ROOTING EFFICIENCY RESEARCHES FOR THE *CAMPSIS RADICANS* SPECIES USED FOR IMPROVING SLOPES

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Abstract *Campsis radicans* (trumpet creeper) is native to the southeastern part of the United State, being a perennial woody vine with showy red-orange flowers that are attractive to hummingbirds (Streiner, 2006). The main objective of the study is determination the *Campsis radicans* growing, the species being used for the eroded slopes. For this study were collected 80 cuttings by *Campsis radicans* and there were put in a peat and perlite substrate. The plants were placed in the greenhouse. The experiments were performed during three years (2016-2018). The determination about cutting height and annual growing was made. In 2018 it was used a treatment with a rooting hormone named RADI-STIM. In 2016 an average growth of 2.7 cm was recorded and the percentage of rooting was 23.75%. In 2017 an average growth of 6.8 cm was recorded and the percentage of the rooting is 28.75%. In 2018 the recorded average growth was 11cm, with a percentage of rooting of 60%. The highest number of the cutting rooted was done at cutting introduced in RADI-STIM with a percentage of 60%.

Keywords: *cutting, land degradation, micropropagation, slope*

INTRODUCTION

A member of the Bignoniaceae family, *Campsis radicans* L. is nicknamed trumpet creeper, or trumpet vine because of its characteristic trumpetlike flowers being a perennial woody (Streiner, 2006, William Cullina, 2002, Dohse et al., 2009), flowers is among the most colorful and impressive flowering natural vines (Quentin Streitz, 1987). Trumpet creeper is native to eastern, north-central, and south-central part of the United State, It is abundant from New Jersey to Iowa and south to Florida and Texas. The flowers typically are yellow-orange to red, growing up to 8x4 cm at the mouth. They grow in groups of 4 to 12 and bloom from July to September (USDA, 2004). It climbs up to 10–20 meters high. Leaves are opposite, 15–38 cm long, compose of 7–11 leaflets (Marzena Parzymies et al., 2014). The fruit is a flat, tapered capsule, 8-13 cm long with seeds that are flat and winged. It grows in wet to dry soils and sand, loam, or clay soil types with a pH range of 3.7 to 6.8. Trumpet creeper prefers full sun for best flowering (USDA, 2004). Trumpet creeper is one of the most effective vines for attracting hummingbird its dark green leaves complement the flores trumpet flowers in shades of red, yellows and, orange (Kim Smith, 2008; Carolyn Harstad, 2013). In Europe, a trumpet creeper, is regarded as an attractive ornamental vine often planted in private gardens. For many years it was cultivated only in botanic gardens and arboreta, but nowadays it is available from many nurseries. It is used as a cover for fences,

arbors, walls or large trellises and as a groundcover. What is interesting, this perennial vine, is considered as a weed in the midwestern and southeastern United States, where it is commonly found (Marzena Parzymies et al., 2014). Trumpet creeper is also effective in holding eroding soil on steep slopes (Wasowski Sally et al., 2003). Root is a complex organ necessary to fix the aboveground plant body to the soil and to enable uptake of water and nutrients from the soil (Agnieszka Bielach et al., 2012).

MATERIAL AND METHODS

For this study were collected 80 cuttings by *Campsis radicans* and there were put in a peat and perlite substrate. The plants were placed in the greenhouse. The experiments were performed during three years (2016-2018). The determination about cutting height and annual growing was made. In 2018 it was used a treatment with a rooting hormone powder named RADI-STIM.

