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Performance evaluation of *Portulaca (Portulaca grandiflora)* genotypes for vegetative and floral traits under Chhattisgarh plain zone

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ABSTRACT

The present investigation was conducted to evaluate the performance and variability of 10 local genotypes of *Portulaca grandiflora* for important vegetative and floral characteristics under the Chhattisgarh plain zone. The experiment was conducted during 2025–26 at the Floriculture Farm, College of Horticulture and Research Station, Sankara, Patan, Durg (C.G.). Ten genotypes (G_1 – G_{10}) were evaluated in a Completely Randomized Design (CRD) with 3 replications. G_1 recorded the maximum vine length at 30, 60 and 90 DAP (15.24, 28.86 and 31.23 cm), East–West and North–South plant spread (21.77 and 25.37 cm), leaves per branch (29.33), leaves per plant (250.47), branches per plant (10.87) and nodes per branch (29.20). It also recorded the maximum buds per plant (26.07), flowers per plant (24.80). Overall, G_1 exhibited the best combined vegetative and floral performance and was identified as the most promising genotype under the experimental conditions.

Keywords: *Portulaca grandiflora*, Genotypes, Vegetative traits, Floral traits, Genetic variability, Chhattisgarh plain zone

Introduction

Portulaca grandiflora belongs to the family Portulacaceae, which comprises than 100 species distributed mainly in tropical and subtropical regions of the world. Important species of the genus include *Portulaca grandiflora* and *Portulaca oleracea* (Christenhusz *et al.*, 2016) [1]. The genus is known for its growth habit adaptability to adverse environmental conditions, rapid multiplication and ornamental importance. *Portulaca grandiflora* is native to Brazil, Argentina and Uruguay and is now widely cultivated because of its attractive flowers and adaptability (Setiawan *et al.* 2016). It is commonly known as moss rose, sun rose, rock rose and ten o'clock flower. The flowers generally open in sunlight during the daytime. The species possesses a chromosome number of $x = 9$ and a diploid chromosome number of $2n = 18$. The plant is a herbaceous succulent characterized by fleshy leaves smooth stems, a shallow root system and profuse flowering. Its succulent nature enables water conservation and contributes to tolerance against heat and drought conditions. *P. Grandiflora* performs under warm conditions and prefers full sunlight and well-drained soil (Nyame-Tawiah *et al.*, 2019) [2]. The ornamental importance of *P. Grandiflora* is mainly associated with its flowers, prolonged blooming period, easy cultivation and low maintenance requirement. Flowers occur in colours, including red pink yellow orange, purple, magenta, cream and white. Variation also occurs in form and petal arrangement making the crop suitable for pot culture, landscaping, edging, ground cover hanging baskets, terrace gardening and other ornamental uses (De, 2019) [3]. Genetic variability is a component for improvement of ornamental crops. Different *Portulaca* genotypes may differ in growth branching, plant spread, flowering behaviour, flower size, petal arrangement, flower colour and flowering duration. Systematic evaluation under agro-climatic conditions is therefore useful for identifying suitable genotypes for cultivation and further breeding work. Previous studies have reported variability in *Portulaca*. Alam *et al.* (2014) [4] Observed variation in plant height branching, nodes and leaf production among *Portulaca oleracea* accessions while Setiawan *et al.* (2016) Reported differences among *Portulaca* accessions. The variation reported in studies indicates that genotype plays an important role in determining growth and ornamental characteristics. Environmental factors such as temperature, humidity, sunshine and soil conditions may also influence growth and flowering performance. Considering the importance and available genetic variability the present study was undertaken to evaluate 10 local *Portulaca grandiflora* genotypes for vegetative and floral traits under the Chhattisgarh plain zone and to identify promising genotypes for their overall performance.

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Materials and methods

The experiment entitled “Performance evaluation of *Portulaca* (*Portulaca grandiflora*) genotypes for floral traits under Chhattisgarh plain zone” was conducted during 2025–26 at the Floriculture Farm, College of Horticulture and Research Station, Sankara, Patan, Durg (C.G.), located at 21°11' N latitude, 81°17' E longitude and approximately 317 m above mean sea level. Ten local collections were evaluated, comprising two collections from Bilaspur and eight from Raipur, Chhattisgarh. Bilaspur is situated at 22°05' N, 82°09' E and about 262–265 m above sea level, while Raipur lies at 21°14' N, 81°38' E with an elevation of approximately 296–306 m.

