

Evaluation of Different Hybrids of *Petunia (Petunia hybrida)* for Growth, Quality and Yield Attributes Under Northern Dry Zone of Karnataka

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ABSTRACT

Petunia hybrida is widely recognized as a valuable and aesthetically pleasing annual flowering plant, holds significant commercial value due to its extended flowering period, making it a popular addition to gardens. The study aimed to evaluate eight different *Petunia* hybrids in terms of vegetative growth, flower quality and yield. The experiment was conducted in a Randomized Block Design with three replications at the Department of Floriculture and Landscape Architecture, College of Horticulture, UHS Bagalkot, Karnataka, during the 2024-25. The *Petunia* hybrids evaluated were White, Burgande, Stars Mixed, Red Star, Rose Star, Crimson Star, Bravo Mix, and Frost Blue. Significant differences were observed for all the parameters. The data revealed that hybrid Rose Star expressed highest plant spread in both direction E-W (65.54cm) and N-S (68.55cm), number of flowers (64.55), number of flower buds (67.58), leaf area (12.03cm²) and chlorophyll content (26.96) followed by Burgande. Maximum plant height was recorded in Frost Blue (26.74cm) followed by Burgande and minimum in Red Star (21.58cm). More number of leaves observed in the Crimson Star (1097.93) and less in White (681.95). Longest peduncle length exhibited by the Frost Blue (3.84cm). Hybrid Burgande (16.10) recorded highest number of branches followed by Rose Star and lowest in Crimson Star (10.72). The largest flower diameter (8.59cm) and flower weight (3.02g) belongs to Crimson Star followed by Stars Mixed. Higher flower yield per plant was recorded in Crimson Star (140.50g) and lower in Red Star (82.63g). The hybrid Bravo Mix expressed lowest plant spread in both direction E-W (54.85cm) and N-S (60.57cm), flower diameter (5.79cm), leaf area (6.07cm²) and chlorophyll content (11.09). Minimum number of flowers (49.46), number of flower buds (51.74), peduncle length (2.60cm) showed in Stars Mixed. Thus, out of 8 hybrids screened, *Petunia* Rose Star found promising for this zone followed by Burgande.

Keywords: Hybrid, *Petunia*, Quality, Vegetative growth, Yield

INTRODUCTION

Floriculture in India is experiencing rapid growth, driven by the country's diverse agro-climatic conditions. Over recent decades, ornamental plants have been cultivated for various purposes including decoration, loose flowers, cut flowers, dried flowers, garden landscape designs and bedding plants as well as for use in the food, pharmaceutical, cosmetic industries and phyto remediation. *Petunia* are now among the most economically significant ornamental plants worldwide. The genus *Petunia* includes about 30 species along with a synthetic garden species *P. hybrida*. Most of the *Petunias* cultivated today are hybrids, known for their short life cycle, wide range of colors, compact size, and ease of growth. *Petunias* are widely favoured as bedding plants due to their

adaptability, diverse varieties and extensive colour range. They are classified into four main groups based on flower size, color and growth habit: multiflora, milliflora, grandiflora and ground cover or spreading types. Additionally, *petunias* are categorized into two primary horticultural forms: the compact upright type which grows to a height of 15–25 cm (6–10 inches) and the sprawling long-stemmed balcony *petunia*, reaching about 46 cm (18 inches) in height, often utilized in hanging baskets and window boxes. These plants exhibit rapid growth and offer a wide array of colors, from pure white to deep crimson or purple, frequently adorned with speckles or veins in contrasting hues. When planting in containers, combining several *petunia* colors can create a vibrant and appealing display.

Petunias thrive in temperate climates and do not tolerate shade. In warm climates, they are grown as perennials. Petunias are quantitative long-day plants, meaning they can flower under any photoperiod, but they bloom faster under longer days. Short photoperiods (8-10 hrs) can delay flowering, slow down stem elongation, and encourage lateral branching. The ideal temperature range for flowering, plant height, and lateral branching is between 10–25°C (Kessler, 1999). Regular fertilization and rich, well-draining soil are essential for optimal blooming, allowing Petunias to flower throughout the season (Hoda and Mona, 2014). Petunias are available in both single-bloom and double-bloom varieties, with flowers about four inches in diameter. Petunia seeds especially rare varieties are often imported from other countries, which makes them quite expensive. Despite their short life cycle of about three to five months, Petunias continue to bloom for up to six months.

Currently, there is limited information on selecting suitable Petunia hybrids for the Northern Dry Zone of Karnataka. Evaluating hybrids for new environments is essential to understand their qualitative and quantitative traits under different climatic conditions. In view of the above facts, assessing the performance of various Petunia hybrids under the specific climatic conditions of Karnataka's Northern Dry Zone is essential for identify the most promising hybrids.

