International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(8): 91-94
www.biochemjournal.com
Received: 05-05-2025
Accepted: 08-06-2025

Dr. Lilagar Singh Verma
Professor and Head, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Venkatesh
M.Sc. Research Scholar, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Dr. Vijay Kumar
Professor, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Kotha Likhitha
Ph.D. Scholar Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India, India

Narayanan K
M.Sc. Research Scholar, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Naveena R
M.Sc. Research Scholar, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Corresponding Author:
Venkatesh
M.Sc. Research Scholar, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Morphological characterization and genotypic evaluation of pot mum chrysanthemum (*Chrysanthemum* × *morifolium* Ramat.) under Chhattisgarh conditions

Lilagar Singh Verma, Venkatesh, Vijay Kumar, Kotha Likhitha, Narayanan K and Naveena R

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i8b.5100

Abstract
The present study was conducted to evaluate the "Morphological Characterization and Genotypic Evaluation of Pot Mum Chrysanthemum (*Chrysanthemum* × *morifolium* Ramat.) under Chhattisgarh Conditions" during the *Rabi* season of 2024-25. The experiment was carried out at the Tissue Culture premises, College of Agriculture, IGKV, Raipur, using a Completely Randomized Design (CRD) with three replications and treatments. The selected varieties are Bidhan Madhuri, HCC-3 (Hyderabad chrysanthemum collection-3), HCC-2 (Hyderabad chrysanthemum collection-2), PAU-50, Bidhan Taruna, BCKV-123, Bidhan Jayanthi, Bidhan Shova, SS (Shubhra Sonali) and HCC-1 (Hyderabad chrysanthemum collection-1), were evaluated for various vegetative and floral traits, including plant height, branching, stem girth, flowering duration, flower diameter and yield. The results showed significant variability among genotypes. Bidhan Shova produced the tallest plants and the largest flower diameter. while HCC-3 exhibited maximum branching, flowering duration and number of flowers BCKV-123 recorded the highest yield. Conversely, HCC-2 had the shortest flowering period and lowest flower weight. The earliest flowering was observed in Bidhan Shova. Overall, Bidhan Shova, HCC-3 and BCKV-123 were identified as the superior genotypes for pot culture under Chhattisgarh conditions.

Keywords: Chrysanthemum, morphological and floral traits, varieties, flower yield

Introduction
Chrysanthemum (*Chrysanthemum* × *morifolium* Ramat.), belonging to the Asteraceae family, is one of the most popular ornamental plants worldwide due to its vibrant color range, diverse flower forms and adaptability. Known by names such as Guldaudi, Sevanti and Autumn Queen, it is cultivated extensively in temperate and subtropical regions. In India, chrysanthemums hold immense commercial value for cut flowers, loose flowers and pot culture, playing a vital role in both domestic and export markets.

Morphologically diverse, chrysanthemum varieties exhibit considerable variation in plant architecture, leaf traits, inflorescence types and flowering behavior, making them a suitable candidate for ornamental breeding. This crop is classified into standard and spray types based on floral architecture, with standard types preferred for cut flowers and spray types for loose flowers and pot culture. The success of chrysanthemum cultivation relies heavily on selecting genotypes best suited to regional agro-climatic conditions

In the context of varietal registration and improvement, the International Union for the Protection of New Varieties of Plants (UPOV) and India's Protection of Plant Varieties and Farmers' Rights Act (PPV&FRA) emphasize the importance of DUS (Distinctness, Uniformity and Stability) testing. Morphological characterization using DUS descriptors is a cost-effective method to distinguish and select superior varieties.

Chhattisgarh, with its diverse agro-climatic conditions, is emerging as a promising region for commercial floriculture.

However, limited information exists on the performance of chrysanthemum genotypes in this region. Therefore, this study was undertaken to evaluate and characterize the morphological and flowering traits of ten pot mum genotypes under the plain conditions of Chhattisgarh, aiming to identify promising varieties for pot culture and floriculture-based livelihood development.

