romania, i.e., Radi-Stim powder no. 1,2,3 and 0.5% S<sub>2</sub> solution. They are complex compositions, which contain natural products and synthetic auxines. The other two rooting powders were Incit-5 and B<sub>2</sub> rooting powders from Hungary. The results were compared with untreated control. The cuttings were inserted in a mixture of perlite and sand (1:1), and then placed in cold greenhouse.



**Figure 1.** Mini-cuttings

The trials were arranged in random blocks, in three repetitions. The number of cuttings / repetition was 100.

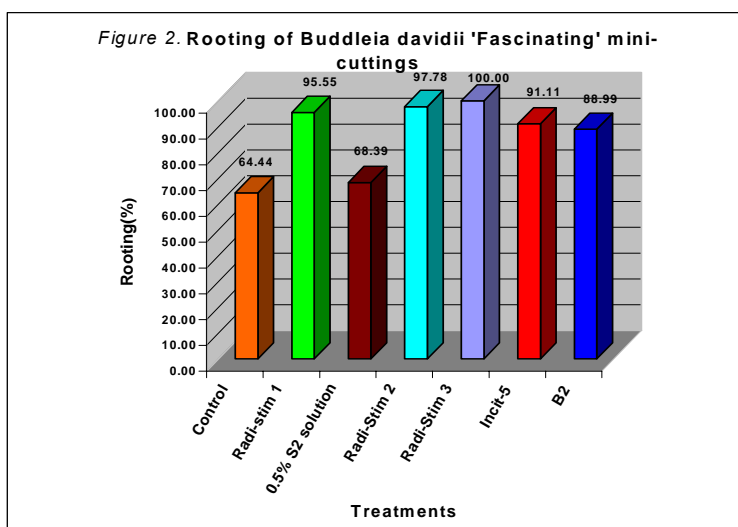
The temperature of the greenhouse during rooting was between 5-8 °C. The assessment was carried out after 77 days in case of lavender, after 46 days on *Buddleia* and after 100 days on *Santolina*.

Assessments included measurements on:

- proportion of rooted cuttings (%)
- number of roots on rooted cuttings
- mean length (cm) of roots (based on the longest and the shortest root)
- mean length of shoots on rooted cuttings

## RESULTS AND DISCUSSIONS

The impact of treatments on the percentage proportion of rooting between treatments for *Buddleia* is shown in Figure 2.



All treatments granted significant developmental percentages on rooted cuttings. The highest rooting percent (100%) were obtained with Radi-Stim 3.

Table 1 shows the differences between number and length of roots of treated and non-treated (control) mini-cuttings. Treated cuttings, especially Radi-Stim 3 treated cuttings develop longer and richer roots than control cuttings.

Figure 3 illustrates improved rooting level of *Lavandula* mini-cuttings, excepted Radi-Stim 1 and 2. All other treatments gave higher rooting percent compared with untreated control. For the rooting percentage, the most effective compound was Incit-5 (95.6% rooting percent), Radi-Stim 3 and B<sub>2</sub> rooting powders.(93.3%) were very effective, too.

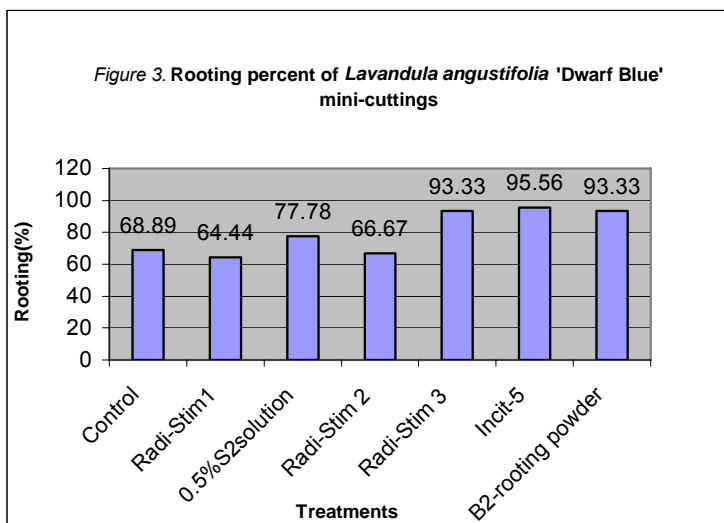
Untreated *Santolina* mini-cuttings were compared just with one rooting hormone, named Radi-Stim 2. Differences between treated and non-treated variants are tellingly displayed in Figure 4.

