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Research on rooting rate in *Campsis* cuttings and *Lonicera* cuttings treated with Atonik and Radistim under different cultural conditions

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Abstract Research was carried out in the greenhouses of the Teaching Station of the Faculty of Horticulture and Forestry of the Banat's University of Agricultural Science and Veterinary Medicine „King Michael I" of Timisoara, Romania, using cuttings of Campsis and Lonicera on substrates of sand, peat, perlite, and perlite+peat treated with root-enhancing substances such as Atonik and Radistim. During the experiment, we monitored the rooting rate of the cuttings aiming at comparing the rooting rate in the two species, Campsis and Lonicera, treated with Atonik and Radistim under different cultural conditions. Taking into account the cumulated influence of the substrates and stimulators on rooting in Campsis cuttings, we could see that the most significant differences were on the substratum of perlite+peat when treating with enhances, while the least significant ones were on the substratum of peat alone. When using Atonik, there were the highest deviations in the rooting percentage. Under the influence of the two stimulators, the rooting percentage of Lonicera cuttings reached a span of 8.00%, with values ranging within 46.67% when using Atonik and 54.67% when using Radistim. Overall, treating with Radistim was more effective: it increased considerably and very significantly the rooting percentage than the treatment with Atonik.

Key words

Campsis, Lonicera, root-stimulators, cuttings

The goal of cultivating decorative plants is also to enrich spiritually, to widen one's culture, to ensure privacy and inner satisfaction – and all this needs proper care. Developing green areas and protecting, conserving and expanding the existing ones is an important means of controlling polluters and of improving the environment [1].

There are about 180 species of honeysuckle from different areas of the Northern Hemisphere. There are also some from Asia, which have been adapted rather well to our temperate-continental climate: some of them are deciduous in winter, but most have persistent or semi-persistent leafage [2].

Since the species are valuable decoratively, they have been improved and turned into numerous hybrids with remarkable features. Specialise shops sell such potted plants in spring, when people purchase them for outer decorations. Lonicera are les fit for inside areas, but they can be displayed outside the windows, on terraces, close to wall entrances and green fences, or they can decorate balconies and gazebos [1].

A garden plant, *Campsis radicans* is a climbing shrub with beautiful orange, trumpet-like flowers. This is, undoubtedly, one of the most spectacular summer flower liana. It has on its stems adventive roots that help it climb on the walls or supports. It is planted in the garden because it makes up beautiful bows or green fences that attract due to their vivid colours. Trumpet vine originates from North America (*Campsis radicans*), Japan and China (*Campsis grandiflora*), where it grows luxuriantly reaching 10 m in height [3].

Planting *Campsis radicans* (trumpet vine) along a green fence made of evergreen shrubs such as arborvitae, for instance, has an outstanding aesthetic effect. In America, its continent of origin, the beautiful flowers attract the humming birds. In Romania, the trumpet-like flowers attract butterflies and bees [4].

Work Method

Research was carried out at the Young Naturalists' Station in Timisoara (8.59 ha, southern Timisoara).

The research consisted in monitoring the rooting rate of Lonicera and Campsis cuttings on different substrates treated with different rooting substances (Atonik and Radistim).

We used boxes 50x30 cm filled with substrates of sand, peat, perlite, perlite+peat.

The cuttings of Lonicera and Campsis were purchased from public parks and private gardens; they were cut 15 cm long and treated with Atonik or Radistim, then re-planted in boxes three times.

Results

Taking into account the unilateral effect of the substrate, the mean percentage of rooting had a span of 50%, with values ranging between 31.33% when using the sand substrate and 82% when using the perlite+peat substrate, with a high variability ($s_{\%}$=47.35) between the results of the four substrates.

Table 1

Effect of substrate on rooting percentage in Campsis cuttings

Rooting substrate	Means (%)		Relative values (%)	Difference/ Significance
Peat - Sand	32.00	31.33	102.14	0.67
Perlite - Sand	57.33	31.33	182.99	26.00***
(Perlite+Peat) - Sand	82.00	31.33	261.73	50.67***
Perlite - Peat	57.33	32.00	179.16	25.33***
(Perlite+Peat) - Peat	82.00	32.00	256.25	50.00***
(Perlite+Peat) - Perlite	82.00	57.33	143.03	24.67***

$DL_{5\%}$=4.88, $DL_{1\%}$=6.51, $DL_{0.1\%}$=8.52

The substrate of perlite and peat was the most effective since it yielded very significant increases of cutting rooting of over 24.67% compared to the other substrates. Perlite alone allowed a significantly higher rooting – 25.33-26.00% compared to peat and sand, not differentiated statistically.

