The Behavior of Some Petunia Varieties for Improvement the Romanian Assortment

Maria CANTOR, Emese KRIZBAI, Erzsebet BUTA*

Faculty Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5
Mănăştur Street, 40037 Cluj-Napoca, Romania

*Corresponding author, e-mail: ebuta2008@yahoo.com

Bulletin UASVM Horticulture 72(1) / 2015

Print ISSN 1843-5254, Electronic ISSN 1843-5394

Doi:10.15835/buasvmcn-hort:10664

ABSTRACT

Petunias are one of the most popular plants grown in pots or outdoors for summer design. The main goal of the present study was to introduce new *Petunia* varieties imported from Hungary that could improve the Romanian floral assortment. Lately many private flower growers from our country are looking to improve the range of new varieties of petunias in order to obtain additional income, thus justifying objectives taken to study. The trial was conducted at the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca during 2012-2013. The objectives were to evaluate the main biological and morfo-decorative characteristics of seven new petunias varieties (flower color, length flower stems, number of flowers per branch, plant circumference and diameter, and the diameter of the corolla). The data were processed by statistical analysis of variance (LSD test) and the best *Petunia* varieties will be promoted in our country. The results reveals the decorative potential of new *Petunia* varieties 'Hot red', 'White' and 'Purple' for improving the Romanian floral assortment for landscape design.

Keywords: *annual flower, new varieties, ornamental value.*

INTRODUCTION

Petunia is considered to be the first cultivated bedding plant and has remained as a commercially important ornamental since the early days of horticulture and it is one of the favorite genera for developing new varieties. The history of petunia development as a crop is highlighted with implications for a wide variety of other floricultural crops (Griesbach, 2007). Hybrid seed production transformed the crop and continued domestication by flower breeders produced a wide range of flower colors and flower patterns (Ganga *et al.*, 2011).

Petunia genus includes about 20 of South American origin, generally perennials but grown as annuals (Selaru, 2008), and of Toma (2009) only 14 herbaceous species, but *Petunia hybrida* Hort. (*P. axillaris* Lam. X *P. violacea* Lindl.) species presents

decorative value (Selaru, 2008). Recent researches also confirm that the genus *Petunia* consist of 14 currently recognized species (Stehmann *et al.*, 2009). *Petunia hybrida* Hort. is a horticultural species, which with its many cultivars (varieties, cultivars and hybrids) ranks first in the hierarchy of the flowers used in decoration of green spaces in the summer (Toma *et al.*, 2011).

All petunia species are native of Argentina, Brazil or Uruguay (Dole and Wilkins, 1999). Today numerous cultivars are grown (varieties, hybrids, cultivars) with great variability of characteristics. There are four distinct categories of petunias, based on flower size and growth habit (multiflora, grandiflora, milliflora, groundcover or 'spreading'). Many new cultivars are bred with a mix of varieties or species to create more hybrid petunias. New petunia varieties come out every

year, making older varieties obsolete, but here are some particular favorites (Toma, 2009).

The evolution *Petunia* hybrids and variety, for setting balcony was very important in recent years. The research was directed to a better resistance of flowers to environmental conditions. From large and very delicate flowers of the variety 'Balcony Bernois' was passed to small flowers, even the tiny flowers of Surfinia and Million Bells.

Modern petunias are hybrids of species such as the fragrant white or wild petunia (*Petunia axillaris*) and violet petunia (*P. violacea*, also sold as *P. integrifolia*). While the previous is rarely cultivated today, the latter is a rediscovered favorite. A trailing plant with small, rosy purple flowers that have dark throats, blooms nonstop from spring until fall and makes a superb choice for containers (Bender, 2006).

Petunia plants are spread across all continents, often with other species annuals with a wide variety of colors, long flowering period (about 6 months). Petunias bloom profusely even in hot summers and new varieties even in seasons with high humidity (Bala, 2012). After Selaru, 2008, petunia is a plant with high potential for growth and flowering, which gives us beauty relentlessly on very long, as long as they provided the necessary environmental conditions, first needs more heat. Because of their profuse blooms, petunias are excellent in hanging baskets, either alone or as a trailing plant in a mixed planting. They are low growing and need to be planted in large groups, to make a splash in the garden.