Materials and Methods

The research was conducted during the *Rabi* season of 2024-25 at the Tissue Culture premises, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya IGKV, Raipur, (Chhattisgarh). The experiment was laid out in a Completely Randomized Design (CRD) with three replications and ten treatments. *viz* Bidhan Madhuri, HCC-3, HCC-2, PAU-50, Bidhan Taruna, BCKV-123, Bidhan Jayanthi, Bidhan Shova, SS and HCC-1. Observations to be included are Plant height, number of branches per plant, stem girth, Days to first bud initiation, flower diameter and flower yield per 10 pots. Standard cultural practices, including pinching, staking, nutrient application, irrigation and pest control, were uniformly applied. Data were recorded at 90 days and analyzed using appropriate statistical methods for CRD, including mean, standard error, critical difference and coefficient of variation.

Results and Discussion

Plant height (cm)

As summarized in Table 1, a significant variation in plant height was observed among the evaluated genotypes. The maximum plant height was recorded in Bidhan Shova (62.77 cm), while the minimum was recorded in HCC-3 (35.17 cm).

These variations can be attributed to both genotypic differences and environmental factors such as light intensity, temperature and nutrient availability (Parmar *et al*., 2017) [1]. Similar findings were reported by Tewari (1993) [17], Banerji *et al*. (2012) [2] and Kumar *et al*. (2015) [8].

Number of Primary and Secondary Branches per Plant

Branching pattern significantly influences the canopy architecture and overall structural development of the plant. As detailed in Table 1, the genotype HCC-3 exhibited the highest number of primary branches (15.53), while Bidhan Taruna recorded the lowest (9.53). A similar trend was observed for secondary branches, with HCC-3 producing the maximum (31.50) and Bidhan Taruna the minimum (20.07).

These differences are likely due to variations in genetic constitution and the effect of environmental conditions on branch development (Vijayalakshmi *et al*., 2010) [23]. Similar trends were reported by Chaudhary (2020) [5], Patil *et al*. (2021) [14] and Verma *et al*. (1993) [22].

Stem girth (cm)

The recorded data, presented in Table 1, indicate that the variety SS exhibited the maximum stem girth (1.04 cm), whereas the minimum stem girth was observed in Bidhan Shova (0.55 cm).

Stem girth is influenced by potting media, nutrient application and environmental conditions (Kumar *et al*., 2019) [9]. Similar observations have been reported by Singh *et al*. (2022) [19], Madhumathi *et al*. (2018) [10], Basoli *et al*. (2016) [3] and Jamaluddin *et al*. (2015) [7] and Madhusmita Bhoi and Tarsiyus Tirkey (2023) [4].

Days to 1st Bud Initiation (days)

Bud initiation was monitored through regular field observations and visual inspection. As presented in Table 2, the maximum number of days to first bud initiation was recorded in HCC-3 (118.93 days), while the earliest bud initiation was observed in Bidhan Shova (94.73 days).

Such variation can be attributed to genotypic differences affecting the transition from vegetative to reproductive stages (Verma *et al*., 2015) [21]. Similar findings were also reported by Kumar *et al*. (2015) [8], Negi *et al*. (2018) [12] and Roopa (2018) [16].

Flowering Duration (days)

The data on flowering duration, as shown in Table 2, revealed that HCC-3 exhibited the longest flowering period (67.67 days), whereas the shortest duration was recorded in Bidhan Taruna (50.66 days).

This variation is mainly due to genetic differences influencing flowering behavior, including initiation, anthesis and senescence (Mahesh and Naik, 2020) [11]. Similar results were observed by Shankar and Tewari (1993) [1], Banerji *et al*. (2012) [2] and Chaudhary (2020) [5] and Verma *et al*. (1993) [22].

Flower Diameter (cm)

As presented in Table 2, significant variation in flower diameter was observed among the genotypes. Bidhan Shova recorded the largest flower diameter (6.24 cm), while HCC-3 produced the smallest flowers (3.11 cm).

Differences in flower diameter are influenced by genotypic variation in petal development and floral traits (Singh *et al*., 2017) [18]. Similar results were reported by Shukla *et al*. (2019), Pawar *et al*. (2021) and Madhusmita Bhoi and Tarsiyus Tirkey (2023) [4].

Flower Yield per 10 Pots (g)

The data on flower yield per plot, as presented in Table 2, showed that the highest yield was obtained from BCKV-123 (557.66 g), while the lowest was recorded in HCC-1 (183.33 g).

