

THE INFLUENCE OF FERTILIZERS APPLIED ON CONTAINERIZED CULTURE OF THUJA OCCIDENTALIS COLUMNNA

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Abstract

The containerized culture of the ornamental plants has an increasing importance for producers. These are interested in finding the proper solutions for the insurance of the best growth conditions for the plants. Fertilizers are indispensable for success of the type of culture at high parameters. Researches have been done at the Fruit Research Development Constanta between 2004-2006. The biological material used for studies was represented by plants of Thuja Occidentalis Columnna. Substratum for culture, resulted by mixing some compounds, were represented by: Substratum 1 made by: ground celery, ground leaf, peat and sand 1:1:1:0,5; Substratum 2 made by: forest compost and perlit 3:1. Experimental scheme included 6 variants: 2 controls unfertilized, with plants cultivated in the two substratum; 2 variants with substratum fertilized with forest compost NPK 15:15:15; 2 variants fertilized during vegetation with Coic nutritive solution. There were organized (6) six variants with four (4) replications. During the three years of studies has been done agrochemical analysis of substratum from containers, in May and in September, to establish: pH; total nitrogen; humus %; organic substance; phosphorus; potassium. The observations made on the plants consisted in: biometric measurements of the plants in May and September regarding: height of plants (cm), trunk thickness diameter (mm), number of offshoots; agrochemical analysis for finding the provisioning level in nutritive elements of the plants. The best substratum for Thuja Occidentalis "Columnna" was represented by substratum 1 with complex fertilizer (NPK) 15:15:15 applied 5 kg/mc before planting in containers. Substratum 1, fertilized before planting in containers leded to significant growth. Coic solution applied during vegetation had also considerable influence on plants growth.

Key words: complex fertilizer, nutritive solution, substratum.

INTRODUCTION

The containerized culture of the ornamental plants has an increasing importance for producers. These are interested in finding the proper solutions for the insurance of the best growth conditions for the plants.

Fertilizers are indispensable for success of the type of culture at high parameters, so that it is necessary to solve the aspects of using them.

MATERIALS AND METHODS

Researches have been made at the Fruit Research Development Constanta between 2004-2006. The biological material used for studies was represented by plants of Thuja Occidentalis Columnna, multiplied before by cuttings. Substratum for culture, resulted by mixing some compounds, were represented by: -Substratum 1 made by: ground celery, ground leaf, peat and sand 1:1:1:0,5.-Substratum 2 made by: forest compost and perlit 3:1.

Experimental scheme included 6 variants: -2 controls unfertilized, with plants cultivated in the two substratum; -2 variants with substratum fertilized with forest compost NPK 15:15:15; -2 variants fertilized during vegetation with Coic nutritive solution. There were organized (6) six variants with four (4) replications. Each replication included three plants. Plants of Thuja were planted in containers with 12 cm diameters.

Analyses and observations Substratum.

During the three years of studies has been done agrochemical analysis of substratum from containers, in May and in September, to establish the following parameters: pH (in water) – potentiometer; total nitrogen (N), by Kjeldhal method; humus%, by Walkley Black method (modified by Gogoșă); organic substance%, by wet combustion method; phosphorus (P), ppm in Al, by Egner – Rhiem Domingo method; potassium, ppm in Al, by flame photometry. Biological material. The

observations made on the plants of Thuja from containers consisted in: -biometric measurements of the plants in May and September, for every vegetation cycle, regarding: -height of plants (cm) -trunk thickness diameter (mm) -number of offshoots- agrochemical analysis for finding the provisioning level in nutritive elements of the plants which were made in May and September to determine: -N%, by Kjeldhal method -P%, by

wet mineralization and colorimetric dosage- K%, by wet mineralization and flame photometry

RESULTS AND DISCUSSIONS

In table 1 are presented the effects of different nutrition of the plants about the height, trunk thickness diameter and number of offshoots.

Table 1. Biometric determinations of Thuja occidentalis " Columna"

Nr. crt.	Variant	Average data on :								
		High (cm)			Trunck thickness (mm)			Number offshoots		
		May 2004	Sept. 2006	Increase growth	May 2004	Sept. 2006	Increase growth	May 2004	Sept. 2006	Increase growth
1	V1 Substratum 1 - control	20,2	35,0	14,8	5,2	5,4	0,2	12	20	8
2	V2 Substratum 1 + NPK	30,2	52,8	22,6	5,8	6,1	0,3	15	25	10
3	V3 Substratum 1 + nutritive solution	27,2	49,1	21,9	5,1	5,3	0,2	17	28	11
4	V4 Substratum 2 - control	27,8	39,4	11,6	6,2	6,3	0,1	12	19	7
5	V5 Substratum 2 + NPK	30,1	45,3	15,2	5,8	6,1	0,3	15	22	7
6	V6 Substratum 2 + nutritive solution	26,1	42,3	16,2	4,8	5,0	0,2	18	26	8

Substratum 1 made by: ground celery, ground leaf, peat and sand 1:1:1:0,5

Substratum 2 made by: forest compost, perlit 3:1

Table 1 shows that the best results were registered at fertilized variants, in substratum 1: 22,6 cm increase growth for fertilizing with NPK and 2,9 cm for nutritive solution.

