

STUDIES ON GROWTH AND FLOWERING OF *LILIMUM REGALE* SPECIES IN CONDITIONS OF FERTILIZATION WITH OSMOCOTE

STUDII PRIVIND CREȘTEREA ȘI ÎNFLORIREA SPECIEI *LILIMUM REGALE* ÎN CONDIȚIILE FERTILIZĂRII CU OSMOCOTE

**BRÎNZĂ Maria¹, DRAGHIA Lucia¹,
CHELARIU Elena Liliana¹, AELENEI S.¹**
e-mail: mariabrinza2007@yahoo.com.

Abstract. The aim of the experiment was to evaluate the effect of Osmocote Pro fertilizer on the growth and flowering of the species *Lilium regale*. The experience has been organized in four variants with three repetitions: V1-without fertilizer, V2-4g Osmocote/plant; V3-6g Osmocote/plant and V4-8 g Osmocote/plant. The plants' growth in height and their ability of flowering have been stimulated by the fertilizer regardless of the dose used. Compared with the control variant, the increase in concentration caused an increase in the height of the plants, the number of flowers, the diameter and length of the cups.

Key words: *Lilium regale*, Osmocote, assimilating pigments

Rezumat. Scopul experimentului a fost de a evalua efectul aplicării îngrășământului Osmocote Pro asupra creșterii și înfloririi speciei *Lilium regale*. Experiența a fost organizată, în patru variante cu trei repetiții : V₁- fără îngrășământ, V₂- 4g Osmocote/plantă; V₃- 6g Osmocote/plantă și V₄- 8g Osmocote/plantă. Creșterea în înălțime și capacitatea de înflorire a plantelor au fost stimulate prin aplicarea îngrășământului indiferent de doza utilizată. Comparativ cu varianta martor, mărirea concentrației a indus un spor de creștere privind înălțimea plantelor, numărul de flori, diametrul și lungimea cupelor.

Cuvinte cheie: *Lilium regale*, Osmocote, pigmenti asimilatori

INTRODUCTION

The genus *Lilium* contains many species originating from different climatic zones, which explain the differences in behaviour of the species (Băla, 2007; Draghia and Chelariu, 2011). Lilies have a long history as ornamental plants and currently they are cultivated in large numbers Woodcock *et al.* (1950). Lately, there appeared on the market different hybrids that are very impressive through such qualities as the multitude of colours and their scent, while the different methods of culture turned the lily into one of the most beloved flowers in the contemporary society. The multitude of species and varieties make this plant to be one of the most valuable species of flowering bulbs used in landscape design and determine their name as everlasting flowers due to their life-

¹University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

length (Siljak-Yakovlev *et al.*, 2003). However, in the commercial horticultural industry, native species have preserved their place among the new hybrids due to their potential in creating new crops meant for landscaping design and those intended for the production of cut flowers (Pelkonen *et al.*, 2012).

MATERIALS AND METHODS

Researches were conducted during the period October 2013 - November 2015. The experiment was organized using bulbs of *Lilium regale* as biological material acquired from a firm that is specialized in the production of flowering seedling material. The experiment was organized in randomized blocks with 4 variations and 3 repetitions each, each repetition consisting of 10 plants. In order to establish the plants' capacity of growth under conditions of fertilization, there has been tested the Osmocote®Pro fertilizer with controlled release, a high content of NPK (N11:P10:K19:2MgO + ME) and longevity for 5-6 months, being specially designed for the culture of flowering plants. In order to determine the influence of controlled-release fertilizer on the development of plants there have been administered different concentrations of fertilizer on the experimental variants while the control variant was left unfertilized.

