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PHENOLOGICAL STUDIES ON SOME VARIETIES OF ROSES FROM THE COLLECTION IN THE "DIMITRIE BRANDZA" BOTANICAL GARDEN IN BUCHAREST

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Abstract

The study shows the influence of climate changes, which are more and more present, especially on the differences of temperatures recorded in short periods of time as well as similar periods of time throughout the years, in the development of roses. This study of the influence of temperatures on roses was conducted in the Bucharest area. This particular research was done by observing the behaviour of 10 varieties of roses from "Dimitrie Brandza" Botanical Garden's rose collection, between the years of 2011 and 2012. The main aspects of the study were: the growth rate and phenological phases, in correlation with the changes in the atmospheric temperature.

Key words: *roses, phenological phases, climate changes.*

INTRODUCTION

Climate changes are more and more evident, which affect all living creatures in different ways, causing behavior changes. On roses, these changes determine a change in growth rhythm, an offset in phenological phases and are a big influence on the lifespan of open flowers

A study on the effect of negative temperatures on roses from the Botanical Garden collection in Iasi was made by Ostaciuc in 1987. He followed, during the winters of 1981 to 1986, rose varieties from the following groups: hybrid tea, polyantha, polyantha hybrids, floribunda, floribunda grandiflora, climbers and park roses**.** The research showed that the polyantha, polyantha hybrids and floribunda have their biological threshold at 10°C, hybrid tea at 8°C and climbers and park ones at-15°C (Ostaciuc I., 1987). The present study aims to conduct collection on ten varieties from the Botanical Garden 'Dimitrie Brandza' in Bucharest, during their growing season, between the months of May and November 2011 and 2012. In the two growing seasons, the study followed and compared growth rhythm, the phonological phases and power of growth (the length of the shoots) in correlation with temperature fluctuations. Data collected from this study is part of the PhD thesis.

MATERIALS AND METHODS

The biological material that was used for determination came from 10 varieties planted during 2008 to 2009 in the 'Dimitrie Brandza' Botanical Garden Rose Collection (‘Abraham Darby’, ‘Acapella’, ‘Angela’, ‘Caprice de Meilland’, ‘Christoph Columbus’, ‘Forever Young’, ‘Heritage’, ‘Ingrid Bergman’, ‘Rapsody in Blue’, ‘Red Berlin’).

Temperature data was taken from the NIMH-Bucharest Centre and recorded in tables.

The culture technology was used under normal conditions, with cuts during the spring and in the growing seasons, to stimulate a new wave of blooming.

Hydric regime was also similar in the two years, without performing additional irrigation.

Biodynamic growth rate was determined at an interval of 4 weeks by measuring and calculating the average growth of shoots during May to November in each of the two years. Important phenophases (budding, leafing and blooming) were determined visually when at least 80% of the plants showed characteristic phenological aspects.

RESULTS AND DISCUSSIONS

Results of the phenophases.

Regarding phenophases, there were significant differences in blooming for up to 3 weeks between the two years, for the 'Rhapsody in Blue' variety, which in 2011 was the most tardy of all, at the opposite pole being the 'Forever Young' variety which has even shown earliness in blooming in 2012.

Also, in the case of leaves, between the two years there were differences of up to a week in most varieties. (Table 1, 2)

Table 1. Phenological phases for researched varieties in 2011

Variety	Budding	Leafing	Blooming
Abraham Darby	March 15	March 29	May 24
Acapella	March 15	March 29	May 30
Angela	March 15	March 29	May 23
Caprice de Meilland	March 14	March 29	May 24
Christoph Columbus	March 16	March 31	May 30
Forever Young	March 15	March 29	May 19
Heritage	March 15	March 29	May 25
Ingrid Bergman	March 15	March 29	May 26
Red Berlin	March 15	March 31	May 26
Rhapsody In Blue	March 15	March 31	June 7

Table 2. Phenological phases for researched varieties in 2012

Variety	Budding	Leafing	Blooming
Abraham Darby	March 26	April 5	May 13
Acapella	March 26	April 5	May 18
Angela	March 24	April 4	May 13
Caprice de Meilland	March 26	April 5	May 14
Christoph Columbus	March 26	April 5	May 20
Forever Young	March 24	April 5	May 5
Heritage	March 26	April 5	May 15
Ingrid Bergman	March 25	April 5	May 16
Red Berlin	March 24	April 4	May 13
Rhapsody In Blue	March 24	April 4	May 13

Results of the growth rate study exhibit growth averaged during the months of May to November.

