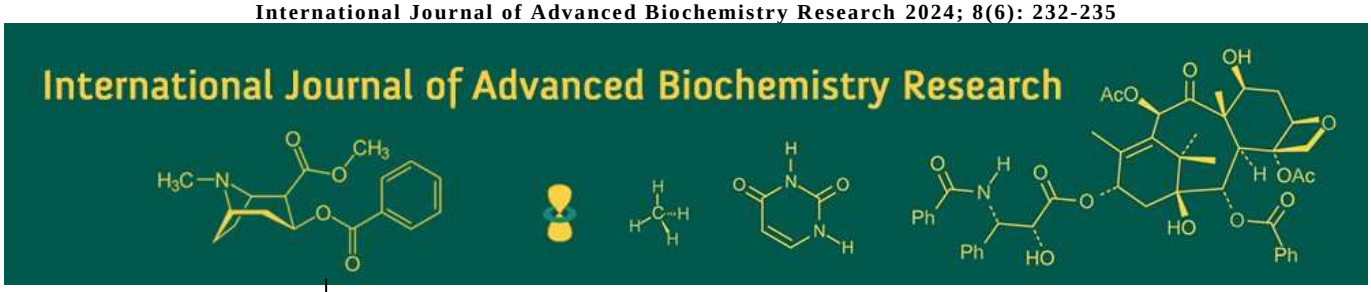

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(6): 232-235
www.biochemjournal.com
Received: 15-04-2024
Accepted: 20-05-2024

Yashasvi Sharma
M.Sc. Scholar, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh, India

Samir E Topno
Assistant Professor, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Yashasvi Sharma
M.Sc. Scholar, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh, India

Performance of different varieties of chrysanthemum under Prayagraj agro-climatic conditions

Yashasvi Sharma and Samir E Topno

DOI: https://doi.org/10.33545/26174693.2024.v8.i6c.1302

Abstract
An experiment was carried out in the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, from November, 2023 to March, 2024. The experiment was conducted in Randomized Block Design (RBD) with fifteen varieties, replicated thrice. It was reported that it is concluded that From the present investigation, it is concluded that variety SHYMAL was found to be best in terms of plant height and plant number of leaves , number of flowers per plant, duration of flowering and vase life of the flowers days taken to first bud initiation , numbers of flowers per hectare, Gross returns, net returns and benefit-cost ratio (2.66) were found to be best in SHYMAL.

Keywords: Chrysanthemum, evolution Shyamal, Arka Pratham, flowering, growth

Introduction
The name chrysanthemum (Chrysanthemum) is derived from the Greek chryos meaning gold and anthemon meaning flower. Early depictions of chrysanthemums show them as small, yellow, daisy-like flowers. Chrysanthemums are herbaceous flowering plants with densely packed cluster of small individual flowers called florets. Florets are of two types; disc florets are found in the center of the flower head and are botanically perfect. They are the reproductive part of the plant that forms seeds. However, ray florets are on the perimeter of the plant and are imperfect. These are the showy parts of the plant which helps in attracting pollinators by their beautiful colours.

Chrysanthemums belong to the Asteraceae or daisy family. It is one of the largest families in the botanical world. The basic chromosome number of chrysanthemum is 9, while 2n ranges from 36 to 75 though most of them are hexaploid. It is the national flower of Japan. It is commonly called as "Queen of the East", (Koley and Sarkar, 2013) [14] "Autumn Queen", "Guldaudi" in India and "Mum" in America. In evolutionary terms, it is considered one of the more advanced families because of its complex flower structure. Members of this family include chrysanthemums, asters (Aster), coneflowers (Echinacea) and zinnias (Zinnia).The Asteraceae family was formerly known as the Compositae or composite family. In many ways the old nomenclature presents us with a better visualization of the family. While members of the Asteraceae family often look like one large flower, the flower head is in fact a composite of many tiny flowers.