The doses of fertilizer administered for each plant were: variant V₁ was not fertilized, being the control variant; variant V₂ was fertilized with Osmocote®Pro 4 g/each plant; variant V₃ was administered Pro®Osmocote fertilizer 6 g/each plant and the variant V₄ was administered Osmocote®Pro 8 g/each plant. It has been studied the influence of fertilization with Osmocote®Pro on the performance of vegetation phenophases while the phenological determinations focused on vegetation, the emergence of floral buds, the beginning and ending of flowering. Also, to highlight the influence of Osmocote®Pro fertilizer on the ornamental characteristics of the plants, there have been carried out biometric measurements throughout the period of vegetation, including measurements related to plants' height, diameter and number of flowers per plant.

RESULTS AND DISCUSSION

The observations conducted in order to determine the influence of fertilization with Osmocote®Pro on the development of vegetation phenophases in the species *Lilium regale* showed an early start with the increase of the concentration of fertilizer (fig.1). The earliest vegetation was observed in the group of plants from the variants V₃ and V₄, which were fertilized with the largest doses of fertilizer - they started to germinate with up to 12 days earlier as compared to the control group (V₁). In V₂, the plants started to germinate 6 days earlier as compared to the control group. By comparing the results obtained in the four experimental variants, it is established that the application of Osmocote fertilizer had a significant influence on the beginning of germination. The plants of the variant V₁, which did not benefit from fertilization, knew a delay in the germination process.

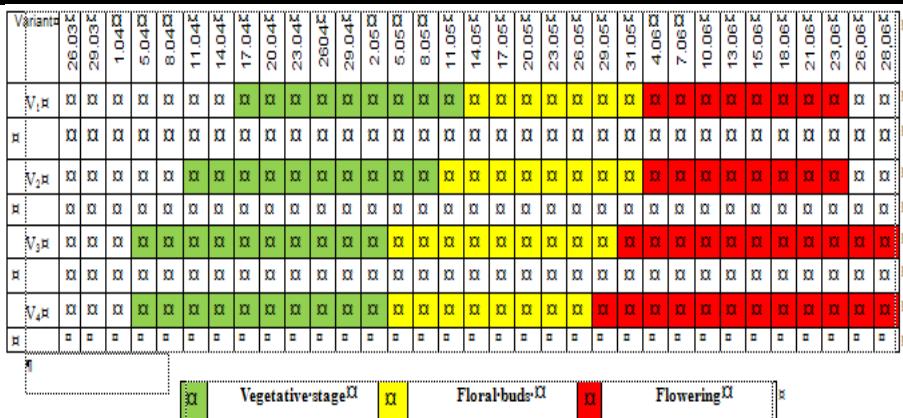


Fig. 1 Phenophases in the species *Lilium regale*

The emergence of floral buds was observed during the period 14-31 May in the group of plants from the unfertilized variant (V_1), while in the case of V_2 , their occurrence was three days earlier as compared to the control group. In the case of the variants fertilized with the largest doses (V_3 , V_4), the buds have started to form up to 9 days earlier compared with the plants in the unfertilized group. In the group of plants benefitting of 4 g of Osmocote on each plant, the occurrence of floral buds happened three days earlier as compared to the control group (V_1) and six days later than in the group of the plants from V_3 and V_4 (table 1). In terms of flowering, it started on June 4th in the control group, while significant differences were observed only in the case of variants V_3 and V_4 . Variant V_3 , benefitting of 6g of fertilizer on each plant bloomed 3 days earlier than the plants from variant V_1 , while the plants from variant V_4 , fertilized with 8 g, and bloomed 6 days earlier. By comparing the results obtained in the group of plants from V_3 and V_4 with the results obtained in the control variant (V_1), we can observe a delay of the flowering period by up to 12 days.

The influence of the concentrations of fertilizer on plants growth and development was highlighted through biometric measurements that focussed on the height of the floral stem, the length of the buds, the number of flowers in the inflorescence and the diameter of the cup. By comparing the results obtained in the experimental variants, there has been highlighted the positive influence of fertilization on the growth of floral rods in the species *Lilium regale*.

Determinations regarding the average height of the plants, reflects the influence of the concentration of fertilizer on the growth and development of plants (fig. 2). Within the four variants, it can be noted that the greatest increase in the floral rod was obtained in variant V₄ (118 cm), while the lowest increase was obtained in the group of plants from the control variant (82 cm).

