INFLUENCE OF SUBSTRATE AND ATONIK BIOACTIVE SUBSTANCE ON THE ROOTING OF THUJA OCCIDENTALIS COMPACTA AND GLOBOSA CUTTINGS

Vlad Mariana*, Vlad Ioana Andra*, Vlad Ioan*

*University of Oradea,Faculty for environmental Protection,26 General Magheru Street 4100848,Oradea,Romania;mariana_popvlad@yahoo.com

Abstract

Both Thuja occidentalis Compacta and Globosa are particularly valuable ornamental plants, rarely spread in our country, due to the lack of planting material as a consequence of low efficiency in multiplication (do not seed) but also due to the high costs of the imported plants.

In the experiments conducted during the period 2014-2016, the percentage of rooted cuttings ranged within quite wide limits from 60.4% for the control variant (sand without Atonik treatment in 2010) and reaching 89.5% for the optimum variant (sand 75% + beech sawdust 25% treated with Atonik).

The factor that greatly influenced the rooting of cuttings was the rooting substrate.

The substrate made up of sand 75% and beech sawdust 25% increases the rooting rate. Thus, the cuttings of Thuja occidentalis Globosa can be rooted in a proportion of 89.5% with respect to 61.6 in sand, and those of Thuja occidentalis Compacta in a proportion of 88.7% with respect to 60.4% in sand, which is a satifying level taking into account that no other more expensive substrates (perlite, peat, etc.) can not get much higher yields.

Key words: rooting substrate, rhysogen stimulants, cuttings

INTRODUCTION

The number of varieties and cultivars belonging to the genus Thuja is very high (Krussmann, 2009).

Many of them have special uses: for hedges, groups, isolated. Given the demands of Oradea, we studied cultivars of the species Thuja Compacta and Globosa occidentalis (Nesmann, 2000).

Thuja occidentalis Compacta. It has a straight stem with reddish brown bark and conic crown. The spindles are compressed, oblique or horizontal, having a dark green colour on the superior side and light green on the inferior side. The scaly leaves are disposed oppositely, on four rows; those that are dorso-ventral are flat and the lateral ones are bent under the form of a boat, covering completely the spindle. The paired dorso-ventral leaves are foreseen with a round resiniferous gland (Iliescu, 1998).

Thuja occidentalis Globosa. Its leaves are golden in summer and yellow - orange in winter with globular aspect (Zaharia, Adelina, 2003).

MATERIAL AND METHOD

The experiments were conducted during 2014-2016 in Leş (Oradea). The research on root cuttings were organized as trifactorial experiences, namely:

• Factor A – rooting substrate:

a_1 – sand

a_2 – sand 50% + beech sawdust 50%

a_3 – sand 75% + beech sawdust 25%

• Factor B – treatment with rhysogen stimulants:

b_1 – untreated

b_2 – treated with Atonik

• Factor C – cultivar:

c_1 – Thuja occidentalis Compacta

c_2 – Thuja occidentalis Globosa

By the factor combination ,12 experimental variants resulted (Tab. 1).

Atonik is a rooting stimulant based on auxines and citokinine (Nozerran, 2002).

Table 1

Experimental variants, Leş (Oradea) 2014-2016

Variants	Rooting substrate	Treatment with stimulants	Cultivar
1	a_1 - sand	b, - untreated	c_1 - Thuja occidentalis Compacta
2	a_1 - sand	b, - untreated	c_2 - Thuja occidentalis Globosa
3	a_1 - sand	b_2 – treatment with Atonik	c_1 - Thuja occidentalis Compacta
4	a_1 - sand	b_2 - treatment with Atonik	c_2 - Thuja occidcntalis Globosa
5	a_2 - sand 50% + beech sawdust 50%	b, - untreated	c_1 - Thuja occidentalis Compacta
6	a_2 - sand 50% + beech sawdust 50%	b, - untreated	c_2 - Thuja occidcntalis Globosa
7	a_2 - sand 50% + beech sawdust 50%	b_2 - treatment with Atonik	c_1 - Thuja occidentalis Compacta
8	a_2 - sand 50% + beech sawdust 50%	b_2 - treatment with Atonik	c_2 - Thuja occidentalis Globosa
9	a_3 - sand 75% + beech sawdust 25%	b, - untreated	c_1 - Thuja occidentalis Compacta
10	a_3 - sand 75% + beech sawdust 25%	b, - untreated	c_2 - Thuja occidcntalis Globosa
11	a_3 - sand 75% + beechsawdust 25%	b_2 - treatment with Atonik	c_1 - Thuja occidentalis Compacta
12	a_3 - sand 75% + beech sawdust 25%	b_2 - treatment with Atonik	c_2 - Thuja occidentalis Globosa

It stimulates the cell division, formation and elongation of roots . The base of the cuttings was introduced into the stimulant solution on 2 cm

lenght for two hours (Iliescu, 2008). The planting of cuttings for rooting was made at a distance of 5x5 cm and at a depth of 3.5-4.5 cm (Nozeran, 2002).

Both sand and beech sawdust are cheap and easily available. The thickness of the rooting substrate was of 12 cm (Stanica et al., 2002).

During rooting, the temperature ranged between 18-25°C in the substrate (Haissing, 1994). The light was controlled by covering the cuttings with a plastic green net with meshes of 0.1/0.2 mm (Micheli et al., 2000).

RESULTS AND DISCUSSION

In 2014, the duration of cuttings' healing was 22 days in variants with sand 75%+ beech sawdust 25%, 25 days in variants with sand 50% + beech sawdust 50% and 28 days in variants with sand.

