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Genetic variability studies in Petunia at Raipur Chhattisgarh

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Abstract
Petunias are one of the most popular plants grown in pots or outdoors for summer design. Petunias are one of the most plausible flowering annuals. They have a long flowering period, are easy to grow and available in many forms and colours. The main goal of the present study was to find genetic variation in Petunia varieties to elaborate their further use for different aesthetic purpose. Eleven cultivars of petunia were selected for evaluation and there heritability, genetic advance, PCV, GCV were evaluated.

Keywords: Browallia, brunsfelsia, datura, nicotiana

Introduction
Petunia (*Petunia hybrida*, 2n = 14) belongs to family Solanaceae. The solanaceous family is one of the most engrossing and miscellaneous plant groups among the dicotyledons. Plant of several genera are grown for their edible parts, for drugs and for ornamental purposes. The six genera is grown primarily as ornamental plants are: Browallia, Brunsfelsia, Datura, Nicotiana, Petunia and Salpiglossis (Sink, 1984) [6]. Petunia is very popular in home garden as well as public gardens. Petunia name is derived from greek word means tobacco like. It is native of North America. USA pioneer in growing petunia cultivars (Randhava, 1986) [3].
Petunia display a number of qualities that make petunia ideally suited as a plant model; A short life cycle & easy culture condition, easy propagation (sexual by seed & asexual by stem cutting), stable transformation & biochemical analysis, easy growth habit, its endogenrous highly active transposon system with a strong potential for forward & reverse genetics, an easy transformation protocol and an amenity for biochemical analysis because of its large leaves and flowers (Griesbach, 2007) [2]. Petunia is cross pollinated plant due to presence of Self incompatibility, genetic male sterility & cytoplasmic male sterility (A. K. Singh, 2014) [5]. The data around 30 Petunia (sub) species have been described and geographical origin of petunia is the southern/central part of South America and various species have been documented from collection made in Argentina, Brazil, Paraguay & Uruguay (Ando *et. al.* 2001) [1].
Petunia genus comprise about 20 of South America origin, generally perennial but grown as annual (Selaru, 2008 & Toma, 2009) [4, 8] only 14 herbaceous species, but *Petunia hybrida* Hort. (*P. axillaris* × *P. violacea* Lindl.) species present decorative value (Selaru, 2008) [4]. Recent reserchers also confirm that the genus petunia consist of 14 new recognized species (Stehmann *et al.,* 2009) [7]. *Petunia hybrida* Hort. is a horticultural species, which with its many cultivars rank first in the hierarchy of the flowers used in decoration in the summer (Toma *et. al*., 2011) [9].

Genetic variability
(a) Phenotypic coefficient of variation (PCV)

$\sigma p = \sigma g + \sigma e$

$PCV\% = \frac{\sigma p}{\bar{X}} \times 100$

where, $\sigma p = \sqrt{\sigma^2 p}$

(b) Genotypic coefficient of variation (GCV)

$GCV\% = \frac{\sigma g}{\bar{X}} \times 100$

where, $\sigma g = \sqrt{\sigma^2 g}$

Where,
$\sigma^2 p$ = Phenotypic variance
σp = Phenotypic standard deviation
$\sigma^2 g$ = Genotypic variance
σg = Genotypic standard deviation
σ e = Environment variance
$\bar{X}$ = General mean

3.6.4 Heritability (Broad sense)
It is the ratio of genotypic variance to the phenotypic variance. Heritability for the present study was calculated in broad sense by adopting the formula suggested by Hanson *et al*. (1955).

$$h^2(bs)\% = \frac{\sigma^2 g}{\sigma^2 p} \times 100$$

Where,
h^2 (bs) = Heritability in broad sense
$\sigma^2 g$ = Genotypic variance
$\sigma^2 p$ = Phenotypic variance
The range of heritability was categorized as:
low (below 50 per cent)
moderate (50-70 per cent)
high (above 70 per cent) as followed by Johnson *et al*. (1955) [10].

3.6.5 Genetic advance
Improvement in the mean genotypic value of selected plants over the parental population is known as genetic advance. Expected genetic advance (GA) was calculated by the method of Johnson *et al*. (1955) [10].

$$G A = K. \sigma_p h^2(bs)$$

Where,
GA = Genetic advance
K = Constant (Standardized selection differential) having the value of 2.06 at 5 per cent level of selection intensity
h^2 = Heritability of the character
σp = Phenotypic standard deviation

3.6.5.1 Genetic advance as percentage of mean
It was calculated by the following formula

$$\text{GA as percentage of mean} = \frac{\text{Genetic advance}}{\text{General mean}} \times 100$$

GA was categorized as – > 35 per cent = high

25-35 per cent = moderate

< 25 per cent = low

Materials and Methods
The experimental material consisted of eleven cultivars. The cultivar of petunia exploited for genetic variability were randomly selected form the local market of Raipur state and check cultivars of petunias were conserved in Horticulture Research cum Instructional Farm in Department of floriculture and Landscape Architecture. The research analysis was accomplished in the Horticulture Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, College of Agriculture, Department of Floriculture & Landscape Architecture and Department of Genetics and Plant Breeding in 2022-23 with appropriate provision for irrigation and other management were contributed. The experimental area positioned at the core of Chhattisgarh aimed latitude of 220 33'N to 210 14'N and longitude high on 820 38'E to 81 0 38'E with an elevation of around 298m MSL. The characteristics which were measurable in numerical form expressed in units and analysed with the help of statistics comes under quantitative characteristics. The quantitative characters were examined visually, maybe present or not, depends on whether the gene is responsible for the character it is consider.