MATERIALS AND METHODS

The experiment was carried out during the 2024–25 period at the experimental farm of the Floriculture Department, College of Horticulture, University of Horticultural Sciences, Bagalkot. Petunia hybrids served as the experimental material. To identify the most suitable hybrids for the region, eight different hybrids were cultivated under open field conditions, employing a Randomized Complete Block Design (RCBD) with three replications. Measurements of plant height and spread were taken using a standard scale. Flower diameter was assessed with a Mitutoyo Vernier Caliper. Leaf chlorophyll content was quantified using a handheld SPAD-502 chlorophyll meter (Minolta, Japan) with three readings per plant per treatment. Leaf area was estimated using the graphical method.

Well-decomposed farmyard manure (FYM) and a prescribed quantity of NPK fertilizers comprising urea, single super phosphate (SSP) and muriate of potash (MOP) were administered to the plants. The nitrogen component was supplied in three stages:

initially as a basal application, followed by two additional doses at 30 and 45 days after planting. Cultural practices such as irrigation, weeding, hoeing and plant protection measures were implemented as needed, adhering to the standard package of practices for the crop (Anonymous, 2014).

RESULTS AND DISCUSSION

The vegetative growth of the petunia hybrids was assessed based on parameters such as plant height (cm), number of branches, plant spread (cm), number of leaves and leaf area (cm²), as detailed in Table 1. The data indicated significant variations across all traits studied. Among the hybrids, 'Frost Blue' exhibited the tallest plants, measuring 26.74 cm, followed closely by 'Burguande' at 25.72 cm and 'Rose Star' at 25.52 cm. In contrast, 'Red Star' had the shortest plant height at 21.58 cm. These differences in plant height are influenced by both genetic factors and environmental conditions, including production techniques and cultural practices. The observed outcomes are consistent with previous studies on various ornamental crops. Syamal and Kumar (2002) and Vikas *et al* (2015) reported similar findings in Dahlia, while Munikrishnappa (2011) and Chowdhuri *et al* (2015) observed comparable results in China Aster and Gladiolus respectively.

A notable variation in leaf production was observed across different hybrid cultivars, highlighting the influence of genetic factors on plant growth. The hybrid Crimson Star exhibited the highest leaf count, averaging approximately 1098 leaves per plant followed by the hybrids Star Mixed and Rose Star with averages of 962 and 896 leaves per plant, respectively. In contrast, the White hybrid had the fewest leaves, averaging about 682 per plant. Plant spread is vital for maximizing sunlight utilization and ensuring the vitality of flower crops. Rose Star produced maximum plant spread with a (N-S) of 68.55cm and (E-W) of 65.54cm which was at par with hybrids Burguande (N-S) of 68.03cm and (E-W) of 64.41cm and Star Mixed (N-S) of 65.34 cm and (E-W) of 63.61cm. This is likely due to the higher number of branches and more vigorous growth in these hybrids. The minimum number of plants spread (N-S) of 60.57cm and (E-W) of 54.85cm was registered in hybrid Bravo Mix this may be likely due to varietal differences and less vigorous growth. Research by Kumar *et al* (2010) and Gupta *et al* (2015) highlighted similar variations in vegetative growth parameters among Dahlia cultivars. In the evaluation of various Petunia hybrids, the hybrid Burguande exhibited the highest average number of branches per plant at 16.10, followed by Rose Star with

Evaluation of Different Hybrids of Petunia (*Petunia hybrida*)

Table 1. Various Vegetative parameters as influenced by different hybrids of Petunia

Cultivar	Plant height (cm)	Plant spread (East-West) (cm)	Plant spread (North-South) (cm)	No of leaves	Leaf area(cm ²)	No of branches
White	23.57	62.43	66.51	681.95	9.30	12.71
Burgande	25.72	64.41	68.03	811.1	9.91	16.10
Stars Mixed	21.77	63.61	65.34	962.02	6.90	11.69
Red Star	21.58	63.56	66.73	783.71	8.03	13.88
Rose Star	25.52	65.54	68.55	895.63	12.03	14.62
Crimson Star	24.33	58.15	64.48	1097.93	7.95	10.72
Bravo Mix	21.71	54.85	60.57	759.84	6.07	12.63
Frost Blue	26.74	60.10	64.48	860.30	7.08	11.70
S.EM(±)	0.54	0.61	0.42	0.67	0.34	0.64
CD (5%)	1.63	1.85	1.28	2.03	1.03	1.95

14.62 and Red Star at 13.88. Conversely, Crimson Star had the fewest branches, averaging 10.72 per plant. An increase in the number of branches typically leads to a higher number of leaves, which in turn enhances flower and tuber yield by improving the source-sink relationship. Regarding leaf area, Rose Star recorded the largest average leaf area at 12.03 cm², closely followed by Burgande at 9.91 cm² and White at 9.30 cm². The hybrid Bravo Mix had the smallest leaf area, averaging 6.07 cm². These variations in leaf area among hybrids may be attributed to genetic differences and growth vigor, as observed in previous studies on Gerbera cultivars by Shruti *et al* (2004) and Anop *et al* (2010).