Surfinia petunias are more difficult to maintain through winter without a suitably heated greenhouse, but they are readily available as plants from garden centers and by mail order in spring (McHoy, 1998). Rate of flower development is most rapid at warmer temperatures even under SD (short day) (Dole and Wilkins, 1999). Erwin (2006) has been described as an obligate long-day plant.

The need for diversification of the floral material used in landscaping appeared amid the ongoing urban green spaces. *Petunia hybrida* prominently in landscaping by the forms, colors and the versatility in terms of growing conditions, fully justifying reasons researches.

In countries where many flower plants are cultivated, are created annually hundreds of new varieties that are promoted quickly into

production. These varieties are specially designed, with the disadvantage that the flowers and plants in general, are still only a few years (2-3 years) after which depreciates quality. This obliges us to procure new varieties and novelties that have a good acclimatization in our ecological conditions. Therefore, the aim of this study is to analyze the main morfo-decorative characteristics of new petunia varieties in order to promote in our country.

MATERIALS AND METHODS

Genus *Petunia* is very appreciated and cultivated in Romania for summer decoration, this justified us in our work to address issues related to improving existing product range with new creations produced worldwide.

The objectives were to evaluate the main biological and morfo-decorative characteristics of some new petunias varieties (flower colour, length flower stems, number of flowers per branch, plant circumference and diameter, and the diameter of the corolla). Lately many private flower growers looking to improve range of new varieties of petunias in order to obtain additional income, justifying objectives studied.

The experiment was conducted at the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca during 2012-2013.

Biological material studied in this paper was imported from Hungary and consisted of seven varieties of *Petunia hybrida* different colors, beyond to grandifloras type: 'White', 'Hot Pink', 'Patio Red', 'Famous Blue', 'Lila White', 'Purple' and 'Hot Red' (Fig.1).

Fig. 1. Biological material: Purple, White, Hot Red, Famous Blue, Patio Red and Hot Pink (original photo).

The experience was established in three repetitions and was taken 5 plants of each variant (cultivar), in total 15 plants/cultivar (variant), 35 plants/repetition and total 105 plants.

Observations and determinations were made by measurements on the main morpho-decorative characteristics to the seven varieties of petunia (circumference and diameter of plants, floral stem length, number of flowers/stem, corolla diameter, color of flowers). The results were compared using as control the average of experience for each character.

The two years of experience can be characterized as a normal year for Cluj-Napoca with temperature slightly higher (+0.2°C, respectively 11.5°C in 2012 and +1.0°C in 2013 compared with average of last ten years -11.3°C). Year 2013 was more abundant in rain with an average 53.7 mm compared with 43.3 mm the average of the last ten years, while 2012 was power in rainfall (40.3 mm).

Petunia hybrida varieties studied are:

1. **'White'** is a white variety with large flowers, blooms profusely from May until the coming cold. It is very sensitive to rainfall.
2. **'Hot Pink'** has a bright dark pink with darker median striped. Stems are long, have waterfall appearance and are abundant flowering throughout the decor.
3. **'Patio Red'** is a very decorative variety, bright red blood flower color, with medium size of flower, and a compact form with good capacity of decoration.
4. **'Famous Blue'** has a blue-indigo color, with many flowers of medium size, branches in cascade, slightly loose.
5. **'Lila White'**, a variety with large flowers of lilac color, open and light edge darker stripes.

6. **'Purple'** has a pink-purple to light cyclamen color, medium-sized flowers with darker lines, large bushes, bulky.

7. **'Hot Red'** has a salmon-pink, intense color, with many flowers of medium size, a constant and abundant flowering, with long stems, more resistant to drought than other varieties.

