

RESEARCH REGARDING THE CULTIVATION IN PROTECTED SYSTEMS OF SOME *LILIUM* ASIAN HYBRIDS

CERCETĂRI PRIVIND CULTURA ÎN SISTEM PROTEJAT A UNOR HIBRIZI ASIATICI DE *LILIUM*

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Abstract. In this paper are presented three Asian hybrids of *Lilium*. *Gironde*, *Lolly Pop* and *Crimson Pixie* that were grown in a protected system: in the green house and solarium, both cultured in the direct soil of the green house and in pots. The plants were observed during the time necessary to develop from bulbs till flowering period and then till the end of the circle, the height of the stem, the number of the flowers of each plant, and their diameter. The results show that for all three hybrids, planting in the solarium is the most efficient.

Key words: *Lilium*, Asian hybrids, protected crops

Rezumat. Lucrarea de față prezintă trei hibrizi asiatici de *Lilium*: *Gironde*, *Lolly Pop* și *Crimson Pixie* cultivați în cultură protejată: în seră și în solar, la fiecare din cele două sisteme practicându-se cultura la ghivece și direct la sol. Asupra plantelor s-au efectuat observații cu privire la: durata de timp necesară de la plantare până la apariția bobocilor floriferi și încheierea înfloririi, înălțimea tijelor florifere, numărul de flori pe plantă, diametrul florilor. Rezultatele demonstrează că la toți cei trei hibrizi, cultura în solar este cea mai eficientă.

Cuvinte cheie: *Lilium*, hibrizi asiatici, culturi protejate

INTRODUCTION

The *Lilium* genus is part of the *Liliaceae* family and has more than 110 species also known by their popular name of lilies, with a diversity of shapes and cultures that is very uncommon for most flowers. All species are perennial and their bulbs assure their vegetative multiplication (Cantor and Pop, 2008). Native species of *Lilium* are widespread in the northern hemisphere (10° to 60° latitude) and found mostly in Asia, North America and Europe. The Lilly is a well known plant that its job in pleasing the eye is an old knowledge. At the moment lilies has a major importance in horticulture as a cut flower, potted flower and also as a garden flower. On a global scale, every year over 2000 bulbs are produced, Holland is the first on bulb production and forth on cut flowers. Also a large number are produced annually in Japan, United States of America and more recently in the southern hemisphere Australia, Chile and South Africa.

The conventional reproductive system is made using the bulbs, it is the most used method of multiplication and it is used in the commercial cultures but also to satisfy the increasing demand of planting material; the modern techniques

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of in vitro culture of tissue and cells are used as an alternative and are used a variety of explants and types of concentrations for the growth, or crioconservation using vitrification of the meristems (Kapoor, 2008; Kumar, 2009; Roh, 1999). Also, applying the fertilizers and the growth regulators substances and also the possibility of using herbicides for the regulation of herbs growth in the bulb culture are of a big importance in the study made on lilies (Wilfret, 1999).

This paper wants to establish the possibility of culturing some Asian Hybrids of the genus *Lilium*, in different systems of culture: in the greenhouse, in pots in the greenhouse, in the solarium, in pots in the solarium with the purpose of assuring which method is best for exploitation also as cut flowers and potted ones.

MATERIAL AND METHOD

The experiments were made in the greenhouse and the solarium of the Floriculture, field of study part of the University of Agriculture Science and Veterinary Medicine Iași, Romania.

The biological material used to start the experiment field was represented by hybrid bulbs of Asian *Lilium*:

- *Gironde*, with yellow flowers, high stems between 70-80 cm, glossy green lance like leaves (fig. 1 a);
- *Lolly Pop*, has pink flowers, stems from 40 to 50 cm, narrow lance like leaves that remain green throughout season (fig. 1 b);
- *Crimson Pixie*, with purple red flowers, 25-30cm stems, deep green lance like leaves (fig. 1 c)