Table 1.

Effect of treatments on rooting  
*Buddleia davidii* 'Fascinating' mini-cuttings

No.	Treatments	Number of roots	Mean length (cm) of roots
1.	Untreated control	3.64 <sup>-</sup>	0.69 <sup>-</sup>
2.	RADI-STIM 1	5.72 <sup>-</sup>	1.41 <sup>*</sup>
3.	0.5 %S <sub>2</sub> solution	3.30 <sup>-</sup>	1.15 <sup>*</sup>
4.	RADI-STIM 2	7.17 <sup>*</sup>	1.49 <sup>*</sup>
5.	RADI-STIM 3	10.27 <sup>*</sup>	1.57 <sup>*</sup>
6.	INCIT-5	8.58 <sup>*</sup>	1.30 <sup>*</sup>
7.	B <sub>2</sub> rooting powder	5.05 <sup>-</sup>	1.15 <sup>*</sup>
		SD 5% =	3.31      0.41

Note: results marked with <sup>\*</sup> differsignificantly from each other at P=5%



No significant differences between length of roots of treated and untreated mini-cuttings. Length of shoots of rooted lavender cuttings were significant higher on Radi-stim 2 and 3 and Incit-5 and B<sub>2</sub> treated cuttings. (Table 2).

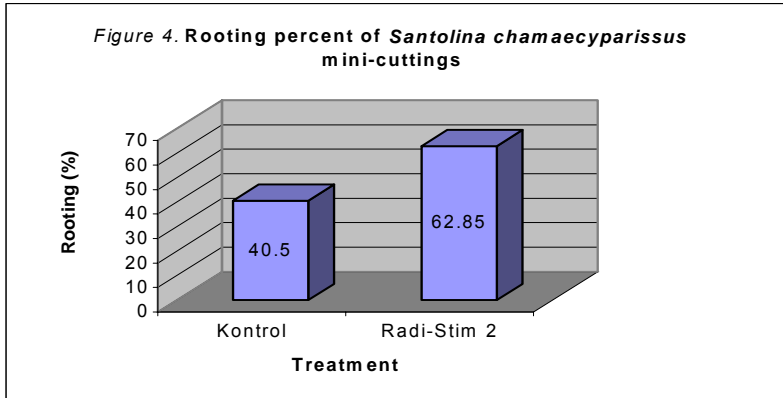


Table 2

Effect of rooting treatments on rooting *Lavandula angustifolia* 'Dwarf Blue' mini-cuttings

No.	Treatments	Number of roots	Length of roots (cm)	Length of shoots (cm)
1.	Untreated (control)	1.87 <sup>-</sup>	0.85 <sup>-</sup>	0.84 <sup>-</sup>
2.	RADI-STIM 1	2.01 <sup>-</sup>	0.83 <sup>-</sup>	1.06 <sup>-</sup>
3.	0.5 % S <sub>2</sub> solution	2.58 <sup>-</sup>	0.79 <sup>-</sup>	1.11 <sup>-</sup>
4.	RADI-STIM 2	2.08 <sup>-</sup>	0.78 <sup>-</sup>	1.26 <sup>-</sup>
5.	RADI-STIM 3	2.37 <sup>-</sup>	0.90 <sup>-</sup>	1.20 <sup>-</sup>
6.	INCIT-5	2.89 <sup>+</sup>	0.87 <sup>-</sup>	1.16 <sup>-</sup>
7.	B <sub>2</sub> Rooting powder	2.03 <sup>-</sup>	0.80 <sup>-</sup>	1.15 <sup>-</sup>
SD 5% =		0.85	0.17	0.28