Mean values of the rooting percentage on the four substrates when using Radistim ranged between 32.00% on peat or sand alone and 80% on the mixture perlite+peat, with high variability ($s_{\%}$= 45.61). On perlite+peat, the efficacy of this treatment on cutting rooting was significantly superior, allowing very significant increases of 48.00% compared to peat and sand, respectively. Perlite alone also was more favourable to rooting than sand and peat, with a very significant increase of 42.67. Adding peat to perlite lead to a slight, insignificant increase of the rooting percentage (5.33%).

Table 2

The rooting percentage of Campsis cuttings on different substrates under the effect of the same stimulator

Rooting substrate **x Radistim**	Means (%)		Relative values (%)	Difference/ Significance
Peat - Sand	32.00	32.00	100.00	0.00
Perlite - Sand	74.67	32.00	233.34	42.67***
(Perlite+Peat) - Sand	80.00	32.00	250.00	48.00***
Perlite - Peat	74.67	32.00	233.34	42.67***
(Perlite+Peat) - Peat	80.00	32.00	250.00	48.00***
(Perlite+Peat) - Perlite	80.00	74.67	107.14	5.33
Rooting substrate **x Atonik**	Means (%)		Relative values (%)	Difference/ Significance
Peat - Sand	32.00	30.67	104.34	1.33
Perlite - Sand	40.00	30.67	130.42	9.33**
(Perlite+Peat) - Sand	84.00	30.67	273.88	53.33***
Perlite - Peat	40.00	32.00	125.00	8.00*
(Perlite+Peat) - Peat	84.00	32.00	262.50	52.00***
(Perlite+Peat) - Perlite	84.00	40.00	210.00	44.00***

$DL_{5\%}$=6.90, $DL_{1\%}$=9.21, $DL_{0.1\%}$=12.05

When applying Atonik, the different studied substrates allowed cutting rooting between 30.67% on sand and 84.00% on perlite+peat, with higher variability ($s_{\%}$=51.06) than when treated with Radistim. Therefore, the Lonicera cuttings benefited from more favourable rooting conditions on perlite and peat yielding very significant increases of the rooting percentage above 44.00% compared to the other substrates. Adding peat to perlite resulted in a significant increase of the rooting percentage of 44.00%, while adding perlite to peat resulted in a very significant increase of the rooting percentage of 52.00%. With this treatment, perlite alone was significantly more favourable to cutting rooting than peat alone. There was no significant difference between peat and sand effect on the rooting of Campsis cuttings.

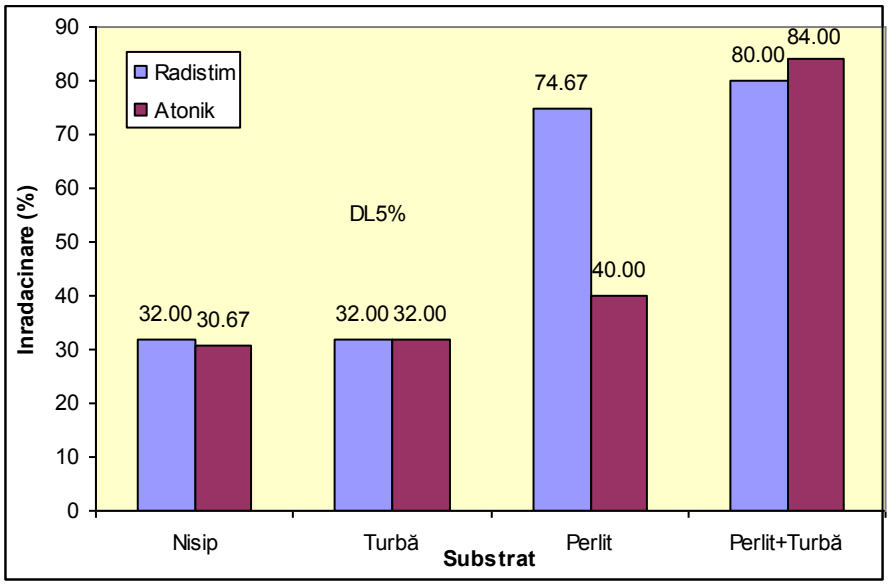

Fig. 1. Rooting percent of Campsis cuttings with different substrates and stimulators

Under the influence of different substrates, the rooting percentage of Lonicera cuttings had a span of 46.66%, with values ranging between 30.67% when using peat and 77.33% when using perlite, with high variability ($s_{\%}$=35,29) between the results on the four substrates. Perlite alone was the most effective substrate if we take into account that it allowed very significant increases of the rooting percentage of the cuttings (about 22.00%-24.00%) compared with sand and perlite+peat. Using perlite and peat had an effect similar to that of sand alone on cutting rooting, allowing values significantly superior to that of peat alone.