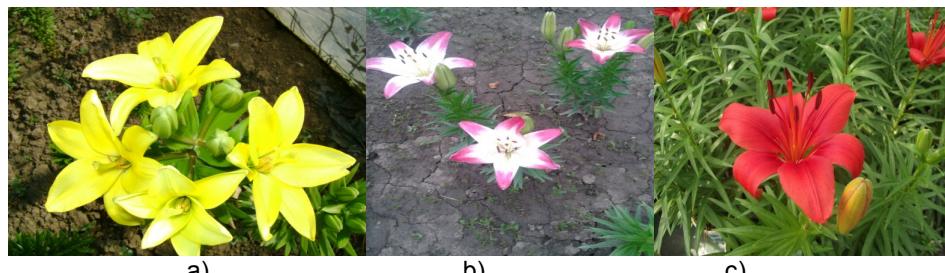


Fig. 1 - Asian hybrids used in the experiments variants :a) *Gironde*; b) *Lolly Pop*; c) *Crimson pixie*

Experiments were made in randomized blocks, in a three repetitions process, of planting 33 bulbs for each repetition.

Planting of the bulbs in the greenhouse, and also in the solarium was made at 25 cm distance between bulbs and 15 cm deep in the soil. In the case of planting in pots, it was used 10 cm diameter pots and a soil made of a mixture of garden soil and coal (3:1). Before planting, regarding the place of culture, the bulbs were kept for 30 min in a solution of Topsin 0,3%.

The starting day of the cultivations was 22 March 2012. No supplementary heating was applied in the solarium and the potted cultures were placed in the heated greenhouse, at temperatures between 18-24°C. The experiment scheme is described in table 1.

Table 1

Experimental scheme		
Hybrid	Variant	Specifications
<i>Gironde</i>	V ₁	Culture in greenhouse soil
	V ₂	Culture in pots, in greenhouse
	V ₃	Culture in the solarium soil
	V ₄	Culture in the solarium, in pots
<i>Lolly pop</i>	V ₁	Culture in greenhouse soil
	V ₂	Culture in pots, in greenhouse
	V ₃	Culture in the solarium soil
	V ₄	Culture in the solarium, in pots
<i>Crimson Pixie</i>	V ₁	Culture in greenhouse soil
	V ₂	Culture in pots, in greenhouse
	V ₃	Culture in the solarium soil
	V ₄	Culture in the solarium, in pots

The establishment and maintenance of the greenhouse culture and pots culture were specific for every variant, keeping the technology recommended in the speciality range for each culture system. During the period of the experiment determinations were made regarding the beginning of vegetation, height of the stems, number and diameter of the flowers and also the period of the flowering.

RESULTS AND DISCUSSIONS

After the setup of greenhouse and pot cultures determinations have been made regarding the height growing of flower shanks.

The height of flower shanks varied depending on type and culture system (fig. 2). The type character has influenced the registered values. Thus, with an average of variants of 39cm, the *Gironde* hybrid has registered the highest value of shanks, followed by *Lolly Pop* with 33,2cm. *Crimson Pixie* has had the shortest shanks, the average of the four variants being 18,9 cm.

Depending on the culture variant, the differences within the type have underlined the tendency of the greenhouse plants to grow higher, not only in the ground – V₃, but also in pots – V₄ (with approx. 37% for *Gironde*, 33,2% for *Lolly Pop* and 17,9% for *Crimson Pixie*). At the same time, the highest growth was that of the plants cultivated directly in the ground (V₁, V₃) as compared to the ones cultivated in pots (V₂, V₄), larger differences being in the case of the green house culture for the *Gironde* variety (16,8%) and the greenhouse cultures for varieties *Lolly Pop* and *Crimson Pixie* (with 13,7%, namely 10,8% to the advantage of variants V₃ to V₄). For the greenhouse cultures from the *Gironde* variety, differences have been insignificant (0,9%), through they have been in favour of the plants cultivated in the ground (V₃), and for the greenhouse culture for varieties *Lolly Pop* and *Crimson Pixie*, the plants from variants V₁ have exceeded the height of the plants in V₂ by 6,9%, namely by 6,5%.