Compared to the control variant, the variations in height in all the experimental groups were directly proportional to the increase of the fertilizer

dose, the largest increases being obtained in the group of plants from variant V₄, in which the dose of fertilizer was 8 g/each plant.

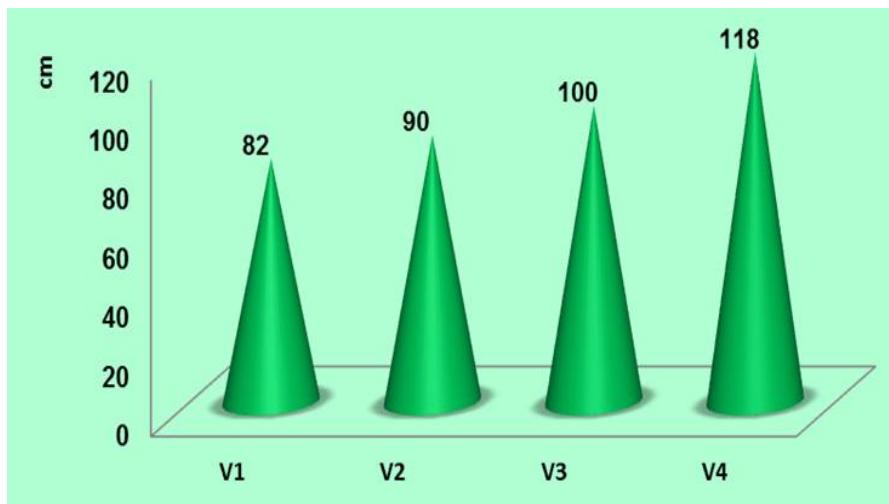


Fig. 2 The average height (cm)

The average plant height in V₂ was 90 cm while in V₃ was 100 cm. By analysing the results there was recorded a variation in the height of the floral stem from the 82 cm in the control group up to 118 cm in V₄, resulting a difference of 36 cm. Therefore, we can state that fertilization with Osmocote®Pro has a significant influence on the increase in height of the floral stem at the species *Lilium regale*.

Observations regarding the influence of fertilization with Osmocote on the formation of flowers at species *Lilium regale* revealed an increase in the number of flowers per plant corresponding to higher dosages of fertilizer administered to each experimental variant (tab. 1). Compared to the control group, the average number of flowers in the inflorescence was 8.2 flowers on each plant and there has not been observed any significant differences in the plants which benefitted of 4 g of Osmocote on each plant and registered an average number of flowers per plant of approximately 10.3.

The highest average number of flowers was obtained in the group of plants from V₃ (with 12.4 flowers on the plant) and V₄ (with 18.5 flowers on the plant). The increase in concentration of Osmocote®Pro in the substrate causes an increase of the average number of flowers, each variant recording positive difference as compared to the control group. Observing the tendency of increase in the number of flowers on each plant, we can observe that the variants fertilized with the highest doses recorded a significant increase in their number as compared to the control group.

Thus, the increase of the dosage of Osmocote®Pro in substrate caused an increase in the number of flowers as compared to the control sample with 2.1

flowers in the plants from variant V₂, 4.2 in the plants from variant V₃ and 10.3 flowers in the plants of variant V₄ (tab. 1).

Table 1

The average number of flowers per plant

Variant	No. flowers (PCs.)	% compared with control	Difference	The significance
V ₁	8.2	100.0	-	16.33
V ₂	10.3	125.6	2.1	xx
V ₃	12.4	151.22	4.2	xxx
V ₄	18.5	225.6	10.3	xxx
LSD 5% 1.2	LSD 1% 1.8	LSD 0.1% 2.9		

± d = difference compared to the control sample

At first sight we can say that fertilizer Osmocote stimulates the formation of flowers on the plants of *Lilium regale* which further increases their ornamental value. On a thorough analysis and comparing our results with those from different studies, the increased number of flowers was commonly attributed to the increase in the concentration of nutrients in the substrate of culture. Through the statistical interpretation of the results, there was observed a very significant positive difference in plants from V₃ and V₄, while in the group of plants of V₂ there was noted a significant positive difference as compared with the control variant.