Taking into account the cumulated influence if the substrate and stimulators on the rooting of Lonicera cuttings, we could see that perlite and peat yielded the highest significant differences between stimulator treatments, unlike peat alone where applying rooting stimulators had similar effects. When using Radistim, there were the highest deviations between substrates in the rooting percentage.

Table 3

Effect of stimulator and substrate on rooting percentage in Lonicera cuttings

Substrate	Stimulator			
	Radistim	**Atonik**	$\bar{x} \pm s_{\bar{x}}$	$S_{\%}$
Sand	x60.00b	y49.33b	54.67±2.63	20.39
Peat	x30.67c	x30.67c	30.67±2.19	30.34
Perlite	x82.67a	y72.00a	77.33±2.87	15.77
Perlite+Peat	x64.00b	y42.67b	53.33±3.48	27.71
$\bar{x} \pm s_{\bar{x}}$	59.33±3.61	48.67±2.95	54.00±2.40	
$S_{\%}$	36.55	36.31	37.71	

$DL_{5\%}$=7.89, $DL_{1\%}$=10.54, $DL_{0.1\%}$=13.78

When applying Radistim, the different studied substrates allowed a cutting rooting between 30.67% on peat to 82.67% on perlite, with high variability ($s_{\%}$=36.55). Therefore, Lonicera cuttings benefited from more favourable rooting conditions on perlite alone with very significant increases of the rooting percentage of over 18.67% compared to the results on the other substrates. Adding peat to perlite resulted in a significant increase of the rooting percentage of 33.33% compared to peat alone. There was no significant difference between the rooting percentage in Lonicera cuttings on perlite+peat and sand.

Mean values of the rooting percentage on the four substrates when treated with Atonik ranged between 30.67% on peat alone and 72.00% on perlite, with close variability ($s_{\%}$=36.31). On perlite alone, the efficacy of this treatment on cutting rooting was significantly superior, favouring statistically ensured differences of 41.33% compared to peat and 22.67% compared to sand. In this treatment also, sand and perlite+peat substrates were more favourable to rooting than peat. Adding perlite to peat allowed superior rooting percentage (about 12.00%).

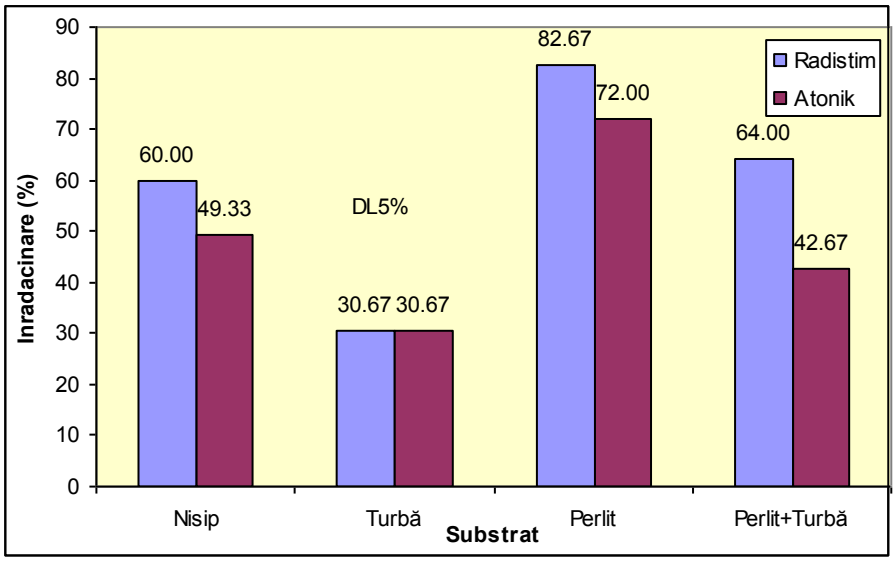

Fig. 2. Rooting percentage of Lonicera cuttings with different substrates and stimulators

Conclusions

Research on Campsis and Lonicera cuttings aimed at comparing the cutting rooting on different substrates and with different treatments with rooting substances (Atonik and Radistim).

Results show a distinctly significant rooting percentage in Campsis cuttings cultivated on perlite+peat and treated with Atonik. Rooting rate in Campsis cuttings was significant on perlite+peat treated with Radistim, but the highest rooting percentage of 84.00% was on perlite+peat treated with Atonik.

Results in Lonicera cuttings show a rooting rate of 82.67% on perlite treated with Radistim and only 72.00% on perlite treated with Atonik.

Final results show a much more significant rooting rate in Lonicera cuttings cultivated on perlite and treated with Radistim; as for Campsis cuttings, we recommend cultivation on perlite+peat and treatment with Atonik.

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