The data was processed using analysis of variance. This method allows testing the significance of differences between variants with LSD test (Ardelean *et al.*, 2007).

RESULTS AND DISCUSSION

Growing and decorative characteristics are presented in the following tables.

Analyzing Table 1 it is found provided values of statistically recorded of the seven varieties studied compared to the average of varieties circumference (219.8 cm), considered the control. The largest circumference was recorded at varieties 'White', 'Purple' and 'Red Hot' very significant positive differences. On the opposite site varieties 'Famous blue', 'Hot pink' and 'Lila white' recorded negative significant differences and variety 'Patio Red' negative significant differences. The highest circumference of the plants was recorded with 'White' (280 cm) and the lowest with 'Hot pink' (156 cm). These results are in agreement with those found by Roman *et al.* (2008) on rose. These data are encouraging when use petunia plants for ornamental design in landscape.

Data presented in Table 2 concerning the average diameter of the plant reveals that there is a very high variability of this character within the varieties studied. Significance of differences in the varieties analyzed recorded significant positive or negative in all studied cases. Depending on the

Tab. 1. Average circumference of plants at petunia cultivars.

No. Var.	Cultivar	Circumference of plant			Significance of difference
		Absolute (cm)	Relative (%)	±d (cm)	
1	White	280	127.4	60.2	xxx
2	Famous blue	208	94.6	-11.8	ooo
3	Patio red	215	97.8	-4.8	oo
4	Hot pink	156	70.9	-63.8	ooo
5	Lila white	185	84.2	-34.8	ooo
6	Purple	260	118.3	40.2	xxx
7	Hot red	235	106.9	15.2	xxx
	Average (Control)	219.8	100.0		

LSD_{5%} = 4.78 LSD_{1%} = 5.66 LSD_{0.1%} = 6.85

Tab. 2. Average diameter of plants at petunia cultivars.

No. Var.	Cultivar	Diameter of plant			Significance of difference
		Absolute (cm)	Relative (%)	$\pm d$ (cm)	
1	White	85	109.0	7	xxx
2	Famous blue	66	84.6	-12	ooo
3	Patio red	65	83.3	-13	ooo
4	Hot pink	87	111.5	9	xxx
5	Lila white	71	91.0	-7	ooo
6	Purple	88	112.8	10	xxx
7	Hot red	84	107.7	6	xxx
Average (Control)		78	100.0		

$LSD_{5\%} = 1.84$ $LSD_{1\%} = 2.66$ $LSD_{0.1\%} = 3.89$

Tab. 3. Average length of floral branches at petunia cultivars.

No. Var.	Cultivar	Length of floral branches			Significance of difference
		Absolute (cm)	Relative (%)	$\pm d$ (cm)	
1	White	68	117.2	+10	xxx
2	Famous blue	53	91.4	-5	ooo
3	Patio red	46	79.3	-12	ooo
4	Hot pink	35	60.3	-23	ooo
5	Lila white	44	75.9	-14	ooo
6	Purple	74	127.6	+16	xxx
7	Hot red	85	146.6	+27	xxx
Average (Control)		58	100.0		

$LSD_{5\%} = 1.68$ $LSD_{1\%} = 2.39$ $LSD_{0.1\%} = 2.51$

Tab. 4. Average number of flowers/stem at petunia cultivars.

No. Var.	Cultivar	Number of flowers/stem			Significance of difference
		Absolute	Relative (%)	$\pm d$	
1	White	16	99.4	-0,1	-
2	Famous blue	13	80.7	-3,1	o
3	Patio red	18	111.8	+1,9	-
4	Hot pink	16	99.4	-0,1	-
5	Lila white	17	105.6	+0,9	-
6	Purple	12	74.5	-4.1	oo
7	Hot red	21	130.4	+4,9	xxx
Average (Control)		16.1	100.0		

$LSD_{5\%} = 2.36$ $LSD_{1\%} = 3.48$ $LSD_{0.1\%} = 4.23$

Tab. 5. Average diameter of flower (corolla) at petunia cultivars.

