

ANNUAL INCREASES OF PLANTS IN THE CLIMATIC CONDITIONS OF THE YEARS 2012-2014

CREȘTERILE ANUALE ALE PLANTELOR DENDROLOGICE ÎN CONDIȚIILE CLIMATICE ALE ANILOR 2012-2014

LAMBAN Carmen¹, CORNEANU Margareta¹

e-mail: lamban_carmen@yahoo.com

Abstract. *The paper presents some aspects regarding the influence of climatic conditions (temperature, precipitation, humidity, etc.), the annual increases in some species of ornamental woody plants. The objective was to determine the length of annual increases in climatic conditions from Iasi of the years 2012-2014.*

Key words: *trees, shrubs, annual growth, climatic conditions.*

Rezumat. *Lucrarea prezintă câteva aspecte privind influența condițiilor climatice (temperatură, precipitații, umiditate etc.), asupra creșterilor anuale la unele specii de plante lemnoase ornamentale. Obiectivul urmărit a fost determinarea lungimii creșterilor anuale în condițiile climatice de la Iași ale anilor 2012 – 2014.*

Cuvinte cheie: *arbori, arbuști, creșteri anuale, condiții climatice.*

INTRODUCTION

Knowing how the growth of ornamental plants has a special importance for multiplying species, this being influenced by environmental conditions (temperature, precipitation, humidity etc.), aimed at providing branches for a large number of skilled plant cuttings, as well as a large number of seedlings (Bernardis, 2012; Clinovschi, 2005; Draghia, 2000; Iliescu, 2002; Sandu, 2009). Phenological observations and measurements were made on existing plants in dendrological plantation of Research and Development of Fruit Growing Iasi.

MATERIAL AND METHOD

Biological material used in the making of this works were coniferous species of three botanical families (*Cupresaceae*, *Pinaceae*, *Taxaceae*), belonging to the genera (7 species of *Thuja*, 5 species of *Juniperus*, 6 species of *Chamaecyparis*, 3 species of *Picea*, and only one species of *Pinus*, *Taxus*, *Pseudotsuga*, *Abies*). Measurements relating to annual increases in the length of the plants were made in the first decade of the month of november, when the plants have gone dormant.

During a calendar year three were carried out measurements of annual increases then the media was made. The working method is that of randomized blocks placed on a single line. We analyzed the meteorological factors, reaction to climatic conditions in the years 2012-2014 annual increases in length.

¹The Research and Development of Fruit Growing Iasi, Romania

In papers are presented the average length of annual increases and compared to average of 25 species taken into study.

RESULTS AND DISCUSSION

Research has been carried out in the period 2012-2014, given as a record 25 species of conifers.

In terms of heat transfer in 2012 annual average temperature was 10,37°C. The lowest average temperature was recorded in January of -2.7°C, the highest temperature was in July of 25.3°C.

From the point of view of the average annual rainfall in pluviometric 2012, 31,14 mm was the largest amount of precipitation fell in may by 84,2 mm and the smallest in November of 3.0 mm (tab. 1).

The annual average humidity registered was 74,66 %, humidity, most with 88,9 % in December, and the lowest in July 52,0 %.

Table 1

Climatic characterization of the years 2012-2014

| Moon | Medium temperature °C | | | Precipitation mm | | | Humidity % | | |
|----------------|-----------------------|-------------|--------------|------------------|--------------|-------------|--------------|-------------|--------------|
| | 2012 | 2013 | 2014 | 2012 | 2013 | 2014 | 2012 | 2013 | 2014 |
| January | -2,7 | -3,5 | - 1,9 | 8,9 | 60,4 | 12,8 | 81,0 | 87 | 86 |
| February | -9,2 | 0,3 | -1,0 | 18,2 | 20,4 | 26,8 | 74,0 | 84 | 88,1 |
| March | 4,1 | 2,0 | 7,7 | 19,6 | 37,8 | 23,8 | 64,0 | 72 | 66,6 |
| April | 12,7 | 12,0 | 10,9 | 62,0 | 36,0 | 73,0 | 64,0 | 60 | 70 |
| May | 17,3 | 18,3 | 15,6 | 84,2 | 113,4 | 113,0 | 69,0 | 64 | 80 |
| June | 21,2 | 21,3 | 18 | 32,0 | 179,0 | 75,2 | 62,0 | 76 | 76 |
| July | 25,3 | 19,8 | 29 | 24,8 | 76,4 | 60,3 | 52,0 | 64,2 | 82 |
| August | 22,3 | 20 | 30 | 22,4 | 41,6 | 40,1 | 56,0 | 69 | 60,5 |
| September | 18,2 | 13,7 | 16,5 | 53,0 | 105,6 | 9,4 | 62,3 | 78 | 60 |
| October | 11,3 | 10,6 | - | 41,4 | 2,6 | - | 80,4 | 79 | - |
| November | 6,34 | 7,1 | - | 3,0 | 25,4 | - | 86,4 | 77 | - |
| December | -3,5 | 0,1 | - | 4,22 | 8,8 | - | 88,9 | 82,6 | - |
| Average | 10,37 | 14,1 | 13,87 | 31,14 | 58,95 | 48,3 | 74,66 | 74,4 | 74,35 |

In 2013 the average annual temperature was 14,1°C, the lowest temperature was recorded in January of -3,5°C, and the highest in June of 21,3°C. The average annual rainfall in 2013 was 58,95 mm, the largest amount was recorded in June of 179,0 mm and the smallest amount was in October of 2,6 mm. Average annual atmospheric humidity was 74,4 %, most atmospheric humidity was registered in January to 87 %, the lowest 60 % in April.