Number of offshoots was also bigger in these variants towards of unfertilized control and

variant from substratum 2, with light composition.

Statistic interpretation of the results of the biometric measurements are included in table 2 and figure 1.

Table 2. Statistical interpretation of the growth increase at Thuja Occidentalis " Columna"

Variant	Height in 2004 (cm)	Height in 2006 (cm)	Increase growth		Difference	Signification
			(cm)	%		
V1 Substratum 1- control	20,2	35,0	14,8	100	-	-
V2 Substratum 1 + NPK	30,2	52,8	22,6	152,7	+7,8	*
V3 Substratum 1 + nutritive solution	27,2	49,1	21,9	147,9	+7,1	*
V4 Substratum 2- control	27,8	39,4	11,6	100	-	-
V5 Substratum 2 + NPK	30,1	45,3	15,2	131,0	+3,6	-
V6 Substratum 2 + nutritive solution	26,1	42,3	16,2	139,6	+4,6	-
x = 17,05; DL 5% = 6,39; 1% = 10,03; 0,1% = 17,08						

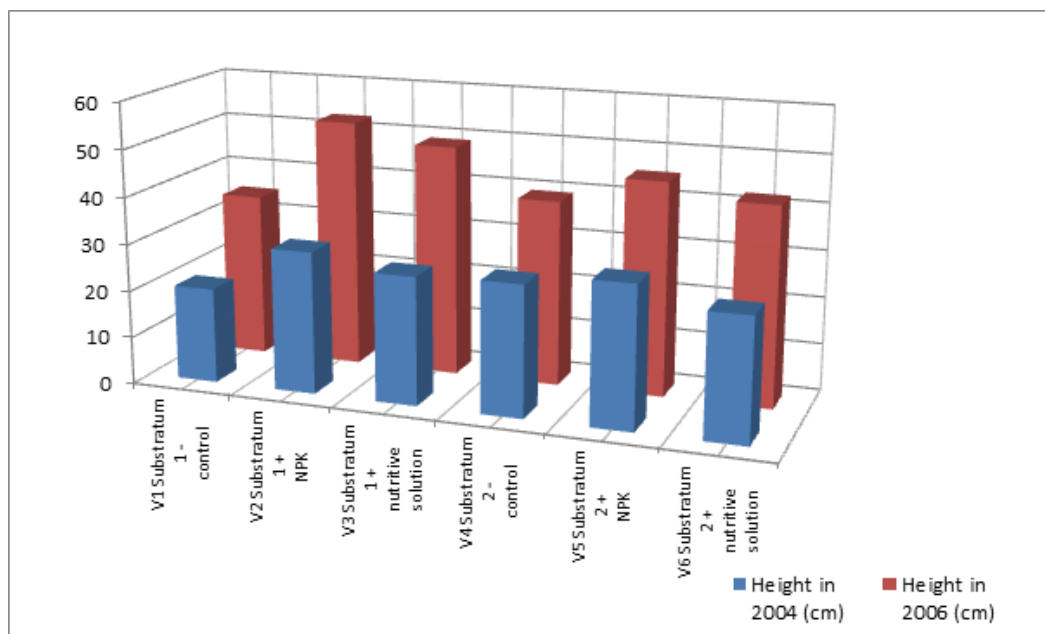


Figure 1. The dynamic height growing of the plants

Plants of *Thuja occidentalis* "Columna" from substratum 1 fertilized with NPK had a progress of growth with 52,7% bigger than the unfertilized control.

Fertilization of plants from substratum 1 with Coic solution during the vegetation determined a growth of 47,9 cm towards the control (table 3).

The analysis of the results shows the following provisioning of plants in N, P, K.

Table 3. Average content in nutritive elements from plants at *Thuja Occidentalis* " Columna"

Variant	N%		P%		K%	
	May	Sept.	May	Sept.	May	Sept.
	2,37	2,56	1,48	1,63	0,34	0,40
	2,81	3,08	1,69	1,89	0,42	0,48
	2,69	2,93	1,59	1,78	0,37	0,43
	2,05	2,36	1,40	1,57	0,32	0,37
	2,28	2,53	1,54	1,70	0,38	0,44
	2,36	2,62	1,49	1,66	0,36	0,41

The best provisioning was founded at V2, fertilized with NPK (3,08% N in September, 1,89% for P and 0,48% for K).