The experiment was laid out in a Completely Randomized Design (CRD) with ten genotypes and three replications. Healthy 4–6 cm long cuttings were planted in 30 × 30 × 60 cm polybags containing soil, sand, FYM and vermicompost in a 2:1:1:1 ratio. Data were collected on vegetative and floral characters, including vine length, plant spread, leaves, branches, nodes, bud development, buds and flowers per plant, flower diameter, petals per flower, flower weight, petal layer, flowering duration, flower colour and flower opening behaviour. The recorded data were subjected to statistical analysis using CRD, and genotype differences were assessed at the 5% level of significance.

Treatment details

Different 10 genotypes are collected from Raipur and Bilaspur region of Chhattisgarh.

Results and discussion

Vegetative traits

Vine length (cm)

The genotypes showed considerable variations in vine length at 30, 60 and 90 DAP. At 30 DAP, G_1 recorded the maximum vine length (15.24 cm), followed by G_2 (12.55 cm) and G_8 (8.05 cm), whereas G_9 recorded the minimum (6.02 cm). At 60 DAP, G_1 again recorded the highest vine length (28.86 cm), followed by G_2 (24.36 cm), while G_6 recorded the lowest value (6.31 cm). At 90 DAP, G_1 maintained the maximum vine length (31.23 cm), followed by G_2 (26.78 cm) and G_8 (10.99 cm), whereas G_6 recorded the minimum (8.69 cm). Similar variability among *Portulaca* genotypes was reported by Pasha *et al.* (2021) [5] and Alam *et al.* (2014) [4].

Plant spread (East-West, North-South)

Significant differences were observed in plant spread in both directions. G_1 recorded the maximum East–West spread (21.77 cm), followed by G_2 (16.48 cm), whereas G_3 and G_9 recorded the minimum

value (5.83 cm). In the North–South direction, G_1 recorded the highest spread (25.37 cm), followed by G_2 (19.69 cm), while G_{10} recorded the lowest spread (5.67 cm). Genetic variation in plant spread and vegetative characteristics has also been reported in *Portulaca* by Alam *et al.* (2014) [4] and China aster by Rymbai *et al.* (2012) [6].

Leaves per branch

The number of leaves per branch varied among the genotypes. G_1 produced the maximum number of leaves per branch (29.33), followed by G_2 (26.67) and G_8 (12.53). G_6 recorded the minimum value (8.40). Pasha *et al.* (2021) [5] also reported considerable differences among *Portulaca* genotypes for leaf production.

Leaves per plant

G_1 recorded the highest number of leaves per plant (250.47), followed by G_2 (232.80) and G_9 (112.00), whereas G_{10} recorded the lowest number (77.53). Alam *et al.* (2014) [4] also observed wide variation in leaf production among *Portulaca* accessions.

Branches per plant

G_1 produced the maximum number of branches per plant (10.87), followed by G_2 (10.00) and G_7 (6.73), while G_6 recorded the minimum (6.07). Alam *et al.* (2014) [4]

also reported significant variation in the number of branches among *Portulaca* accessions.

Nodes per branch

G_1 recorded the maximum number of nodes per branch (29.20), followed by G_2 (26.13) and G_8 (11.73), whereas G_6 recorded the minimum (8.47). Similar variation in node number among *Portulaca* accessions was reported by Alam *et al.* (2014) [4].

Floral traits

Buds per plant

G_1 produced the maximum number of floral buds (26.07 buds per plant), followed by G_2 (24.40) and G_5 (19.13), whereas G_6 produced the minimum (13.60). Pasha *et al.* (2021) [5] reported considerable variation in flowering performance among *Portulaca* genotypes, including flowers per plant.

Flowers per plant

G_1 recorded the maximum number of flowers per plant (24.80), followed by G_2 (22.80) and G_5 (18.00), while G_6 recorded the minimum (12.67). Similar genotypic differences in flowers per plant have been reported in *Portulaca* by Pasha *et al.* (2021) [5].