In the year 2014, the average annual temperatures so far September was 13,87°C, the lowest temperatures were recorded during the month of February of - 2°C and the highest were in August (30°C).

In 2014, the annual average rainfall (until September) were 48,3 mm; the greatest amount of rainfall was recorded in May (113 mm), and the lowest amount in September (9.4 mm). Average atmospheric humidity in 2014 was 74,35%, in February registered the highest value (88.1%) and lowest in September (60%).

In table 2, making comparison between the species of the genus *Thuja* and *Taxus*. In the year 2012, the largest increases were recorded from *Thuja occidentalis* (40 cm), the smaller ones have been the *Thuja occidentalis obovata* (16 cm).

In 2013, the biggest increases were from *Thuja occidentalis* 'Aureovariegata' (39 cm) while the lowest values of the increases have been the *Taxus baccata* (16 cm).

In 2014, the following measurements, the biggest increases were from *Thuja occidentalis* 'Aureovariegata' (30 cm) and *Thuja occidentalis laxa* (30 cm). In 2014, *Thuja occidentalis* 'Danica' has recorded the biggest increases of 16 cm

Table 2

Results regarding the annual increases of the plants of *Thuja* species and *Taxus baccata* (cm)

| Species | The average length of annual increases | | | Compared with average $\pm d$ | | |
|--|--|-------------|--------------|-------------------------------|-------|-------|
| | 2012 | 2013 | 2014 | 2012 | 2013 | 2014 |
| <i>Thuja occidentalis</i> 'Danica' | 18 | 21 | 16 | -6.25 | -8.0 | -9.13 |
| <i>Thuja occidentalis elvangeriana</i> 'Rheingold' | 25 | 32 | 24 | +0.75 | +3.0 | -1.13 |
| <i>Thuja pisifera</i> | 20 | 22 | 25 | -4.25 | - 7.0 | -0.13 |
| <i>Thuja occidentalis laxa</i> | 27 | 35 | 28 | +2.75 | +6.0 | +2.87 |
| <i>Thuja occidentalis</i> 'Aureovariegata' | 19 | 39 | 30 | - 5.25 | +10.0 | +4.87 |
| <i>Thuja occidentalis</i> | 40 | 33 | 30 | +15.75 | +4.0 | +4.87 |
| <i>Thuja occidentalis obovata</i> | 16 | 34 | 18 | -8.25 | +5.0 | -7.13 |
| <i>Taxus baccata</i> | 29 | 16 | 30 | +4.75 | -13.0 | +4.87 |
| Average | 24.25 | 29.0 | 25.13 | - | - | - |

In table 3 are presented results increases in annual species of the genus *Juniperus*.

In 2012, the best results concerning annual increases were obtained from *Juniperus horizontalis* (42 cm), the weakest were *Juniperus squamata* 'Meyeri' (20 cm).

In 2013 the *Juniperus virginiana* were obtained high levels of increases of 54 cm, small values were *Juniperus horizontalis* 'Picta' (12 cm).

In 2014 the biggest increases were from *Juniperus virginiana* of 38 cm, the smallest being the *Juniperus horizontalis* 'Picta' (12 cm).

Table 3

Results regarding the annual increases of the plants of *Juniperus* species (cm)

| Species | The average length of annual increases | | | Compared with average $\pm d$ | | |
|---|--|-------------|-------------|-------------------------------|-------|-------|
| | 2012 | 2013 | 2014 | 2012 | 2013 | 2014 |
| <i>Juniperus horizontalis</i> 'Picta' | 23 | 12 | 12 | -8 | -19.8 | -13.6 |
| <i>Juniperus horizontalis</i> | 42 | 36 | 28 | +11 | +4.2 | +2.4 |
| <i>Juniperus virginiana</i> | 38 | 54 | 38 | +7 | +22.2 | +12.4 |
| <i>Juniperus scopulorum</i> 'Skyrocket' | 32 | 36 | 28 | +1 | +4.2 | +2.4 |
| <i>Juniperus squamata</i> 'Meyeri' | 20 | 21 | 22 | -11 | -10.8 | -3.6 |
| Average | 31.0 | 31.8 | 25.6 | - | - | - |

The species in the genus *Chamaecyparis* (tab. 4), in 2012 was with *Chamaecyparis semperauraea* increases of 32 cm, *Chamaecyparis lawsoniana* 'Ellwoody Gold', only with rises of 6 cm. Also, in 2013 *Chamaecyparis lawsoniana semperauraea* had the highest values of increases of 38 cm and *Chamaecyparis lawsoniana* 'Ellwoody Gold' 10 cm.