Yield differences are primarily determined by genetic potential, plant vigor and flower longevity (Telem *et al*., 2017) [20]. Similar observations were made by Priya *et al*. (2022) [15], Bala *et al*. (2015) [1] and Chaudhary *et al*. (2023) [6].

Table 1: Plant height (cm), Number of Primary and Secondary Branches per Plant and Stem girth (cm)

Sl. No	Varieties	Plant Height (cm)	Number of Primary Branches	Number of Secondary Branches	Stem girth (cm)
		90 DAT	90 DAT	90 DAT	90 DAT
1	Bidhan Madhuri	57.85	9.6	26.95	0.90
2	HCC-3	35.17	15.53	31.50	0.75
3	HCC-2	49.74	12.13	20.99	0.60
4	PAU-50	40.21	13.33	28.31	0.63
5	Bidhan Tarun	58.37	9.53	20.07	0.73
6	BCKV-123	43.72	10.52	28.02	0.80
7	Bidhan Jayanthi	41.57	11.93	22.90	0.71
8	Bidhan Shova	62.77	12.13	23.28	0.55
9	SS	46.69	14.86	22.41	1.04
10	HCC-1	54.19	13.73	24.77	0.68
SE(m)±		0.65	0.17	0.37	0.012
CD (5%)		1.94	0.51	1.11	0.037
CV%		2.55	2.70	2.90	3.28

Table 2: Days to 1st bud initiation (days), flowering duration (days), Flower Diameter (cm) and flower yield per 10 pots (g)

Sl. No	Varieties	Days to 1st bud initiation (days)	Flowering duration (days)	Flower Diameter (cm)	Flower yield per 10 pots (g)
1	Bidhan Madhuri	96.40	55.66	6.00	363.66
2	HCC-3	118.93	53.33	1.81	375.33
3	HCC-2	99.53	67.66	4.23	267.66
4	PAU-50	100.53	56.66	4.16	297
5	Bidhan Tarun	96.53	50.66	5.86	215.33
6	BCKV-123	100.60	54.00	4.86	557.66
7	Bidhan Jayanthi	99.07	56.66	5.14	198
8	Bidhan Shova	94.73	57.33	6.24	407.33
9	SS	97.00	59.66	5.26	275
10	HCC-1	100.53	60.66	5.81	183.33
SE(m) ±		1.40	0.87	0.687	5.578
CD (5%)		4.15	2.57	0.246	16.45
CV%		2.67	2.91	3.222	3.38

Conclusion

The present study revealed significant morphological and floral variation among ten pot mum genotypes of *Chrysanthemum* × *morifolium* under Chhattisgarh conditions. Bidhan Shova excelled in plant height and flower diameter, while HCC-3 showed superiority in branching pattern and flowering duration. BCKV-123 recorded the highest flower yield, indicating strong commercial potential. Conversely, HCC-2 and HCC-1 were among the lowest performers in terms of flowering period and yield, respectively. Based on overall performance, Bidhan Shova, HCC-3 and BCKV-123 were identified as promising genotypes for pot culture and floriculture-based livelihood opportunities in Chhattisgarh. These genotypes may be recommended for further evaluation, varietal registration and commercial cultivation.