Chrysanthemums have a history that is as colorful as the flowers themselves. First cultivated centuries ago in China, the chrysanthemum was used primarily as a culinary herb. Its petals and young shoots found their way to the table in salads; its flowers and leaves were taken and brewed into teas. The flower is used on the Emperor's official seal and crest, and the highest level of decoration that can be awarded to an individual for distinguished service to the nation is the Supreme Order of the Chrysanthemum. The Japanese have a National Chrysanthemum Day, the Festival of Happiness, which is one of five ancient festival days in the country. Kiku is the Japanese word for chrysanthemum. The chrysanthemum was introduced into European culture in the 17th century. Some European countries gave the flower a markedly different meaning, adopting it as a symbol of death, using it for funerals and graves.

The world produced 10.4 million tonnes of chrysanthemums in 2020. Japan was the leading producer, with 3.1 million tonnes. China was the second largest producer, with 2.6 million tonnes. The Netherlands was the third largest producer, with 1.2 million tonnes. Italy was the fourth largest producer, with 0.8 million tonnes. Colombia was the fifth largest producer, with 0.7 million tonnes. India produced 40,000 tonnes of chrysanthemums in 2020. Tamil Nadu was the leading producer, with 18,000 tonnes. Karnataka was the second largest producer, with 10,000 tonnes. Maharashtra was the third largest producer, with 6,000 tonnes. Andhra Pradesh was the fourth largest producer, with 4,000 tonnes. Kerala was the fifth largest producer, with 2,000 tonnes. In different states of India, it is grown with different names, Guldaudi in Hindi belt, Chandramalika in the eastern states, Samanti in the southern states and Shevanti in the western states of India.

Experimental Detail

The trail was laid out in a Randomized block design with fifteen varieties replicated thrice. Spacing 1 m x 1m. Fifteen different varieties used Priscilla, joska, Dhanvantari, Phule Neel Rekha, Souvik Biscuit, Pusa Suhagin, Chandni, Arka Amar, Arka Pratham, Smoky Lady, Arka Tilak, Panibica Beauty, Arka Naveen, Manhattan, Snow Board Corm are procured, DFR, Pune College of Agriculture Campus, Narveer Tanaji Wadi, Shivajinagar, Pune, Maharashtra 411005

Observation details

Number of days to sprouting, Plant height, Chrysanthemum as cut flowers or long-stem are used for bouquets, vases, etc. (Prakash *et al.*, 2018) [21]. In North India, various hues of red, yellow, white, and purple chrysanthemums are abundant for decorating the landscape in the ground or pots. To produce cut and loose flowers is possible in high density planting which can fulfil the demand of the market. However, the research work on this aspect in chrysanthemum is lacking.

Results and Discussions

Vegetative Parameter

Plant Height: 90 days after planting, significantly taller plants (60.04) were recorded in variety V_4 (SHYMAL) followed by varietyV_5 (Kalvin Victory, 26.16 cm) whereas shorter plants were recorded in variety V_2 (Yellow Lillput, 10.91 cm).

Plant height is a genetic character of every species and cultivar variation in plant height of different varieties may be attributed to the fact that this genetic character varied from variety to variety. Similar findings in variation in plant height were obtained by Dorajeerao and Mokashi (2013) [7] and Mali *et al*. (2016) [17] in variety of chrysanthemum cm).

A. Number of leaves: 90 days after planting, significantly more no. of leaves (110.89) were recorded in variety V_4 (**S**HYMAL) followed by varietyV_{10} (PINK JEKR, 101.89) whereas less no. of leaves were recorded in variety V_6 (NAYAN TARA, 62.44).

Difference in number of leaves in different varieties might be due to the different genetic makeup of the varieties and their adaptability to the existing environmental conditions. The findings of the present investigation are in conformity with the reports of Treder (2008) [28] in Oriental lily; Lalmuanpui *et al.* (2021) [29] in gerbera; Balan *et al.* (2020) [30] in tuberose; Khan *et al.* (2020) [31] in Chrysanthemum.

Plant Spread: 60 days after planting, significantly more plant spread (22.6) were recorded in variety V_4 (**S**HYMAL) followed by varietyV_5 (Kalvin Victory, 13.1) whereas lesser plant spread were recorded in variety V_2 (Yellow Lillput, 11.1).

The different in plant spread among the different variety may be due the genetic makeup and development of primary and secondary branches under the existing environment condition giving them different plant spread. Similar results were obtained by Joshi *et al.* (2016) [10] in annual chrysanthemum and Pratibha *et al.* (2018) [22] in French marigold environmental conditions. The findings of the present investigation are in conformity with the reports of Gupta *et al.* (2018) [21, 22] in marigold; Balan *et al.* (2020) [30] in gladiolus; Singh *et al.* (2010) [16] in Chrysanthemum.