From the analysis of the obtained results we can ascertain that for each variety, the differences between variants are higher if the height of the shanks is bigger, the *Crimson Pixie* variety registering the closest values of the four variants.

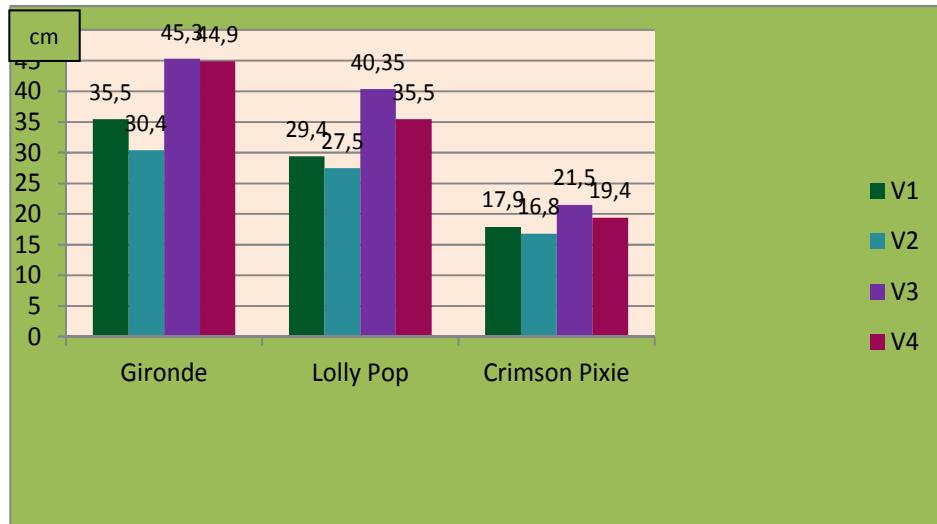


Fig. 2 - Height of flower shanks

For each of the three hybrids studied in the two culture systems, we have also followed the decorative aspect of flowers by determining the number and size of the flowers and their flowering period. Regarding the average number of flowers/plant (table 2) we ascertain that at the *Gironde* hybrid the differences to the average of the variants are significantly positive for variant V_3 and significantly negative for variants V_1 and V_2 . At the other two hybrids, *Lolly Pop* and *Crimson Pixie*, the differences significantly positive statistically insure the results obtained for the plants cultivated in greenhouse, in the ground.

Tabel 2

Number of flowers/plant

Hybrid	Variant	Number of flowers	% regarding average	Differences	Significance of difference
<i>Gironde</i> LSD 5% = 1.0 unit. LSD 1% = 1.5 unit. LSD 0.1% = 2.4 unit.	V_1	3.0	75,0	-1	0
	V_2	3.0	75,0	-1	0
	V_3	5.7	142.5	1.7	XX
	V_4	4.4	110,0	0.4	-
	Average	4.0	100,00	-	-
<i>Lolly Pop</i> LSD 5% = 0.9 unit. LSD 1% = 1.4 unit. LSD 0.1% = 2.2 unit.	V_1	2.6	74.29	-0.9	0
	V_2	2.8	80.00	-0.7	-
	V_3	4.5	128.57	1.0	X
	V_4	4.1	117.14	0.6	-
	Average	3.5	100,00	-	-
<i>Crimson Pixie</i> LSD 5% = 0.8 unit. LSD 1% = 1.2 unit. LSD 0.1% = 1.9 unit.	V_1	3.2	91.43	-0.3	-
	V_2	2.5	71.43	-1.0	0
	V_3	4.3	122.86	0.8	X
	V_4	3.9	114.43	0.4	-
	Average	3.5	100,00	-	-

The results of the flower chalice varied between 8,2 and 12,6cm at *Gironde*, between 7,0 and 11,4cm for *Lolly Pop* and between 8,2 and 11,5cm at *Crimson Pixie*. Analysing this characteristics, we ascertain that the positive differences statistically insured in comparison to the average of the variants, are registered at the plants cultivated in the greenhouse on the ground (V_3) and in pots (V_4). In the case of *Gironde* hybrid, the differences are distinctively significant, and for *Crimson Pixie* the differences are significant. At the hybrid *Lolly Pop* we have registered very significant differences at variant V_4 and distinctively significant at V_3 . To the same proportion, but with negative differences in comparison to the average, we have the variants cultivated in greenhouses (V_1 and V_2) from all types (table 3).