Nutritive solution (Coic solution) applied during the vegetation, had also a good influence for plants provisioning at V3 2,93%

N in September, 1,78 P% and 0,43% K. Both variants (V2 and V3) content plants from substratum 1, with peat.

Results of agrochemical analysis of substratum are included in table 4.

Table 4

Variant	pH		Content in soluble salts		N total %	P %		K %	
	May 2004	Sept. 2006	%			May 2004	Sept. 2006	May 2004	Sept. 2006
			Sept. 2004	Sept. 2006	Sept. 2006				
V1 Substratum 1 - control	8.1	7	0.12	0.12	0.159	139	7	347	299
V2 Substratum 1 + NPK	7.4	6.1	0.22	0.23	0.175	175	88	432	378
V3 Substratum 1 + nutritive solution	8.1	6.8	0.16	0.19	0.162	139	73	347	296
V4 Substratum 2 - control	6.9	6.1	0.17	0.18	0.145	124	70	225	181
V5 Substratum 2 + NPK	6.5	5.8	0.27	0.29	0.158	159	85	273	226
V6 Substratum 2 + nutritive solution	6.9	6.2	0.23	0.27	0.147	124	71	225	179

The values of pH diminished in all variants, being 5,8 at V5. Total content of soluble salts was situated in normal limits between 0,12% at V1 and 0,29% at V5. Phosphorus (P) from substratum diminished, the value being at inferior limit of a temperate provisioning.

Potassium had the biggest value at V2, fertilized with NPK (378 ppm). Evolution of content in P and K from substratum is underlined by graphs 2 and 3.

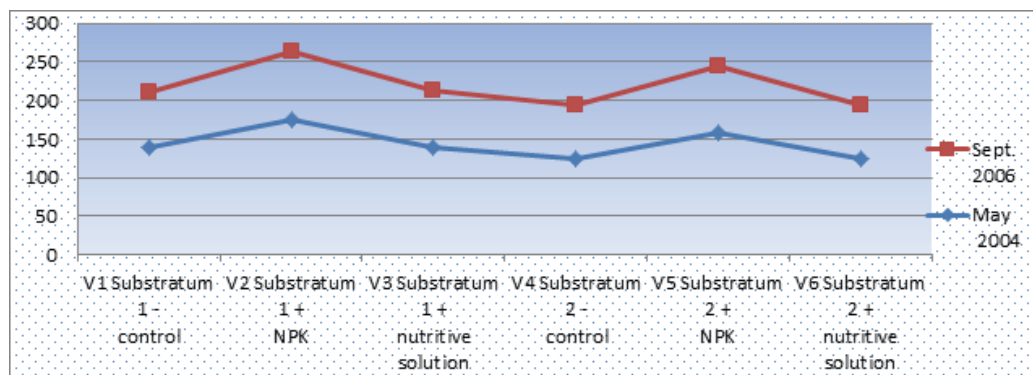


Figure 2. Content of P

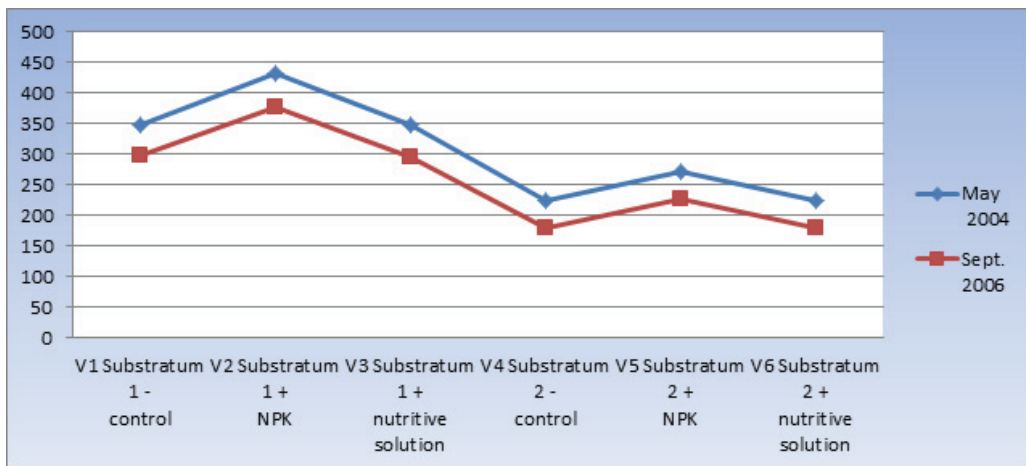


Figure 3. Content of K

Variation of pH of substratum and total content in soluble salts is indicated by graphs 4 and 5.