Table 3.1. Variation in *Portulaca grandiflora* genotypes for vegetative and floral traits

Genotype	Vine length (cm)			Plant spread (cm)		Leaves per branch	Leaves per plant	Branches per plant	Nodes per branch	Buds per plant	Flower per plant
	30 DAP	60 DAP	90 DAP	East to West	North to South						
G_1	15.24	28.86	31.23	21.77	25.37	29.33	250.5	10.87	29.2	26.07	24.8
G_2	12.55	24.36	26.78	16.48	19.69	26.67	232.8	10	26.13	24.4	22.8
G_3	6.99	9.79	10.48	5.83	5.93	12	126.1	6.33	11.13	22.73	21.33
G_4	7.77	7.75	10.08	6.51	5.82	10.73	107.3	6.4	9.8	14.33	13.53
G_5	6.51	7.27	8.81	5.88	6.04	12.13	107.7	6.47	10.8	19.13	18
G_6	7.87	6.31	8.69	5.88	5.89	8.4	81.07	6.07	8.47	13.6	12.67
G_7	6.87	8.05	10.03	5.95	5.88	10.73	101.7	6.73	9.8	14.13	13.33
G_8	8.05	10.17	10.99	6.47	5.87	12.53	100.2	6.33	11.73	20.47	20.93
G_9	6.02	8.47	10.23	5.83	5.99	12	112	6.8	11.13	19.2	17.87
G_{10}	6.15	8.89	10.69	6.02	5.67	9.4	77.53	6.6	9.47	14.33	12.93
SEM±	0.50	0.71	0.66	0.24	0.24	0.92	8.26	0.22	0.69	2.34	2.31
CD at 5%	1.49	2.09	1.94	0.69	0.72	2.72	24.37	0.65	2.03	6.91	6.8

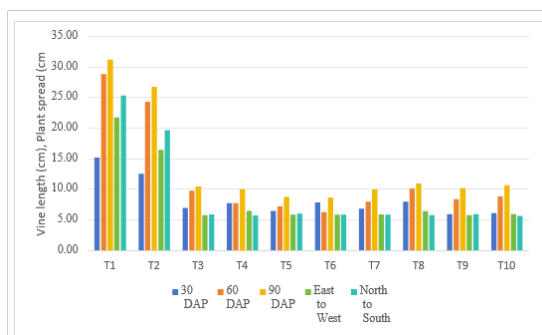


Figure 3.1. Variation in *Portulaca grandiflora* genotypes for vine length (cm) and plant spread (cm)

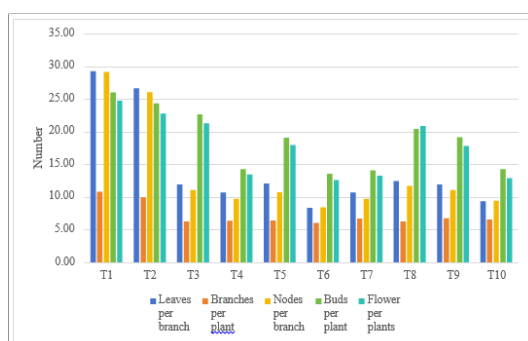


Figure 3.2. Variation in *Portulaca grandiflora* genotypes for leaves per branch, branches per plant, buds per plant and flower per plant

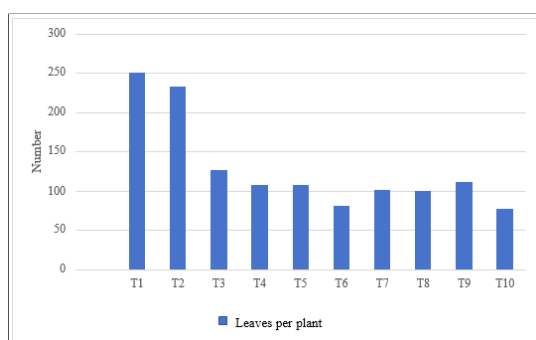


Figure 4.1. Variation in *Portulaca grandiflora* genotypes for leaves per plant

Conclusion

The evaluation of 10 *Portulaca grandiflora* genotypes revealed considerable variation in vegetative growth and flower production under the Chhattisgarh plain zone. Among the evaluated genotypes, G_1 demonstrated superior overall vegetative performance and floral yield, consistently leading in vine elongation across growth stages, plant spread, foliage density, and flower bud formation. Genotype G_2 ranked closely behind G_1 across most vegetative and reproductive parameters. Consequently, G_1 proved to be the most promising genotype for ornamental cultivation under the prevailing agro-climatic conditions.

Disclaimer (Artificial Intelligence)

The authors declare that no generative artificial intelligence (AI) tools, including Large Language Models (such as ChatGPT, Copilot, etc.) or AI-based image generation technologies, were utilized in the preparation, writing, or revision of this manuscript.

Competing interests

The authors confirm that there are no competing interests associated with this manuscript.

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