

CONCLUZII

Din analiza rezultatelor obținute putem formula următoarele concluzii:

- la toate soiurile studiate se observă un efect pozitiv, de stimulare a germinăției semințelor, la concentrațiile mai mici ale soluțiilor de Crosing utilizate de noi 0,25- 1,5 mg/l, la imbițiunile de 3 și 6 ore.
- la concentrațiile de Crosing mai mari - de 5 mg/l, se observă o inhibiție puternică a procesului de germinăție, crescând și numărul plantelor neviabile.
- asupra procesului de creștere, Crosingul are efect de stimulare la toate organele plantei, mai ales la concentrațiile mici de (0,5; 1; 1,5 mg/l). Concentrațiile mai mari inhibă creșterea.
- rădăcinile cele mai bine dezvoltate se remarcă în cazul imbițiunii semințelor cu soluțiile de Crosing, în concentrații de 0,25; 0,5; 1,25 și 1,5 mg/l, la o durată a tratamentului de 3 ore.
- creșterea în lungime a tulpinilor este stimulată mai mult în cazul concentrației de 0,5-1,5, la durata de tratament de 3 și 9 ore.
- alungirea tulpinilor este stimulată atât de concentrații mici, cât și de cele mai mari. La soiul de fasole "Ardeleana" numai concentrațiile mici sunt stimulative.

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CUTTING PROPAGATION IN *THUJA OCCIDENTALIS* L.
"FASTIGIATA" USING ROOTING STIMULATORS

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Abstract

ADRIANA FLORINCESCU, ANGELA PUI, ANA NICOARĂ, 1997, *Cutting propagation in Thuja occidentalis L. "fastigiata" using rooting stimulators* (in English). Not. Bot. Hort. Agrobot. Cluj, XXVI-XXVII.

This study concerns different aspects of the rooting of *Thuja occidentalis L. fastigiata* cuttings. There were studied the influences of the soil and of the rooting stimulators on the cuttings in *Thuja occidentalis L. fastigiata*. The experience was valued as a bifactorial one with two factors: A - the soil : a1 - sand, a2 - perlite and B - the rooting stimulators : b1 - untreated cuttings, b2, b3 - treated cuttings with powder stimulators (1000 ppm and 2000 ppm ANA), b4, b5, b6 - immersion of the cuttings in a solution for 2, 6 and 12 hours (100 ppm alphanaphthylacetic acid, ANA).

The results were interpreted using the analysis of variance. Concluding this study, the rooting of *Thuja occidentalis L. fastigiata* cuttings is best to be made in spring, on perlite, using stimulators for rooting, conditioned as powder (2000 ppm ANA) or the immersion of the cuttings in a solution (100 ppm ANA for two hours). Using this method, the length and the weight of the roots are higher and the rootings percentage is over 5%.

Keywords: *Thuja occidentalis L. fastigiata*, cuttings, rooting stimulators, propagation

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Producing ornamental planting material tends to become more and more important in the context of social and economical changes in Romania.

Thuja occidentalis L. fastigiata has good biological and esthetical qualities and is therefore planted in green spaces as a valuable ornamental variety (2).

In order to establish and efficient technology by which planting material can be produced

certain factors which influenced the rooting of the *Thuja occidentalis* L. fastigiata cuttings have been studied.

Material and method

The biological material is represented by *Thuja occidentalis* L. fastigiata. The producing of the planting material was made by cuttings. The cuttings were collected in the middle of March, from representative plants. The cuttings were treated with rooting stimulators, based on alphanaphthilacetic acid (ANA). The powder-like rooting stimulators were applied in two variants, depending on the different concentration of active substance. The solution-like rooting stimulators were applied in three variants, depending on the immersion period. The untreated cuttings represented the control variant (1). The applience of the rooting stimulators was performed on March 15, right after the collection of the cuttings. The planting of the cuttings was made within a greenhouse, on two types of rooting soil: perlit and sand (control variant). The researches were started after 130 days from the planting of the cuttings.