The rooting period of cuttings spread over 142-149 days in variants with sand 75%+ beech sawdust 25%, 150-157 days in variants with sand 50% + beech sawdust 50% and 160-163 days in the variants with sand.

The treatment with Atonik resulted in rooting cuttings with 3-7 days earlier.

In 2015, the period of healing was 25 days for cuttings rooted in sand 75% + beech sawdust 25%, 28 days for cuttings rooted in sand 50% + beech sawdust 50% and 32 days for those rooted in sand.

The rooting duration was 143-148 days in the substrate made of sand 75% + beech sawdust 25%, 154-160 days in the substrate made of sand 50% + sawdust beech 50% and 165-168 days in the sand.

Cutting stimulation with Atonik reduced the rooting period with 3-5 days.

The average number of rooted cuttings of the total destined to root differ from variant 1 to variant 12, being however grouped on studied factors (Tab. 2).

In the case of sand, the values are smaller with differences between stimulated and unstimulated variants. This difference is also found in other variants that have the same substrate.

The conclusion that emerges is that the variants treated with Atonik are superior to those untreated; on groups of substrates, the variants that contain sand 75% + beech sawdust 25% as regards the number of rooted cuttings with respect to the total number of those destined to rooting, there are quite obvious differences, and varies between 60.4% and 89.5%.

Thus, there is a weak cutting rooting for Thuja occidentalis on the sand substrate 60.4 to 70.2%, which is a low level in both cultivars studied. The substrate improved by mixing sand 75% and beech sawdust 25% increases the percentage of rooted cuttings from 80.9 to 89.5% which is a

satisfactory level, in conditions where no other more expensive substrates (pearl stone, peat, etc.) don't record higher yields.

The increase up to 50% of sawdust content in the substrate determines the decrease of the rooting rate of cuttings from 74.5 to 78.8%, but still superior to the control version (sand).

Table 2

Average experimental data (2014-2016) obtained during the rooting of Thuja occidentalis cutting in Leş nursery (Oradea)

Crt. no.	Variants			Rooted Cuttings			Difference significance
	Rooting substrate	Treatment with stimulants	Cultivar	Number	%	+/- D	
1	Sand	Untreated	Thuja occidentalis Compacta (Mt)	598	100	-	-
2	Sand	Untreated	Thuja occidentalis Globosa	610	102	12	-
3	Sand	Treatment with Atonik	Thuja occidentalis Compacta	682	114	84	X
4	Sand	Treatment with Atonik	Thuja occidentalis Globosa	695	116	97	X
5	Sand 50% + beech sawdust 50%	Untreated	Thuja occidentalis Compacta	738	123	140	XX
6	Sand 50% + beech sawdust 50%	Untreated	Thuja occidentalis Globosa	747	124	149	XX
7	Sand 50% + beech sawdust 50%	Treatment with Atonik	Thuja occidentalis Compacta	776	129	178	XX
8	Sand 50% + beech sawdust 50%	Treatment with Atonik	Thuja occidentalis Globosa	781	131	183	XX
9	Sand 75% + beech sawdust 25%	Untreated	Thuja occidentalis Compacta	801	133	203	XXX
10	Sand 75% + beech sawdust 25%	Untreated	Thuja occidentalis Globosa	811	136	213	XXX
11	Sand 75% + beech sawdust 25%	Treatment with Atonik	Thuja occidentalis Compacta	879	147	281	XXX
12	Sand 75% + beech sawdust 25%	Treatment with Atonik	Thuja occidentalis Globosa	887	148	289	XXX
	Average			750.4	125.2	-	-

D L - 5% - 83 ; D L - 1% - 134 ; D L – 0.1% - 202

CONCLUSIONS

Under the same conditions of substrate and stimulent, Thuja occidentalis Rheingold cuttings were rooted in higher percentage than those of Thuja occidentalis Smaragd.

- The rooting percentage of cuttings varies in quite large limits between the experimental variants that start from 60.4 to 61.6% in the control variant (sand without Atonik treatment) and reach 88.7 to 89.5 in the optimal variant (sand 75% + beech sawdust 25% x Atonik treatment)
- The factor that strongly influenced the cuttings rooting was the rooting substrate. Thus, in comparison with the sand rooting that on average on the whole experience is 65.2% rooted cuttings, in the case of the substrate made of sand 50%+ beech sawdust 50%, the number of rooted cuttings increased by 17.7%, with a distinctly significant difference and in the substrate consisting of sand 75% + beech sawdust 25% increases by 30.7%, the difference being very significant.
- The behaviour of the two cultivars with respect to the complex of studied factors shows that Rheingold is rooting better than Smaragd with 1.5%.
- Treatment with Atonik increases the number of rooted cuttings by 9.2%.
- Analysis of the combined influence of growing media and cultivar on the percentage of rooted cuttings shows small differences, the two cultivars acting similarly in the different substrates with increases of 17.2 to 18.2% for the variants with sand 50% + beech sawdust50% and of 30.2 to 31.2 for the variants with sand 75% + beech sawdust 25%.
- Compared to the control variant 3 (sand x Atonik treatment), variant 11 (mixture of 75% sand and 25% beech sawdust, cuttings treated with Atonik) provides an increase of 197 rooted cuttings, 28.9% respectively.
- Increase in the sawdust in the rooting substrate up to 50% determines the decrease of the rooting yields up to 74.5 - 78.8%, but being superior to the control variant (sand).

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