Result and Discussion
The accomplishment of any investigation is achieved by level of genetic variability accessible among cultivars. It helps for effectual and capable selection of varieties from the existing, which can be exploited for advance study. All the characters in the study were recorded highest phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV). The utmost PCV is obtained in shoot length (41.09%), followed by pedicel length (35.89%), no. of flower per plant (35.81%), leaf length (25.49%), plant height (24.13%), leaf width (21.65%), flower fresh weight (21.59%) and flower width (13.45%). The highest GCV is obtained in shoot length (38.30%), followed by pedicel length (32.72%), no. of flower per plant (27.60%), leaf length (25.49%), plant height (17.80%), leaf width (17.04%), flower fresh weight (12.91%) and flower width (10.81%).
The high heritability was obtained in shoot length (86.88%) followed by pedicel length (83.15%), flower width (64.63%), leaf length (63.71%), leaf width (61.97%), No. of flower per plant (59.42%), plant height (54.44%) and flower fresh weight (35.77%). Hussein and Misiha (1979) also found 84, 88 and 89% heritability at flowering time in *Petunia hybrid.*
The highest genetic advance was noticed in shoot length (17.99) followed by plant height (4.97), no. of flower per plant (4.07), leaf length (2.18), pedicel length (1.62), flower width (1.32), leaf width (0.77) and flower fresh weight (0.14).

Table 1: Mean, Min., Max., Genetic variability, Heritability% and Genetic advance of quantitative characters

Characters	Mean	Min.	Max.	Heritability%	Genetic advance	Genetic advance% mean	PCV%	GCV%
Plant height (cm)	18.40	13.99	29.77	54.44	4.97	27.06	24.13	17.80
Shoot length (cm)	24.10	15.30	43.84	86.88	17.99	73.54	41.09	38.30
Leaf length (cm)	6.35	4.36	8.88	63.71	2.18	33.45	25.49	20.34
Leaf width (cm)	2.82	2.10	3.56	61.97	0.77	27.64	21.65	17.04
Pedicel length (cm)	2.68	1.80	4.36	83.15	1.62	61.47	35.89	32.72
Flower width (cm)	7.31	5.96	9.09	64.63	1.32	17.91	13.45	10.81
No. of flower per plant	9.00	5.00	14.00	59.42	4.07	43.83	35.81	27.60
Flower fresh weight (gm)	0.90	0.70	1.17	35.77	0.14	15.92	21.59	12.91

Conclusion

Petunias come in many different varieties, which makes them popular bedding plants that appear in gardens and terraces during May and June. This variation is found not only in the petunias available at garden centers, but also in wild petunias. All of these different petunia-types are often pollinated by different insects and birds. Some are attracted to purple flowers, others to white flowers. Some fit into the smallest flowers, others can reach the nectar at the end of the long perianth. The shoot length and pedicel length show high variability and heritability concurrently with greatest genetic advance intimates reliability of characters in selection.

Reference

1. Ando T, Nomura M, Tsukahara J, Watanabe J, Kokubun H, Tsukamoto T, *et al*. Reproductive isolation in a native population of *Petunia sensu* Jussieu (Solanaceae). Annals of Botany. 2001;88:403-413.
2. Griesbach JR. Petunia in: Flower Breeding and Genetics, ed. N.O. Anderson, Springer. 2007, 301-336.
3. Randhava GS, Mukhopadhayay A. Floriculture in India Annual flower. 1986, 98-99.
4. Selaru E. Culture flowers for garden. ed. Ceres Bucharest, 2008.
5. Singh AK. Breeding and Biotechnology of Flowers: Vol. 02: Garden Flowers. New India Publishing Agency, 2014.
6. Sink KC. Taxonomy. Petunia, 1984, 3-9.
7. Stehmann JR, Lorenz-Lemke AP, Freitas LB, Semir J. The genus petunia. Petunia: evolutionary, developmental and physiological genetics, 2009, 1-28.
8. Toma F. Floriculture and floral art. ed. INVEL Multimedia Bucharest, 2009.
9. Toma F, Vasilescu Th, Petra S, Zamfir-Vasca D. Research concerning the propagation by cutting of some new cultivars of petunia, Scientific papers USAMV Bucharest Seria B. 2011;LV:253-256.
10. Johnson HW, Robinson HF, Comstock RE. Estimation of genetic and environmental variability in soyabean. Agron. Journal. 1955;47:477-480.