The majority of the varieties showed differences in growth between the two years, with some similarities during the spring, when a more intense growth rate was recorded.

This growth rate was correlated with temperatures recorded during the months of April and December. (Table 3, Figure 1-11)

Table 3. Growth rate in 2011 and 2012

Variety	Group	May	June	July	Aug	Sept	Oct	Nov
Angela 2011	park rose	37,5	79,3	80	101	132	130,7	135
Angela 2012	park rose	46,7	44	68	53,3	77,3	128,6	122,7
Abraham Darby 2011	English rose	36,6	48,2	73	43,4	20,6	25,1	69
Abraham Darby 2012	English rose	50	55,5	19	27,9	47	60,5	67,2
Heritage 2011	English rose	14,7	45,7	79	117	99,1	37,6	97,6
Heritage 2012	English rose	43,2	63,8	69	65,1	83	84,9	91,4
Forever Young 2011	floribunda	27,1	35,9	38	10,1	5,3	16	22,4
Forever Young 2012	floribunda	18	26,4	6,2	5,6	7,9	7,8	11,5
Rhapsody In Blue 2011	floribunda	34,4	80,3	85	85	96,7	49,7	80,7
Rhapsody In Blue 2012	floribunda	35,7	38,2	27	15,7	25,9	21,3	41,3
Acapella 2011	hybrid tea	38,5	45,4	54	76,7	72,2	20,8	111
Acapella 2012	hybrid tea	47,3	54,2	74	22,8	61,6	79,2	76,5
Caprice de Meilland 2011	hybrid tea	22,6	45	67	28,1	72,2	39,6	81,7
Caprice de Meilland 2012	hybrid tea	36,4	60,8	77	22,5	68,5	84,5	81,5
Christoph Columbus 2011	hybrid tea	26,5	55	83	41,2	33,4	19,5	93,8
Christoph Columbus 2012	hybrid tea	33,6	74,7	62	37,5	38,8	116,1	122,2
Ingrid Bergman 2011	hybrid tea	22,8	50,8	58	23,2	19,8	9,7	79,6
Ingrid Bergman 2012	hybrid tea	32,8	45,4	14	16,3	30,7	24,3	36,8
Red Berlin 2011	hybrid tea	21	45,1	50	29,4	19,9	11,2	60,6
Red Berlin 2012	hybrid tea	65,4	65,6	20	48,7	59,2	59,3	31,8

On the 'Angela' variety, significant growth differences were registered between July and October (Figure 1).

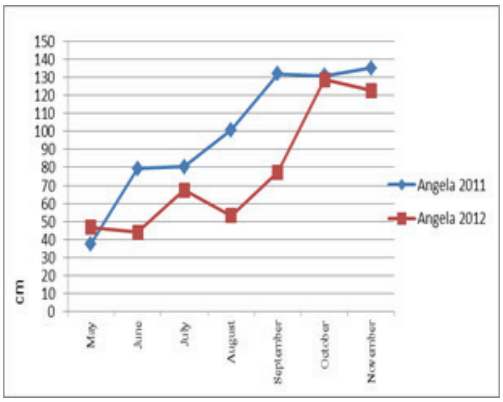

Figure 1. Average growth rate of 'Angela' variety from the park rose group

In the English roses group, major differences in the two years of study were present only in the month of July on the 'Abraham Darby' variety (Figure 2).

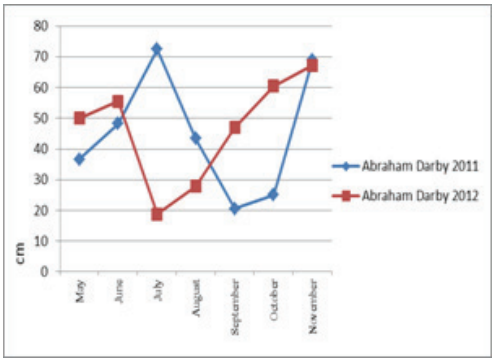

Figure 2. Average growth rate of 'Abraham Darby' variety from the English rose group

The 'Heritage' variety showed an even growth rate in 2011, but in 2012 it presented important differences in growth, with a maximum recording in August, followed by a minimum one in October (Figure 3).