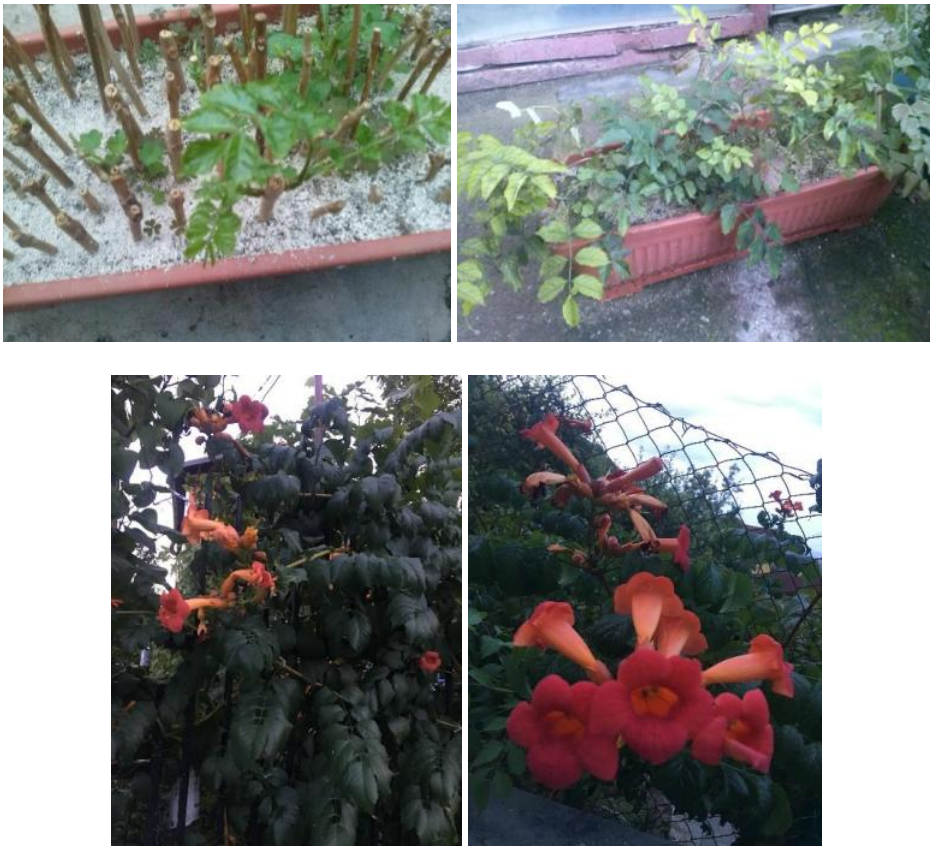


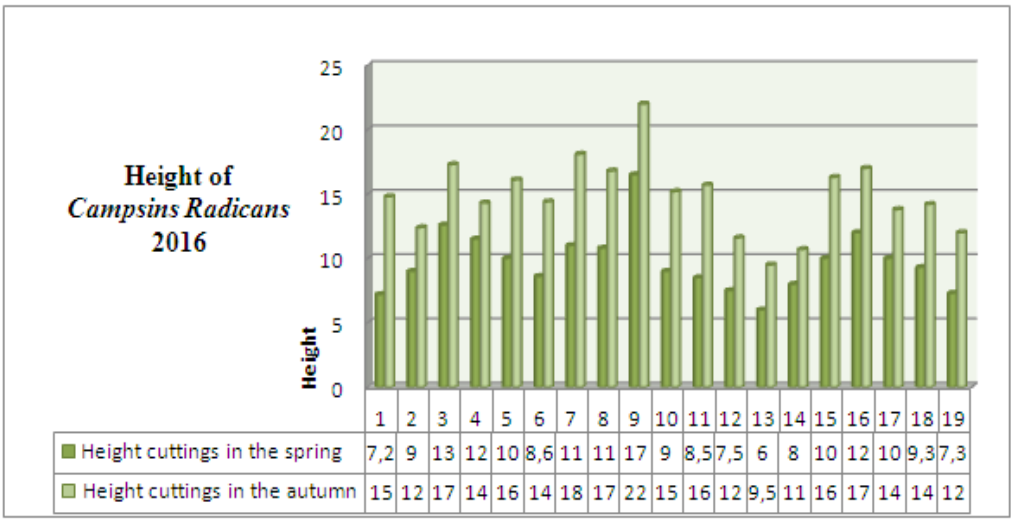
Figure 1. General aspects from experimental field
Source: Original

The woody cutting were taken from the top of the plant, cuttings were cut between 10-15 cm, to each cuttings or leave to 3-4 node. One node was inserted into

the substrate and 1-2 nodes were left above the substrate. On the cuttings were left 2-3 leaves. The cuttings were taken at the end of September.