Note: results marked with <sup>+</sup> differsignificantly from each other at P=5%

Table 3

Effect of rooting treatments on *Santolina chamaecyparissus* mini-cuttings rooting

No.	Treatments	Number of roots	Length of roots (cm)	Length of shoots (cm)
1.	Untreated control	1.41 <sup>-</sup>	4.00 <sup>-</sup>	16.67 <sup>-</sup>
2.	RADI-STIM powder no. 2	2.09 <sup>+</sup>	4.82 <sup>*</sup>	31.33 <sup>-</sup>
SD 5% =		0.36	1.76	14.87

Note: results marked with <sup>+</sup> differsignificantly from each other at P=5%

Data in Table 3 reveal that the average numbers of roots/cutting and their length was significantly influenced by the presence of rooting hormones. The length of shoots of Radi-stim 2 treated, rooted cuttings are higher than length of shoots of control mini-cuttings.

## CONCLUSION

The new method described above, seems to be perspective for the nursery industry because of their advantages as follows:

- extension of propagation season, by utilizing the relatively „free” months of winter
- higher yields of rooted cuttings per stock plant, by using the „mini-cuttings” system
- high rooting percent using rooting hormones

For best rooting results: can be recommended: Radi-Stim No.3 for *Buddleia*, Incit-5 for *Lavandula* and Radi-Stim No.2 for *Santolina* mini-cuttings.

## REFERENCES

1. Bragt, Van J., Gelder, Van H., Pierik, R.: L.M. (1976): *Rooting of shoot cuttings of ornamental shrubs after immersion in auxin-containing solutions*, Scientia Horticulturae, Vol.4, Issue 1, pag. 91-94
2. Nicola, S., Fontana, E. and Hoeberechts, J. (2003): *Effects of rooting products on medicinal and aromatic plant cuttings*. Acta Hort. (ISHS) 614: 273-278
3. Schmidt G., Nagy B. (1991): *Díszfák, díszcserjék*, KÉE Egyetem, Budapest
4. Schmidt G., Tóth I. (1996): *Díszfaiskola*, Mezőgazda Kiadó, Budapest
5. Stilinovic-S, Grbic-M. (1989): *The use of a plant hormone 'Biokor' for propagation of some woody ornamentals by cuttings*, Acta-Horticulturae., No. 251, 393-398; 3 pl
6. Újvári M (2003): *Levendula szaporítása mini-dugványról*, Botanikai Közlemények 90. kötet 1-2 füzet, Budapest, 2003
7. Újvári M, Schmidt G, Tar T (2003): *Propagation using mini-cuttings*, 4<sup>th</sup> International Conference of PhD Students, University of Miskolc, Hungary, 11-17 August, pag. 377-381
8. Újvári M., Schmidt G., Panea T. (2003): *Serkentőszerek hatása néhány díszcserje zölddugványainak gyökeresedésére*, Kertgazdaság, 2003, 35.3, pag 35-44.
9. Újvári M., Tar T, Panea T., Schmidt G (2003): *Buddleia mini-dugványok gyökerezése*, Lippay János-Ormos Imre-Vas Károly Tudományos ülészak 2003 november 6-7, pag. 264-265
10. Zaharia, D.; Panea, T.; Újvári, M. (1997): *Contributions improvement of the producing technology for Santolina chamaecyparissus L.*, Proceedings of the session "20 Years of Horticulture" pag. 77-80.
11. Zlatev-S; Iliev-L; Karanov-E; Tsoleva-M; Donchev-T (1990): *Stimulation of root formation in lavender by growth regulators*, Fiziologiya-na-Rastenyata. 16: 3, 63-67