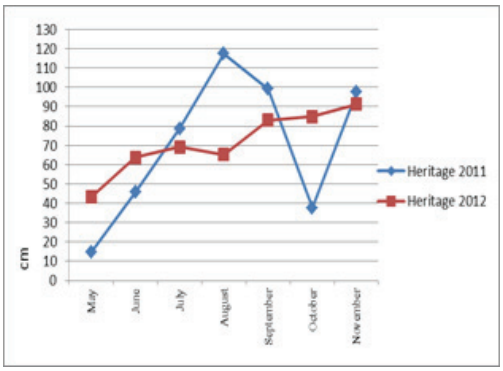

Figure 3. Average growth rate of 'Heritage' variety from the English rose group

'Forever Young ' was the variety who showed an uneven growth rate between June and October, in the floribunda group (Figure 4),

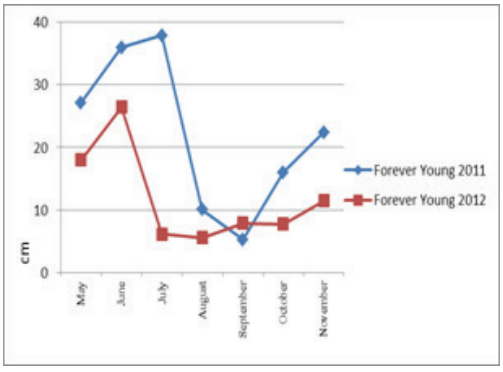

Figure 4. Average growth rate of 'Forever Young' variety from the floribunda group

'Rhapsody in Blue' presented the highest growth rate in 2011, with a maximum recording in September and with the month of November showing significant increased rates for 2012 (Figure 5).

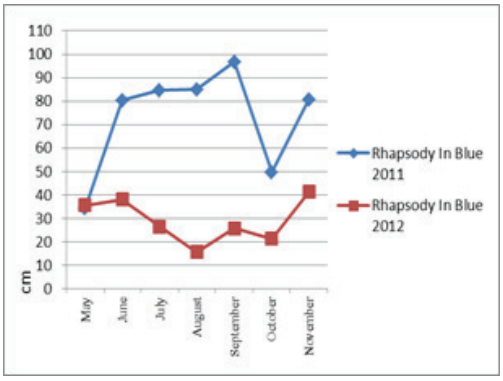

Figure 5. Average growth rate of 'Rhapsody in Blue' variety from the floribunda group

In 2011, the 'Acapella' variety presented the best growth rate in growing seasons, between the 2 years of study, with a maximum recording in November (Figure 6).

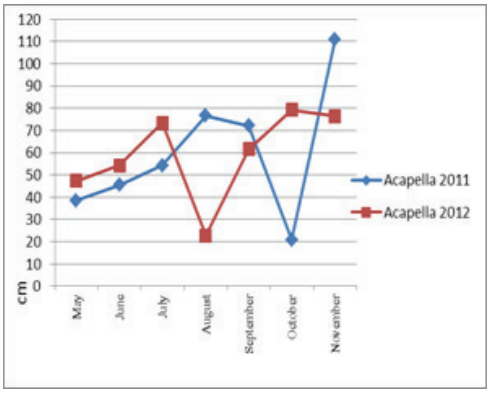

Figure 6. Average growth rate of 'Acapella' variety from the hybrid tea group

The growth rate for the 'Caprice de Meilland' was relatively even during the 2 years of study, with a significant difference recorded in the month of October (Figure 7).

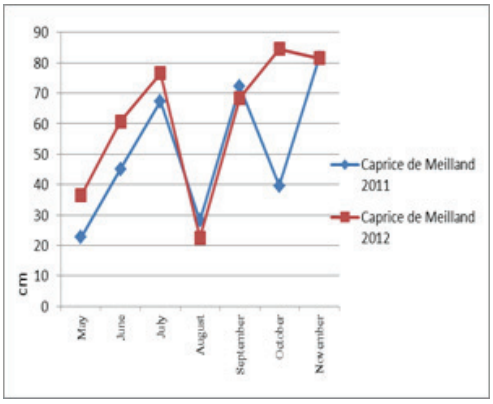

Figure 7. Average growth rate of 'Caprice de Meilland' from the hybrid tea group

November was accounted for significant increases in the 'Christoph Columbus' variety in the two years of study (Figure 8).