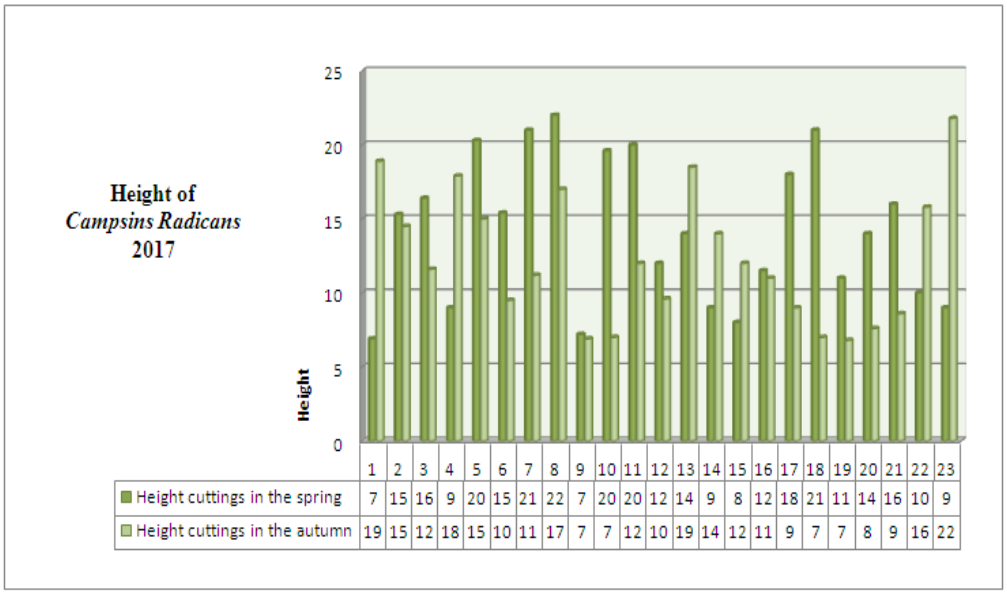
RESULTS AND DISCUSSIONS

The rooting process is determined by a series of factors, one of them being a great concern for technical details, one of them being the substrate and the rooting stimulators (Ban, 2011). In figure is represented the height of the *Campsis radicans* at the beginning and the end of the vegetation period. In 2016 an average growth of 2.7 cm was recorded and the percentage of rooting was 23.75%.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Height cuttings in the spring	7,2	9	13	12	10	8,6	11	11	17	9	8,5	7,5	6	8	10	12	10	9,3	7,3
Height cuttings in the autumn	15	12	17	14	16	14	18	17	22	15	16	12	9,5	11	16	17	14	14	12

Fig. 1. Height of *Campsins radicans* in the spring and autumn in 2016



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Height cuttings in the spring	7	15	16	9	20	15	21	22	7	20	20	12	14	9	8	12	18	21	11	14	16	10	9
Height cuttings in the autumn	19	15	12	18	15	10	11	17	7	7	12	10	19	14	12	11	9	7	7	8	9	16	22

Fig. 2. Height of Campsins radicans in the spring and autumn in 2017

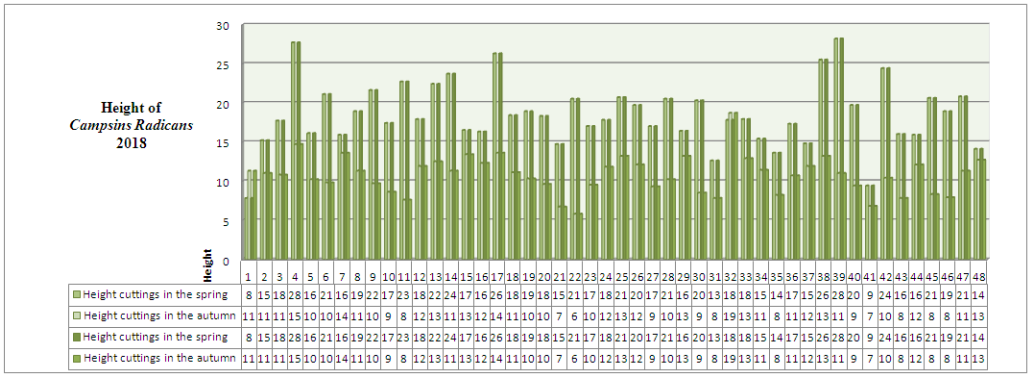


Fig. 3. Height of *Campsins radicans* in the spring and autumn in 2018

In 2017 an average growth of 6.8 cm was recorded and the percentage of the rooting is 28.75%. In 2018 the recorded average growth was 11cm, with a percentage of rooting of 60%. The highest number of the cutting rooted was done at cutting introduced in RADI-STIM with a percentage of 60%.