Table 3

Flower diameter

Hybrid	Var.	Diameter (cm)	% regarding average	Differences	Significance of difference
<i>Gironde</i> LSD 5% = 1.0 cm LSD 1% = 1.5 cm LSD 0.1% = 2.4 cm	V_1	8.6	82.69	-1.8	00
	V_2	8.2	78.85	-2.2	00
	V_3	12.1	116.35	1.7	XX
	V_4	12.6	121.15	2.2	XX
	Average	10.4	100	witness	-
<i>Lolly Pop</i> LSD 5% = 0.6 cm LSD 1% = 0.9 cm LSD 0.1% = 1.5 cm	V_1	7.7	84.62	-1.4	00
	V_2	7.0	76.92	-2.1	000
	V_3	10.4	114.29	1.3	XX
	V_4	11.4	125.27	2.3	XXX
	Average	9.1	100	witness	-
<i>Crimson Pixie</i> LSD 5% = 1.4 cm LSD 1% = 2.1 cm LSD 0.1% = 3.4 cm	V_1	8.4	84.00	-1.6	0
	V_2	8.2	82.00	-1.8	0
	V_3	11.8	118.00	1.8	X
	V_4	11.5	115.00	1.5	X
	Average	10.0	100	witness	-

Table 4

Calendar data regarding flowering

Hybrid	Variant	Opening of the flowers	Closing of flowers	The flowering duration (days)
<i>Gironde</i>	V_1	12.06.2012	4.07.2012	22
	V_2	10.06.2012	6.07.2012	26
	V_3	22.06.2012	5.07.2012	13
	V_4	24.06.2012	4.07.2012	10
<i>Lolly Pop</i>	V_1	14.05.2012	3.06.2012	20
	V_2	12.05.2012	30.05.2012	19
	V_3	23.05.2012	17.06.2012	26
	V_4	22.05.2012	15.06.2012	20
<i>Crimson Pixie</i>	V_1	11.05.2012	4.06.2012	23
	V_2	16.05.2012	10.06.2012	23
	V_3	24.05.2012	29.06.2012	36
	V_4	22.05.2012	1.06.2012	10

In table 4 we have presented the calendar data regarding the opening of the flowers, conclusion of the flowering, data from which the flowering period for the three varieties can be deducted.

We ascertain that the earliest varieties are *Lolly Pop* and *Crimson Pixie*, the opening of the flowers starting in the second decade of May, with variations depending on the culture location. At a difference of about 30 days (second decade of June) the opening flower of *Gironde* start coming out.

CONCLUSIONS

1. The protective culture of those tree Asian hybrids of *Lilium* (*Gironde*, *Lolly Pop* and *Crimson Pixie*) assures the differential utilization (as cut flowers or planted in pots ones), regarding the specific characteristics of the flowering stem and flowers

2. The height differences of the stems in our studied plants are direct proportional with every genus (obvious differences at the taller genus and lower at the shorter ones). The culture in the solarium, either in the soil or in the pot, determines the acquire of plants with taller stems than the ones planted in the greenhouse. In pots they tend to reduce their height.

3. In the solarium, the number of the flowers on the stems and also the diameter of the flowers had reached the maximum parameters..

4. Cultures in the greenhouse made an early flowering period of 10-14 days regarding the ones in the solarium.

5. The reduced height of the stems, that will not be over 20-22cm , dismissive of the culture system, recommends using the hybrid *Crimson Pixie* only for efficiency in planted pots; hybrids *Gironde* and *Lolly Pop*, from all the studied variants they are very efficient as cut flowers and also potted ones.

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