Effect of Cutting Size on the Rooting of *Thuja occidentalis* 'Columna'

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ABSTRACT

Rooting process plays a key role in the vegetative propagation of the ornamental coniferous, and insufficient rooting causes substantial losses in the propagation industry. Cuttings of *Thuja occidentalis* 'Columna' planted in the greenhouse of Mihai Viteazul Nursery Garden from Turda were examined after selecting the cuttings in three size categories. Experimental design included three cutting lengths (10, 15 and 20 cm) and each were growing without rooting hormones. Cutting length is an important factor that affecting rooting. The exact length of the cuttings is dependent upon the selected species used in vegetative propagation. The presence of leaves on a cutting is important also for root formation and development. In our experiment we planted stem cuttings with leaves and length between 10 and 20 cm. The first measurement it was take in the 12th week of rooting process, the second was take in the 18th week of the rooting process. Significant differences were shown among cuttings from the three category in root number per cutting but not in root length per cutting after 18 weeks. Medium length cuttings (15 cm) had significant influence on root number per cuttings. For optimal rooting, we recommend using 15 cm long cuttings.

Keywords: cutting length, root number/cutting, root lenght/cutting, *Thuja occidetalis* 'Columna'

INTRODUCTION

Europeans have grown *Thuja occidentalis* with decorative purposes. *Thuja occidentalis* 'Columna', has a strictly columnar and narrow crown, ten years old specimens can grows up to 6,5-7,5 m tall and 1-1,3 m in width. It has twisted stalks, arranged in horizontal planes with intense green color. Stalks and leaves forms a fine foliage structure which clearly separates from 'Buchanani', 'Holmstrup', 'Rosenthalii' varieties. The 'Columna' variety is taller and wider than the 'Pyramidalis Compacta' variety, but is more similar to 'Fastigiata' variety with the difference that it is narrower and the cones are less prominent (Schmidt and Tóth, 2006). This variety is popular in Romania because is tolerate a wide range of soil and climatic conditions. Thanks to the decorative attributes of *Thuja occidentalis* 'Columna' exist a great interest in the propagation of them. To establish an efficient vegetative propagation process it have to study factors as

cutting length that have an influence on rooting process (Muñoz-Gutiérrez *et al.*, 2009; Ullah *et al.*, 2012).

AIMS AND OBJECTIVES

This paper aims to follow rooting process influenced by the size of *Thuja occidentalis* 'Columna' cuttings.

MATERIALS AND METHODS

Experiments were placed in "Mihai Viteazul" Nursery Garden from Turda, in spring 2013. In the experience were used simple lignified stem cuttings. The fresh *Thuja occidenatalis* 'Columna' cuttings from the nursery' field were selected in three size categories: small (10 cm), medium (15 cm) and large (20 cm). We planted 120 cuttings in each size category. The harvested cuttings were piped without storing to increase the rooting probability.

Tab.1. Average root number per cutting in the size categories of *Thuja occidentalis* 'Columna' cuttings

Cuttings size	Average no. of roots in the 12 th week (piece)			Average no. of roots in the 18 th week (piece)		
	Relative	Absolute (%)	Sign. of differences	Relative	Absolute (%)	Sign. of differences
Small	4.2	96.6	-0.1	5.2	89.7	-0.6
Medium	4.4	100.8	0.0	6.8	117.2	1.0*
Large	4.5	102.6	0.1	5.4	93.1	-0.4
Media (Mt)	4.3	100.0	Mt	5.8	100.0	Mt

DL (5%) 1,6; DL (1%) 2,3; DL (0,1%) 3,5; DL (5%) 1,1; DL (1%) 1,6; DL (0,1%) 2,3;

Tab. 2. Average root length per cutting in the size categories of *Thuja occidentalis* 'Columna' cuttings

Cuttings size	Average root length in the 12 th week (cm)			Average root length in the 18 th week (cm)		
	Relative	Absolute (%)	Sign. of differences	Relative	Absolute (%)	Sign. of differences
Small	1.6	89.6	-0.2	4.2	96.6	-0.1
Medium	2.0	109.7	0.2	4.4	100.8	0.0
Large	1.8	100.7	0.0	4.5	102.6	0.1
Media (Mt)	1.8	100.0	Mt	4.3	100.0	Mt

DL (5%) 0.4; DL (1%) 0.5; DL (0.1%) 0.8; DL (5%) 1.6; DL (1%) 2.3; DL (0.1%) 3.5;

Results and Discussion

It was followed the rooting process of the cuttings from the three different size categories. The average root number per cutting significantly increased in medium sized cuttings in the 18th week of the rooting process (Tab. 1). The cupressaceae *Thuja occidenatalis* 'Columna' 15 cm long medium size cuttings presented average 6,8 roots per cutting in the 18th week. Iliev et al. (2010) found similar results in the case of cupressaceae *Chamaecyparis lawsoniana* 'Columnaris' non IBA treated 8-12 cm long cuttings with 6,1±0,6 average root number after 17 week. Muñoz-Gutiérrez *et al.* (2009) propagated 12-15 cm sized *Taxus globosa* cuttings which were treated with rooting hormones, and the average number of roots formed was between 4,2-5,3 after 5 months rooting. Based on Ullah *et al.* (2012) study the 15 cm height olive (*Olea europea* L.) cuttings resulted the maximum average number of roots (13,43) in the case of all 5 cultivars.

The average root length had no significant differences among different heights of *Thuja occidentalis* 'Columna' cuttings in the 12th week neither in the 18th week (Tab. 2). 10, 15 and 20 cm long cuttings had similar average root length, 4,2-4,5 cm in the 18th week. Iliev et al. (2010) found in the case of non IBA treated 8-12 cm *Chamaecyparis lawsoniana* 'Columnaris' cuttings 3,72±0,18cm average root length after 17 week. Desrochers and Thomas (2003) found that 10 cm height *Populus spp.* cuttings had 29% greater rooting success than 5 cm height cuttings had. For optimal rooting it is recommended to use 10cm height *Populus spp.* cuttings without any additional hormone substance. Based on Ullah *et al.* (2012) study for

the five olive cultivars the maximum average root length was 11,24 cm for the 20 cm length cuttings, while 15 cm height olive (*Olea europea* L.) cuttings resulted 8,23 cm average root length, 35cm height olive cuttings resulted the minimum average root length 5,2cm.

Conclusion

Seedlings of *Thuja occidentalis* 'Columna' are often used in urban landscape. *Thuja occidentalis* 'Columna' is a particularly valuable ornamental conifer used as hedges and alignments. Production by cuttings is the easiest and a commonly used method. Medium-sized cuttings had a strong influence on the rooting of *Thuja occidenatalis* 'Columna' cuttings. For optimal rooting. we recommend using 15 cm cuttings.

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