The experience was valued as a bifactorial one with two factors:

A - the rooting soil:

a1 - sand

a2 - perlit

B - the rooting stimulators

b1 - untreated cuttings

b2 - cuttings treated with powder - 1000 ppm (ANA)

b3 - cuttings treated with powder - 2000 ppm (ANA)

b4 - cuttings treated with solution (100 ppm ANA) - 2 hours

b5 - cuttings treated with solution (100 ppm ANA) - 6 hours

b6 - cuttings treated with solution (100 ppm ANA) - 12 hours

The results were interpreted using the analysis of variance.

Results and discussion

The experimental data shown in table 1 prove the influence of the soil and of the rooting

stimulators on the length of the roots in *Thuja occidentalis* fastigiata cuttings. It results that, if comparing the effect of the same variant that concerns the rooting stimulators, the average length of the roots of the cuttings is strongly influenced by the rooting soil. The perlit eases the growth of the roots. The difference determined between all studied variants and the control variant is very significant. The rooting stimulators have, in general, a positive effect on the length of the roots of the cuttings, as well as on sand, as on perlit.

Influence of soil and of rooting stimulators on the length of roots in

Thuja occidentalis fastigiata cuttings

Influența substratului de înrădăcinare și a substanțelor rizogene asupra lungimii rădăcinilor butașilor de *Thuja occidentalis* fastigiata

Table 1

Tabelul 1

Variant Varianta	Average length Lungimea medie (cm)	Relative length Lungimea relativă (%)	± d (cm)	Significance of difference Semnificația diferenței	Variant Varianta	Average length Lungimea medie (cm)	Relative length Lungimea relativă (%)	± d (cm)	Significance of difference Semnificația diferenței
a1b1	9.76	100.00	-	-	a1b1	9.76	100.00	-	-
a2b1	21.31	218.30	11.54	***	a1b2	11.37	116.40	1.60	**
a1b2	11.37	100.00	-	-	a1b3	12.46	127.60	2.70	***
a2b2	21.47	188.90	10.10	***	a1b4	12.93	132.40	3.17	***
a1b3	12.46	100.00	-	-	a1b5	12.62	129.30	2.86	***
a2b3	26.09	269.40	13.63	***	a1b6	8.63	88.40	-1.13	0
a1b4	12.93	100.00	-	-	a2b1	21.31	100.00	-	-
a2b4	28.44	219.90	15.51	***	a2b2	21.47	100.70	0.16	-
a1b5	12.62	100.00	-	-	a2b3	26.09	122.40	4.78	***
a2b5	31.95	253.10	19.33	***	a2b4	28.44	133.50	7.13	***
a1b6	8.63	100.00	-	-	a2b5	31.95	149.90	10.64	***
a2b6	27.14	314.50	18.51	***	a2b6	27.14	127.40	9.83	***

DL 5% = 0.97

DL 1% = 1.39

DL 0.1% = 2.14

DL 5% = 0.92

DL 1% = 1.25

DL 0.1% = 1.65

The cuttings planted on the sand and treated with powder-like rooting stimulators (2000 ppm) as well as the ones treated 2 and 6 hours with the solution-like rooting stimulators presented very significant differences regarding the length of the roots. This is 27 - 32% higher than the untreated variant. The rooting powder (1000 ppm) determined a distinctly significant difference and the 12 hour immersion of the cuttings in solution (100 ppm ANA) determined an inferior distinctly significant difference.

Influence of soil and of rooting stimulators on the weight of roots in
Thuja occidentalis fastigiata cuttings
Influența substratului de înrădăcinare și a substanțelor rizogene asupra greutateii
rădăcinilor butașilor de *Thuja occidentalis fastigiata*