References

1. Bala M. Evaluation of chrysanthemum (*Chrysanthemum morifolium* Ramat.) genotypes for morphological traits. J Hortic Sci. 2015;10(2):242-244.
2. Banerji BK, Batra A, Dwivedi AK. Morphological and biochemical characterization of chrysanthemum. J Hortic Sci. 2012;7(1):51-55.
3. Basoli M, Dhiman SR, Gupta YC, Gupta RK. Flower regulation in standard chrysanthemum (*Dendranthema grandiflora* Tzvelev) by staggered planting. Int J Farm Sci. 2016;6(3):137-145.
4. Bhoi M, Tirkey T. Performance of chrysanthemum cultivars under agro-climatic condition of Chhattisgarh plains. bioRxiv. 2023;2023-11 (preprint; not yet paginated).
5. Chaudhary D. Suitability of chrysanthemum (*Dendranthema* × *grandiflora* Tzvelev) genotype(s) for making different value-added products for profit maximization [dissertation]. Nauni: UHF; 2020.
6. Chaudhary S, Shah HP, Singh A, Tandel BM, Ninama V. Effect of pinching and growth retardants on growth and flowering of pot chrysanthemum. [Year 2023; full pagination not provided by source].
7. Jamaluddin AFM, Taufique T, Ona AF, Shahrin S, Mehraj H. Growth and flowering performance of thirty-two chrysanthemum cultivars. J Biosci Agric Res. 2015;4(1):40-51.
8. Kumar A, Dubey P, Patanwar M, Sharma R. Evaluation of chrysanthemum varieties for loose flower production in Chhattisgarh plains. Trends Biosci. 2015;8(1):175-177.
9. Kumar R, Singh J, Patel D. Effect of growing media and fertilization on growth and quality of chrysanthemum (*Dendranthema grandiflora* Tzvelev). Int J Chem Stud. 2019;7(6):1235-1240.
10. Madhumathi C, Bhargav V, Reddy DS, Kameshwari PL, Sreedhar D, Lakshmi TN. Assessment of chrysanthemum (*Chrysanthemum morifolium* Ramat.) germplasm for commercial cultivation under Rayalaseema region of Andhra Pradesh. J Appl Hortic. 2018;20(3):213-218.
11. Mahesh A, Naik A. Influence of genotype on flowering duration and ovule development in chrysanthemum. Int J Chem Stud. 2020;8(3):12-15.
12. Negi R, Dhiman SR, Gupta YC. Studies on growth and flowering behavior of newly evolved genotypes of chrysanthemum (*Dendranthema grandiflora* Tzvelev)

for cut flower production. Int J Sci Res. 2018;8(11):745-747.
13. Parmar R, Patel D, Patel N. Evaluation of different cultivars of chrysanthemum (*Dendranthema grandiflora*): relationship between vegetative traits and flower yield. Int J Curr Microbiol Appl Sci. 2017;8:123-129.
14. Patil S, Mishra A, Nagar KK, Kumar C. Evaluation of chrysanthemum (*Chrysanthemum morifolium* Ramat.) varieties for flowering traits under ecological conditions of sub-humid zone of Rajasthan. Chem Sci Rev Lett. 2017;6(22):1338-1342.
15. Priya M, Singh D. Germplasm characterization of chrysanthemum (*Dendranthema grandiflora* Tzvelev) genotypes under Bihar conditions. Ann Agric Res. 2022;43(2):232-236.
16. Roopa S, Chandrashekar SY, Shivaprasad M, Hanumantharaya L, Kumar H. Characterization of chrysanthemum (*Dendranthema grandiflora* Tzvelev) genotypes under hill zone of Karnataka. J Farm Sci Spl. 2018;31(5):620-621.
17. Shankar V, Tewari GN. Evaluation of chrysanthemum (*Chrysanthemum morifolium*) cultivars with special reference to their morphological characters. Bioved. 1993;4(1):53-56.
18. Singh AK, Singh DK, Singh AK, Kumar R. Evaluation of different chrysanthemum (*Chrysanthemum morifolium*) genotypes under shade net house in Northwest Himalaya. Int J Pure Appl Biosci. 2017;5(1):980-985.
19. Singh RK, Singh AK, Kumar R, Tomar KS, Kanwajia A, Singh GOA. Evaluation of different chrysanthemum (*Chrysanthemum* × *morifolium* Ramat.) varieties under Bundelkhand region. J Pharm Innov. 2022;11(5):1606-1610.
20. Telem RS, Sadhukhan R, Sarkar HK, Akoijam R, Haribhushan A, Wani SH. Genetic studies for flower yield and component traits in (*Chrysanthemum morifolium* Ramat.). J Appl Nat Sci. 2017;9(1):211-214.
21. Verma A, Ramesh K, Bhattacharjee S. Genetic variability studies in chrysanthemum (*Dendranthema grandiflora* Tzvelev) for growth and flowering traits. Indian J Hortic. 2015;72(1):124-128.
22. Verma LS. Evaluation of chrysanthemum varieties under Raipur condition [master's thesis]. Raipur: IGKV; 1993.
23. Vijaylakshmi M, Swaroop KV, Nalwadi UG. Performance of chrysanthemum for various vegetative and floral parameters. Indian J Agric Sci. 2010;8:91-95.