No. Var.	Cultivar	Diameter of flower (corolla)			Significance of difference
		Absolute (cm)	Relative (%)	$\pm d$ (cm)	
1	White	6.5	104.8	0.3	-
2	Famous blue	7.1	114.5	0.9	-
3	Patio red	5.2	83.9	-0.1	-
4	Hot pink	6.5	104.8	0.3	-
5	Lila white	7.1	114.5	0.9	-
6	Purple	5.4	87.1	-0.8	-
7	Hot red	5.3	85.5	-0.9	-
Average (Control)		6.2	100.0		

$LSD_{5\%} = 1.42$ $LSD_{1\%} = 1.98$ $LSD_{0.1\%} = 2.63$

average diameter of the plant remarked varieties 'White' (85 cm), 'Hot Pink' (87 cm), 'Purple' (88 cm) and 'Hot red' (84 cm) very significant positive differences compared to the control (78 cm). On the opposite side were the following varieties 'Famous blue', 'Patio red' and 'Lila white' recorded the lowest average diameter of plants, very significant negative deviations from the average experience considered as control. These results are in total accordance with those presented by Florincescu (1998) on *Lathyrus* and Cordea (2009) on *Matthiola*.

The length of the branches (flower stems) had different values within the examined varieties, resulting a change of amplitude of 35 cm (Hot pink) and 85 cm (Hot red) (Tab. 3). After statistical processing of data on this characteristics, expressed through flower stem length, results that the three varieties differ statistically compared to the average character experience (58 cm), considered the control variant. Depending on the length of floral stem remarked the varieties 'White', 'Purple' and 'Hot red' with very significant positive differences; to the opposite varieties 'Famous blue', 'Hot pink' and 'Lila white' registered were differences very significant negative lowest branches of flowers. Similar results were achieved by Stukeniene *et al.* (2013) on *Gladiolus* cultivars. Such results would suggest that the varieties which registered positive differences can be used for container gardening.

The results on the number of flowers per stem are shown in Table 4. The average number of flowers on the varieties examined had values close, were resulting a change of amplitude between 12 and 21. Compared with the average experience (16.1), considered the control, values were assured in statistical terms was only cultivar 'Hot red', which had the highest average number of flowers with very significant deviations above the average for the entire experience. The varieties 'Purple' and 'Famous blue' were noted with the lowest number of flowers per floral stem, registering significant differences lower than the average experience considered control variant. Other varieties ('White', 'Patio red', 'Hot pink' and 'Lila white') have been insignificant compared to the average experience (16.1). These results are in harmony with the results obtained by Ardelean *et al.* (2009) on *Matthiola incana* L.

After statistical processing of the data in Table 5 the average concerning diameter of the corolla (flower), it appears that all the varieties under study do not differ statistically in comparison to the average of studied character per experience (6.2 cm), considered the control variant. Similar results were obtained by Bala (2008) and Manda *et al.* (2008).

Evaluating the main characteristics of seven new *Petunia* varieties in Cluj-Napoca area, the results show high ornamental value of these cultivars. Ganga *et al.*, 2011 considered petunia to be the first cultivated bedding plant and has remained as a commercially important ornamental since the early days of horticulture and one of the favorite genera for developing new varieties. This remark and our increase of landscape area justify the improvement of floral Romanian assortment with new petunia varieties. The diversity within and between current cultivated assortment is very large and many traits not fully explored leaving important perspective for crop improvement under Romanian conditions.

CONCLUSION

The seven varieties of *Petunia hybrida* studied presents a wide range of colours: 'White' – white, 'Hot Pink' - pink dark, 'Red Patio' - bright red, 'Famous Blue' - indigo blue, 'Lila White' - lilac, 'Purple' - purple pink - to cyclamen, 'Hot Red' - salmon. Varieties 'Hot red', 'White' and 'Purple' were remarked with large flowers, long branches. They have a permanent and abundant flowering, having great interest to plant lovers. These varieties deserve to be used in commercial culture and landscaping in our country. Their appearance, frail or robust, high form, dwarf or climbing, each grower's desire to enrich the collection, for new species and varieties, to have as much diversity of plants it is a great interest. The differences in quality traits observed for seven varieties suggest that they may be useful for Romanian floral assortment or sources of variability for petunia breeding.