The assessment of flower characteristics, yield and quality in Petunia hybrids encompassed various parameters including the number of flowers, flower bud count, flower diameter, flower weight, peduncle length, yield per plant and chlorophyll content. These metrics were systematically recorded and are detailed in Table 2. Highest number of buds (67.58) was recorded in hybrid Rose Star followed by hybrids Burgande (62.51) and Frost Blue (57.52). The minimum number of buds (45.51) was observed in hybrid Star Mixed. The maximum number of flowers (64.55) was recorded in hybrid Rose Star followed by hybrid Burgande (59.52) and Frost Blue (54.32). The minimum number of flowers was observed in hybrid Stars Mixed (42.63). A maximum diameter of full bloom (8.59cm) was recorded in hybrid Crimson Star, followed by hybrids Stars Mixed (7.49cm) and Red Star (6.45cm). The minimum diameter of bloom (5.79cm) was observed in hybrid Bravo Mix.

The hybrid Rose Star exhibited the highest bud count at 67.58, followed by Burgande at 62.51 and Frost Blue at 57.52. In contrast, Star Mixed recorded the lowest bud count at 45.51. Regarding flower production, Rose Star also led with 64.55 blooms, while Burgande and Frost Blue had 59.52 and 54.32 blooms, respectively. Star Mixed again had the fewest flowers at 42.63. In terms of bloom diameter, Crimson Star achieved the largest at 8.59 cm, followed by Star Mixed at 7.49 cm and Red Star at 6.45 cm. Bravo Mix had the smallest bloom diameter of 5.79 cm. Peduncle length of (3.83cm) was recorded longest in hybrid Frost Blue which was at par with Crimson star (3.73cm) followed by hybrid Bravo Mix (3.63cm). The shortest length (2.60cm) observed in Stars Mixed hybrid. Weight of flower differed significantly among the hybrids. Hybrid Crimson Star had the highest value (3.02g) followed by Stars Mixed (2.41g) whereas, the lowest weight of flower was recorded with Burgande (1.49g). Leaves play a crucial role in photosynthesis, with chlorophyll content being a key factor influencing growth and flower yield. The results showed that SPAD chlorophyll value was the highest (26.96) in Rose Star hybrid followed by Burgande (23.48) and Crimson Star (23.29). While, the lowest amount of chlorophyll was recorded in Bravo Mix (11.09). Yield per plant is more (140.50g) in hybrid Crimson Star followed by Rose Star (121.52g) and White (120.60g). The lowest yield was registered in hybrid Red Star (182.63g).

The increased flower production per plant and overall yield are closely associated with key morphological traits such as plant height, number of branches, leaf area and leaf count. These

Table 2. Various flowering parameters, flower quality and yield attributes as influenced by different hybrids of Petunia

Cultivar	No of flower per plant	No of buds	Diameter of flower (cm)	Peduncle length (cm)	Flower Weight (g)	Yield/plant (g)	Chlorophyll content (SPAD)
White	54.44	57.73	5.90	3.51	2.21	120.60	19.30
Burgande	59.52	62.51	6.19	2.87	1.49	88.47	23.48
Stars Mixed	42.63	45.51	7.49	2.60	2.41	102.86	17.89
Red Star	44.57	47.44	6.45	3.30	1.86	82.63	16.33
Rose Star	64.55	67.58	6.15	3.01	1.88	121.52	26.96
Crimson Star	46.44	49.43	8.59	3.73	3.02	140.50	23.29
Bravo Mix	57.56	60.56	5.79	3.63	1.92	110.33	11.09
Frost Blue	54.32	57.52	6.38	3.83	1.82	98.58	18.72
S.EM(±)	0.13	0.19	0.21	0.13	0.11	0.45	1.89
CD (5%)	0.39	0.59	0.64	0.31	0.34	1.37	5.75

characteristics enhance the plant's photosynthetic capacity leading to greater energy production and consequently, a higher number of larger flowers. Similar findings were observed by Ahmed and Gul (2002) in Dahlia; Munikrishnappa (2013) and Zosiamlina *et al* (2012) in China Aster; Ramachandrudu and Thangam (2010) in Crossandra; Deepti and Anil (2005) in Marigold; Gupta *et al* (2015) in Dahlia; Tirakannanavar *et al* (2015) in China Aster and in Chrysanthemum by Rajiv (2014).

CONCLUSION

It was concluded from this study that among Petunia hybrids, Rose Star was found most suitable for this area of Northern Dry Zone of Karnataka. Hybrids Burgunde and CrimsonStar also performed well.

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Evaluation of Different Hybrids of Petunia (*Petunia hybrida*)

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