Table 2
Tabelul 2

Variant Varianta	Average weight Greu- tatea medie (g)	Relative weight Greu- tatea relativă (%)	± d (g)	Significance of difference Semni- ficația diferenței	Variant Varianta	Average weight Greu- tatea medie (g)	Relative weight Greu- tatea relativă (%)	± d (g)	Significance of difference Semni- ficația diferenței
a1b1	0.69	100.00	-	-	a1b1	0.69	100.00	-	-
a2b1	0.61	87.40	-0.9	-	a1b2	0.49	70.10	-0.21	-
a1b2	0.49	100.00	-	-	a1b3	0.64	92.10	-0.06	-
a2b2	1.08	222.30	0.60	**	a1b4	0.75	107.98	0.06	-
a1b3	0.64	100.00	-	-	a1b5	0.69	100.00	-	-
a2b3	1.43	223.50	0.79	**	a1b6	0.48	68.80	-0.22	-
a1b4	0.75	100.00	-	-	a2b1	0.61	100.00	-	-
a2b4	2.68	357.00	1.93	***	a2b2	1.08	178.20	0.47	**
a1b5	0.69	100.00	-	-	a2b3	1.43	235.40	0.82	***
a2b5	1.97	283.50	1.28	***	a2b4	2.68	440.70	2.07	***
a1b6	0.48	100.00	-	-	a2b5	1.97	324.50	1.36	***
a2b6	1.67	349.20	1.19	***	a2b6	1.67	274.90	1.06	***

DL 5% = 0.33

DL 1% = 0.50

DL 0.1% = 0.85

DL 5% = 0.28

DL 1% = 0.37

DL 0.1% = 0.49

On perlite, the use of the rooting stimulators had a positive influence on the growth of the roots, its average length being with 22 - 50 % bigger than the one of the roots of the untreated cuttings.

All studied rooting stimulators determined very significant differences between the variants and the control. Only the powder - 1000 ppm did not influence significantly the growth in length of the roots of the cuttings treated with this substance.

The table 2 shows the influence of the soil and of the rooting stimulators on the weight of the roots in *Thuja occidentalis fastigiata* cuttings.

The perlite determined distinctly significant differences for the cuttings treated with powders and very significant differences for 2 and 6 - 12 hour immersion of the cuttings in solution regarding the weight of the roots, compared to the rooting on the sand (control variant). The effect of the rooting stimulators is insignificant on sand for all studied variants.

The rooting stimulators influence positively the weight of the roots of the cuttings on perlite.

The cuttings treated with powder (1000 ppm) present a distinctly significant difference, all the other applied rooting stimulators have determined very significant differences towards the untreated variant, regarding the weight of the roots.

Table 3 shows the influence of the soil and of the rooting stimulators on the rooting percentage in *Thuja occidentalis fastigiata* cuttings. It results that the perlite does not have significant effects on the rooting percentage, no matter the substance used. The untreated cuttings presented an inferior distinctly significant difference towards the ones rooted on sand; the cuttings treated with stimulating solution for 6 hours determine a distinctly significant difference towards the control, regarding the rooting percentage on perlite.

The rooting stimulators applied to the cuttings had different effects on the rooting percentage. On sand the rooting percentage is influenced only when the powders are used.

The use of them determined a distinctly significant difference when using the powder - 1000 ppm and a very significant difference when using the powder - 2000 ppm towards the untreated control.

The rooting percentage increases with 12 - 17 % comparatively to the control. The immersion of the cuttings with the solutions did not have a significant effect regarding the rooting percentage on sand, an inferior distinctly significant difference being noticed when using the 12 hour solution.

Influence of soil and of rooting stimulators on the rooting percentage

in *Thuja occidentalis fastigiata* cuttingsInfluența substratului de înrădăcinare și a substanțelor rizogene asupra procentului de înrădăcinare a butașilor de *Thuja occidentalis fastigiata*