Numerous studies have highlighted the effect of rooting stimulants on the rooting efficiency of ornamental specimens. (Jeberean et al., 2016) studied the effect of RADI-STIM and Atonik on the ornamental species *Lonicera spp*. and *Campsis radicans*, had a catch percentage between 52% and 80% using the rooting stimulators. (Marzen Parzymies et al., 2014) multiplied *Campsis radicans* species in vitro with auxin supplementation: IAA (indole acetic acid), IBA (indolebutyric acid) or NAA (naphthaleneacetic acid). (Voevod et al., 2019) multiplied *Hedera helix* species by cuttings in different substrates peat, garden soil and a mixture of peat and garden soil in ratio of 1:1. The best percentage of rooted cutting it was recorded at substrates formed from peat + garden soil with 32.17% and the lowest percentage was recorded to the one formed by garden soil. (Ban, 2011) studied the effect of two hormones of rooted indolyl butyric acid (IBA), diluted in 0.005% solution and RADI-STIM in the species *Campsis radicans* and *Buddleia davidii* on different types of substrates were combinations of sand, peat and pearl stone, in different proportions. Were highr for the sampling treated with hormones (RADI-STIM 83% and IBA 0.005% -82) then the rooting ration for the test samples 75%. (Mariana Vlad et al., 2009) multiplied the species *Bougainvillea brasiliensis* by cuttings using RADI-STIM the percentage of attachment was high compared to the control variant 742 cutting and 604 cuttings. The treatment with RADI-STIM, also stimulates the quality of rooted cuttings through the number and the dimension of the roots so that the average number of roots per cutting is growing from 8.2 pcs. untreated, to 11.7 pcs. per cutting treated with RADI-STIM 2. (Marzen Parzymies et al., 2012) multiplied *Clematis viticella* and *Clematis integrifolia* 'Petit Faucon' species in vitro the effect of following cytokinins on growth and branching was studied: benzyladenine (BA), isopentenyl adenine (2iP), kinetin (KIN) and thidiazuron (TDZ). The obtained results show that KIN at concentration of 10 $mg \cdot dm^{-3}$or 5 mg $2iP \cdot dm^{-3}$ are the best for proliferation of Clematis viticella shoot tips while nodal parts produce more axillary shoots on the media with 2iP at concentration of 0.62 $mg \cdot dm^{-3}$. Shoot tip explants of Clematis 'Petit Faucon' produce the most axillary shoots in the presence of 20 mg $2iP \cdot dm^{-3}$ or 10 mg $KIN \cdot dm^{-3}$ and nodal ones

branch best on the media with addition of 1.25 mg 2iP·dm^{-3}. (Voevod et al., 2015) multiplied the species *Hedera helix* using three types of substrate: peat, garden soil and a mixture of peat and garden soil in a ratio of 1:1, and all the three of them had the drainage layer being formed from one centimeter of sand The rooting degree for the variants with peat is 84.85% for the variants with garden soil the rooting degree is 78.13% and the variants with mixture – Peat+Garden soil (1:1) the rooting degree is 84,13%. (West et al., 2015) multiplied the species *Wisteria* ′Blue Moon′ in vitro using Prepared axillary nodal bud segments were placed onto four different nutrient salt formulations (DKW, LP, MS, and WPM) and five different concentrations (0, 2, 4, 8, and 16 μM) of BA for a 4 × 5 factorial combination. There was a significant interaction between nutrient salt formulation and BA concentration with DKW and 4 μM BA producing the highest proliferation rate (propagule number) with 3.6 propagules per axillary nodal segment as compared to the other nutrient salt formulations evaluated in this study. This treatment was not significantly different as compared to either 2 or 8 μM supplemental concentrations of BA and significantly higher than values obtained at 16 μM BA. All nutrient salt formulations had the lowest propagation numbers with the exclusion of BA in the nutrient medium.

CONCLUSIONS

The highest number of the cuttings rooted was done at cuttings treated with RADI-STIM with a percentage of 60%. This result indicates the importance of treatment in the rooting process. *Campsis radicans* was cultivated to be used for erosion control in the municipality of Cluj-Napoca, being efficient in the slope stabilization process. The bio-stimulators have multiple effects: they shorten the rooting period, thei improve the quality of the roots or thei provide a better catching (Ban, 2011).

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