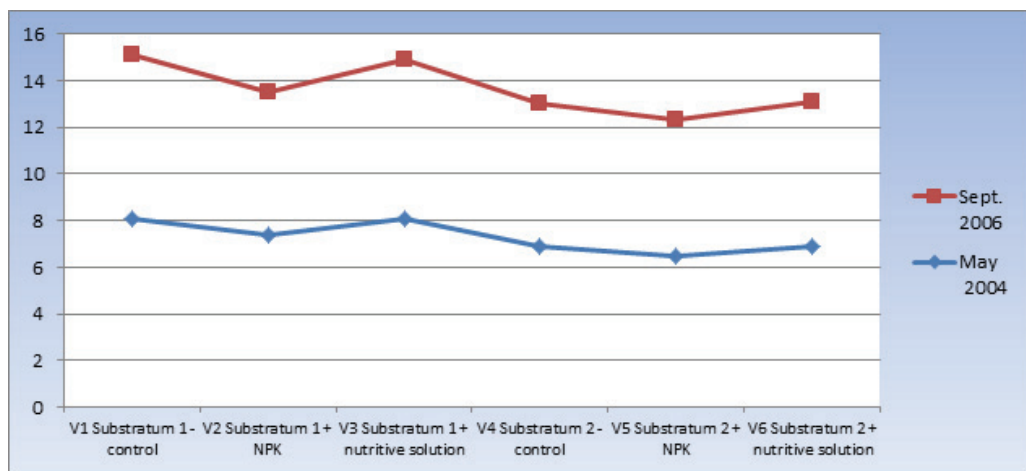


Figure 4. Variation of pH

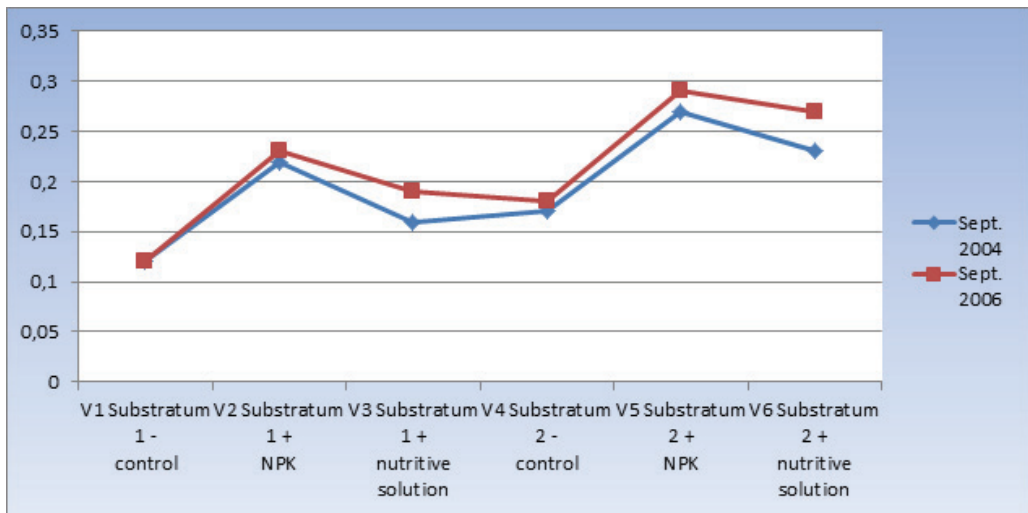


Figure 5. Content of total soluble salts

CONCLUSIONS

The best substratum for *Thuja Occidentalis* "Columna" was represented by ground celery, ground leaf, peat and sand 1:1:1:0,5 (substratum 1) with complex fertilizer (NPK) 15:15:15 applied 5 kg/mc before planting in containers.

Substratum 1, fertilized before planting in containers led to significant growth. Coic solution applied during vegetation had also considerable influence on plants growth.

Substratum and fertilization didn't have an important influence on trunk thickness of plants, these being dependent on morphological characteristics of the variety.

The best behavior of the plants was at pH=7,4 in substratum 1. The total content of salts increase in both substratum, because of fertilization but remains in normal limits.

Total content in nitrogen (N) showed a good provisioning of substratum. The values of phosphor (P) were temperate and potassium (K) diminished by plants consumption, but remained at good and very good values.

The biggest values of nitrogen (N) from leaves had a considerable correlation with the biggest height of plants.

The values of P and K showed a good provisioning of plants, the biggest values registered at plants from substratum 1 fertilized with NPK before planting.

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