REFERENCES

1. Ardelean M, Sestras R, Cordea M (2007). Horticultural Experimental Design. Ed. AcademicPres Cluj-Napoca.
2. Ardelean M, Pui DA, Cordea M, Mihalescu L (2009). Genetic effects involved in the heritability of several quantitative characters of ornamental value in gillyflower

- (*Mathiola incana* L.). I. Plant characters. Bulletin of UASVM Horticulture, vol. 66 (1-2). 13-16 pp.
3. Bala M (2008). Researches concerning behaviour of some new rose varieties in conditions of Timisoara district. Bulletin of UASVM Horticulture, vol. 65 (1). 204-208 pp.
 4. Bala M (2012). Floriculture general and spacial, ed. Partos Timisoara.
 5. Bender S (2006). New types of perfect petunias. Issue of Southern Living. www.southernliving.com/.../new-types-perfect.
 6. Cordea M, Ardelean M, Pui DA, Mihaiescu L (2009). Genetic effects involved in the heritability of several quantitative characters of ornamental value in gillyflower (*Mathiola incana* L.). II. Flower characters. Bulletin of UASVM Horticulture, vol. 66 (1-2). 40-43 pp.
 7. Dole J, Wilkins H (1999). Floriculture principles and species. ed. Prentice Hall New Jersey, USA. 465 p.
 8. Erwin J (2006). Flower breeding and genetics. Factor affecting flowering in ornamental plants. ed. Anderson N.O. Springer Netherlands.
 9. Florincescu A (1998). Inducing genetic variability through intra-and interspecific hybridization in *Lathyrus* genus, PhD Thesis (in Romanian), Tipo Agronomia, Cluj-Napca.
 10. Ganga M, Jayalakshmi S, Jegadeeswari K, Padmadevi K, Jawaharlal M (2011). Petunia, p. 209. In: Chittaranjan Koley (ed). Wild crop relatives: genomic and breeding resources plantation and ornamental crop. Springer Berlin.
 11. Griesbach JR (2007). Petunia in: Flower Breeding and Genetics, ed. N.O. Anderson, Springer. 301-336 pp.
 12. Manda M, Nicu C, Anton D (2008). Study regarding the influence of the cultural techniques on the growth and the development of some decorative plants. Bulletin of UASVM Horticulture, vol. 65 (1). 209-213 pp.
 13. McHoy P (1998). Best plant for your garden, ed. Thunder Bay Press, USA.
 14. Roman G, Sestras R, Wagner St (2008). The response of several modern cultivars of landscape roses in conditions of Cluj-Napoca, Romania, Bulletin of UASVM Horticulture, vol. 65 (1). 122-125 pp.
 15. Selaru E (2008). Culture flowers for garden. ed. Ceres Bucharest.
 16. Stehmann JR, Lorenz-Lemke AP, Freitas LB, Semir J (2009). Petunia, Evolutionary, Developmental and Physiological Genetics, ed. Springer New York.
 17. Stukeniene G, Joudkaite R, Skridaila A (2013). Diversity of Lithuanian Gladiolus Cultivars in the Vilnius University Botanical Garden. Acta Horticulture no. 1002, Proceedings of the Eleventh International Symposium on Flower Bulbs and Herbaceous Perennials, ISHS Belgium, 31-36 pp.
 18. Toma F (2009). Floriculture and floral art. ed. INVEL Multimedia Bucharest.
 19. Toma F, Vasilescu Th, Petra S, Zamfir-Vasca D (2011). Research concerning the propagation by cutting of some new cultivars of petunia, Scientific papers USAMV Bucharest Seria B, vol. LV. 253-256 pp.