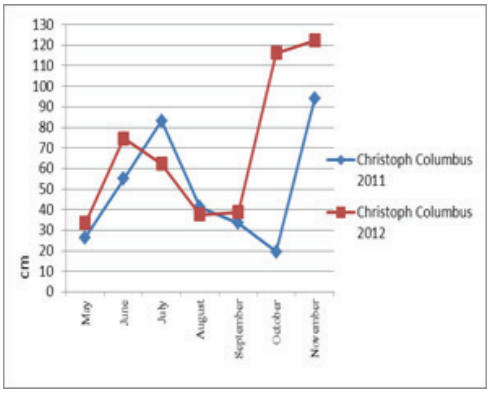

Figure 8. Average growth rate of 'Christoph Columbus' variety from the hybrid tea group

The 'Ingrid Bergman' variety showed a maximum recording in November for 2011 and in June for 2012 (Figure 9).

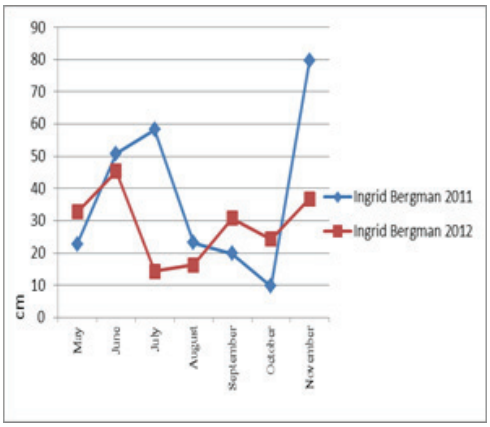

Figure 9. Average growth rate of 'Ingrid Bergman' variety from the hybrid tea group

"Red Berlin's" growth was uneven during the growing season in the two years of study, with a peak in 2012 during May-June and a minimum in July; as for 2011, the maximum was recorded in November and the minimum in October (Figure 10).

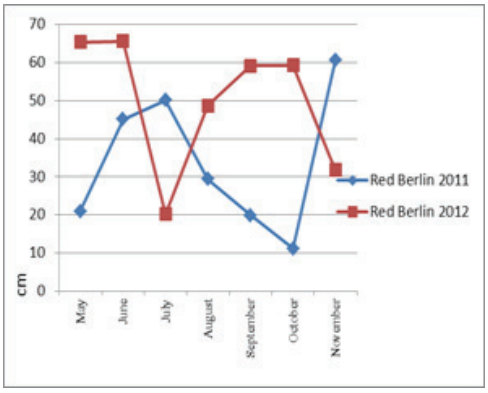

Figure 10. Average growth rate of 'Red Berlin' variety from the hybrid tea group

All of these differences in growth rate are correlated with the average temperatures recorded during the months of April and December, between the years of 2011 and 2012. In 2011 we can clearly see how temperature uniformity caused a stable increase in the growing season for the majority of varieties studied. The graphs presented above show how the cuts performed after the first wave of blooming, which were different every year, did not influence the growth rhythm on the majority of the varieties studied, with only the high temperatures recorded during the summer, being a determinate factor in the decrease of growth rate (Figure 11).

The evolution of average temperatures recorded was relatively even between the 2 years of study, with differences of only 5 degrees being recorded in similar timeframes of the year.

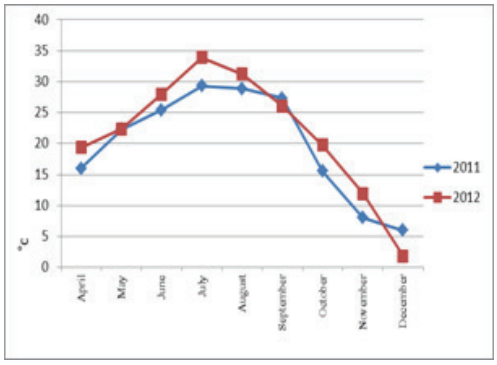

Figure 11. Average temperature recorded at 14.00 during the growth season in 2011 and 2012

CONCLUSIONS

The majority of the varieties studied showed significant differences in growth rate during the growing seasons of the 2 years of study, the only exception being the 'Caprice de Meilland' variety which showed growth rate differences in the month of October.

Climatic conditions in spring resulted in the earliness of blooming in 2012, in comparison to the same period of 2011.

Differences in growth were not affected by maintenance cuts, but with the advent of high temperatures during the summer, it caused a reduction in growth rate, which only returned to normal once the drop in temperatures appeared along with the autumn season.

The variety with the most significant increase was 'Angela', which is a park variety and has shown an average increase of 135 cm maximum in November 2011. At the opposite pole is the variety with the lowest growth, which is 'Forever Young' from the floribunda group with a maximum of 35.9 cm in July 2011.

In 2012 there were higher onset temperatures during the spring, which caused a greater increase in shoots length in the month of May.

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