Table 3

Tabelul 3

Variant Varianta	Average percentage Procentul mediu (%)	Relative percentage Procentul relativ (%)	± d	Signi- ficance of difference Semni- ficația diferenței	Variant Varianta	Average percentage Procentul mediu (%)	Relative percentage Procentul relativ (%)	± d	Signi- ficance of difference Semni- ficația diferenței
a1b1	82.70	100.00	-	-	a1b1	82.70	100.00	-	-
a2b1	70.70	85.50	-12.00	00	a1b2	85.20	103.00	2.50	-
a1b2	85.20	100.00	-	-	a1b3	92.40	111.70	9.70	**
a2b2	83.50	98.00	-1.70	-	a1b4	96.50	116.70	13.80	***
a1b3	92.40	100.00	-	-	a1b5	79.20	95.80	-3.50	-
a2b3	98.40	106.50	6.00	-	a1b6	75.90	90.70	-7.70	00
a1b4	96.50	100.00	-	-	a2b1	70.70	100.00	-	-
a2b4	96.45	99.90	-0.05	-	a2b2	83.50	118.10	12.80	***
a1b5	79.20	100.00	-	-	a2b3	98.40	139.20	27.70	***
a2b5	95.00	119.90	15.80	**	a2b4	96.45	136.40	25.75	***
a1b6	75.00	100.00	-	-	a2b5	95.00	134.40	24.30	***
a2b6	70.50	94.00	-4.5	-	a2b6	70.50	99.70	-0.20	-

DL 5% = 7.59

DL 1% = 11.95

DL 0.1% = 21.58

DL 5% = 5.57

DL 1% = 7.52

DL 0.1% = 9.97

On perlite, the rooting percentage is positively influenced by using rooting stimulators and it is higher with 18 - 39 % compared to the control variant. The immersion of the cuttings for 12 hours in rooting solution did not determine significant differences, but all the other variants have determined very significant differences towards the untreated variant, regarding the rooting percentage.

Conclusions

1. Rooting stimulators have, in general, a positive effect on the growth of the roots of the cuttings in *Thuja occidentalis L. fastigiata* and the rooting soil has different effects on their rooting.
2. The growth in length of the cuttings is strongly stimulated as well on perlite as on sand by the treatment of the cuttings with rooting powders (1000, 2000 ppm ANA) or by the immersion of the cuttings in rooting solutions for 2 and 6 hours.
3. The weight of the roots of the cuttings is bigger when the cuttings are being rooted on perlite than on sand, and the rooting stimulators have positive effects on the weight of the roots in all studied variants.
4. The perlite influences strongly the rooting percentage; the rooting powder (2000 ppm ANA) and the immersion in rooting solution for 2 and 6 hours, lead to a rooting percentage of 95 - 98 %.
5. In order to obtain a high quality planting material, characterized by a connecting length and weight of the roots as well as a high rooting percentage (95 - 98 %) it is recommended that the rooting of the *Thuja occidentalis L. fastigiata* cuttings be done on perlite and that the cuttings be treated with rooting stimulators based on ANA - powder-like (2000 ppm ANA) or the immersion of the cuttings in 2 hour solution (100 ppm ANA).

Rezumat

FLORINCESCU ADRIANA, ANGELA PUI, ANA NICOARĂ, 1997, În rădăcinarea butașilor prin stimularea rizogenă a speciei *Thuja occidentalis L. varietatea "fastigiata"*, Not. Bot. Hort. Agrobot. Cluj, XXVI-XXVII. Studiul se referă la diferite aspecte ale înrădăcinării butașilor de *Thuja occidentalis L. fastigiata*. S-a studiat influența substratului de înrădăcinare și a substanțelor rizogene asupra lungimii, greutatei și a procentului de înrădăcinare a butașilor de *Thuja occidentalis fastigiata*. Valorificarea rezultatelor s-a realizat pentru o experiență bifactorială de tipul: factorul A - substratul de înrădăcinare - a1 - nisip, a2 - perlite și B - substanțele rizogene - b1 - butași netratați (maritor), b2, b3 - butași tratați cu pudre rizogene (1000 ppm și 2000 ppm ANA), b4, b5, b6 - butași tratați în soluție rizogenă (100 ppm ANA) timp de 2, 6 și 12 ore. În rădăcinarea butașilor de *Thuja occidentalis fastigiata* este eficientă dacă se realizează primăvara, folosind ca substrat de înrădăcinare perlite și folosind substanțe rizogene condiționate ca pudre (2000 ppm ANA) sau ca soluție (100 ppm ANA - imersie 2 ore). Folosind această metodă, atât lungimea cât și greutatea rădăcinilor este corespunzătoare, iar procentul de înrădăcinare ajunge spre 98 %.

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