In the culture of flowers, a special importance is represented by the morphological side of the plants that gives them their decorative value. In the case of the species *Lilium regale*, the decorative value is largely determined by its flower and less by its conduct. As a result of the research it was found that the Osmocote®Pro fertilizer influences the dimensions of the corolla only in the group of plants fertilized with the largest doses of fertilizer, respectively 6 g and 8 g/each plant (tab.2). It can be observed that in the case of the control variant (V₁), the average diameter of the corolla is 6.7 cm. As the concentration of fertilizer was increased there could be observed a slight increase in diameter, reaching up to 7.1 cm in V₂, which resulted in a difference of 0.4 cm as compared to the control group. Compared to the control sample, the plants from variants V₃ and V₄ presented more significant differences, respectively 1.5 cm and 1.8 cm.

Table 2

The average diameter of the corolla (cm)

Variant	Ø flowers' cup (cm.)	% compared with control	Difference	The significance
V ₁	6.7	100.0	-	c
V ₂	7.1	125.6	0.4	-
V ₃	8.2	151.22	1.5	xx
V ₄	8.5	225.6	1.8	xx
LSD 5% 0.9	LSD 1% 1.4	LSD 0.1% 2.2		

± d = difference compared to the control sample

Through the statistical interpretation of the results obtained as compared to the control group, in the group of plants from V₂ there has been obtained an insignificant statistical difference, but in the case of the plants from variants V₃ and V₄ positive differences have been recorded (table 3). The fertilizer Osmocote®Pro has not influenced very significantly the diameter of the cup in any of the 3 experimental variants.registered a slight elongation of the flower as compared to the uncontaminated group.

CONCLUSIONS

1. The administration of Osmocote®Pro fertilizer in the culture substrate leads to a significant earlier germination than in the case of the control group that did not benefit from the fertilizer Osmocote®Pro;
2. Fertilization with Osmocote®Pro induces earlier emergence of floral buds with up to 9 days.
3. The flowers belonging to the plants fertilized with the largest doses of Osmocote®Pro fertilizer, respectively V₄ fertilized with 8 g/plant and V₃ fertilized with 6 g/plant, will last up to 12 more days in comparison with the control sample.
4. Application of Osmocote®Pro fertilizer in the species of *Lilium regale* determined an increase of the plants' height, with the best results being highlighted in the group of plants benefitting of the highest dosage of fertilizer, that is V₄;
5. Regarding the number of flowers/plant, in the group of plants from the variants fertilized with the largest doses of Osmocote®Pro (V₃ and V₄) there were recorded highly significant positive differences as compared to the control group, and significant positive differences in V₂;
6. The diameter of the flowers' cup grew in all fertilized variants and positive significant differences were noted in the variants V₃ and V₄ as compared to the control group.

REFERENCES

1. Băla Maria, 2007 - *Floricultură generală și specială*. Editura de Vest, Timișoara.
2. Draghia Lucia, Chelariu Elena Liliana, 2011 – *Floricultură*. Editura Ion Ionescu de la Brad, Iași.
3. Pelkonen V. P., Pirtilä A. M., 2012 – *Taxonomy and Phylogeny of the Genus Lilium*. Floriculture and Ornamental Biotechnology ©2012 Global Science Books.
4. Siljak-Yakovlev S, Peccenini S, Muratovic E, Zoldos V, Robin O, Valles J., 2003 – *Chromosomal differentiation and genome size. in three European mountain Lilium species*. Plant Systematics and Evolution 236, 165-173.
5. Woodcock H.B.D., Stearn W.T., 1950 - *Lilies of the World* (2nd Edn), Country Life Ltd., New York, 431 pp.