In 2014 *Chamaecyparis lawsoniana* registered the biggest increases (30 cm) and the smaller ones have been on *Chamaecyparis lawsoniana* 'Ellwoody Gold' (9 cm).

Table 4

Results regarding the annual increases of the plants of *Chamaecyparis* species (cm)

| Species | The average length of annual increases | | | Compared with average $\pm d$ | | |
|---|--|-------------|-------------|-------------------------------|-------|-------|
| | 2012 | 2013 | 2014 | 2012 | 2013 | 2014 |
| <i>Chamaecyparis lawsoniana</i> | 30 | 26 | 30 | -10.0 | +3.5 | +12.0 |
| <i>Chamaecyparis lawsoniana</i> 'Alumii Gold' | 25 | 30 | 20 | -5.0 | +7.5 | +2.0 |
| <i>Chamaecyparis lawsoniana semperauraea</i> | 32 | 38 | 23 | +12.0 | +15.5 | +5.0 |
| <i>Chamaecyparis lawsoniana</i> 'Ellwoody Gold' | 6 | 10 | 9 | -14.0 | -12.5 | -9.0 |
| <i>Chamaecyparis pisifera</i> 'Boulevard' | 10 | 14 | 10 | -10.0 | -8.5 | -8.0 |
| <i>Chamaecyparis pisifera</i> 'Plumosa' | 17 | 17 | 16 | -3.0 | -5.5 | -2.0 |
| Average | 20.0 | 22.5 | 18.0 | - | - | - |

Because genera *Pinus*, *Abies*, *Pseudotsuga* are represented only by one species, they were analyzed together species of genus *Picea* (tab. 5).

The species of the genus *Picea* (tab. 5), in all three years of study (2012, 2013, 2014) values of the largest annual increases were of the *Picea pungens glauca* (14, 10 and 11 cm), while the lowest in *Picea pungens* 'Glaucosa Globosa' (4, 6 respectively 5 cm).

Of the five species analyzed in table 5, the best growth was douglas (*Pseudotsuga meziensisii*) and *Abies nordmanniana*.

For plants of *Pinus*, *Abies*, *Pseudotsuga* in the years 2012, 2013 the biggest increases were obtained from *Pseudotsuga meziensisii glauca* (35 cm, respectively 27 cm).

Small amounts of the increases resulted from the genus *Pinus* species *Pinus nigra* 'Austriaca' 8 cm, 10 cm.

Table 5

Results regarding the annual increases of the plants of *Picea*, *Pinus*, *Pseudotsuga* and *Abies* species (cm)

| Species | The average length of annual increases (cm) | | | Compared with average $\pm d$ | | |
|---|---|-------------|-------------|-------------------------------|-------|-------|
| | 2012 | 2013 | 2014 | 2012 | 2013 | 2014 |
| <i>Picea pungens</i> var. <i>glauca</i> | 10 | 14 | 11 | -3.33 | -1.0 | +1.84 |
| <i>Picea glauca</i> 'Conica' | 9 | 8 | 6 | -4.33 | -7.0 | -3.16 |
| <i>Picea pungens</i> 'Glaucosa Globosa' | 4 | 6 | 5 | -9.33 | -9.0 | -4.16 |
| <i>Pinus nigra</i> var. 'Austriaca' | 8 | 10 | 10 | -5.33 | -5.0 | +0.84 |
| <i>Pseudotsuga meziensisii</i> var. <i>glauca</i> | 35 | 27 | 8 | +21.67 | +12.0 | -1.16 |
| <i>Abies nordmanniana</i> | 14 | 25 | 15 | +0.67 | +10.0 | +5.84 |
| Average | 13.33 | 15.0 | 9.16 | - | - | - |

By comparing growth of conifer species studied, it follows that in 2012 the highest growth was recorded at genus *Juniperus*, 31 cm and the smallest in the genus *Picea*, *Pinus*, *Pseudotsuga* and *Abies* (13.3 cm), in 2013, the genus *Juniperus* resulted the highest values of 31.8 cm increases and the genus *Picea*, *Pinus*, *Pseudotsuga* and *Abies* 15 cm, and in 2014 recorded the largest increases in the genus *Juniperus* of 25.6 cm the genus *Picea*, *Pinus*, *Pseudotsuga* and *Abies* only 7.3 cm.

CONCLUSIONS

The following measurements and observations from ornamental plants in 2012, with the biggest increases, have resulted from *Juniperus horizontalis* 42 cm.

In the years 2013, 2014, good results concerning annual increases were obtained from *Juniperus virginiana* 54 cm, 38 cm respectively.

Of the genera of plants, which have been taken into account more than three species, where the average annual increases were observed in the years 2012, 2013, 2014, genus *Juniperus* recorded the highest average increases of 31 cm, 31.8 cm and 25.6 cm.

In conclusion, in 2012, 2013, 2014, of species with very good results concerning annual increases were obtained from *Juniperus horizontalis* and *Juniperus virginiana*, and between genera of plants, which have had more than 3 species, the best results were from the genus *Juniperus*, in genres that had only a single species, good results were achieved at like *Pseudotsuga*.

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