Table 1: Vegetative Parameters

Notation	Variety	Plant height (cm)	Number of leaves	Plant Spread
V_1	Priscilla	11.06	72.22	18.1
V_2	Joshika	10.91	81.44	14.7
V_3	Dhanvantari	21.79	66.11	19.1
V_4	Phule Neel Rekha	60.04	110.89	22.8
V_5	Souvik Biscuits	26.16	66.00	18.2
V_6	Pusa Suhagin	23.65	62.44	17.1
V_7	Chandani	21.98	72.44	20.2
V_8	Arka Amar	19.68	67.11	16.3
V_9	Arka Pratham	21.12	68.12	17.3
V_{10}	Smoky Lady	23.08	101.89	16.8
	F-TEST	S	S	S
	SE(d)±	4.32	6.28	1.12
	C D $_{0.05}$	2.16	365.93	2.35
	C.V.	7.04	10.50	7.60

Floral Parameter

Number of days taken to first flower bud appearance: Significantly, minimum days (25 days) taken to first bud appearance was recorded in the variety V3 (SHYMAL), followed by variety V2 (PINK JEKR, 29 days) whereas, the maximum were recorded (Yellow Lillput, 48 days).

Earliness in the commencement of bud initiation in closer spacing might be ascribed to the fact that individual plants grown at the closer spacing produced less vegetative growth and might have entered their reproductive phase earlier due to more competition among the plants for nutrients, moisture, sunlight, etc. Similar findings were reported by Subramanyam (1991) [32] in chrysanthemum cv. Kasturi and Kale (2007) [12] and Kour (2009) [15] in chrysanthemum. On the contrary, Joshi *et al.* (2016) [10] in annual chrysanthemum recorded earliness in the commencement of flowering at wider spacing.

Number of days taken to first flowering after planting

Significantly, minimum days (49 days) taken to first flowering was recorded in the variety V3 (SHYMAL), followed by variety V2 (PINK JEKR, 51 days) whereas, the maximum were recorded (YELLOW LILLPUT, 67 days).

Earliness in the commencement of first flowering in closer spacing might be ascribed to the fact that individual plants grown at the closer spacing produced less vegetative growth and might have entered their reproductive phase earlier due to more competition among the plants for nutrients, moisture, sunlight, etc. Similar findings were reported by

Subramanyam (1991) [32] in chrysanthemum cv. Kasturi and Kale (2007) [12] and Kour (2009) [15] in chrysanthemum. On the contrary, Joshi *et al*. (2016) [10] in annual chrysanthemum recorded earliness in the commencement of flowering.

Flower Diameter (mm): Significantly, bigger floret diameter (43.67 mm) was recorded in the variety V6 (NAYAN TARA), followed by variety V8 (WOLVERIM, 37.7) whereas, the less number of spike recorded in V10 (WOLVERIM, 15.5).

The differences in floret diameter varieties may be attributed to the fact that this genetic character varied from variety to variety. The variation in floret diameter might be due to the retarded growth of the plants, low temperature and low light intensity in winter as reported earlier by Gill and Atwal (1976) [33].

Stalk Length: Significantly longer stalk (12.67 cm) was recorded in variety V_4 (**S**HYMAL) followed by hybrid V_5 (Kalvin Victory, 10.40 cm) whereas the shorter stalk length was recorded in the variety V_3 (Yellow Lillput, 7.4 cm).

Table 2: Floral and quality parameter of different variety of gladiolus

Notation	Variety	Number of days taken to first flower bud appearance	Number of days taken to first flowering after planting	Flower Diameter (mm)	Stalk length of different cultivars of chrysanthemum
V_1	Priscilla	32	50	20.36	7.8
V_2	Joshika	48	67	23.26	6.23
V_3	Dhanvantari	32	51	29.14	7.4
V_4	Phule Neel Rekha	29	49	21.67	12.67
V_5	Souvik Biscuits	30	52	27.43	10.40
V_6	Pusa Suhagin	45	63	43.67	8.47
V_7	Chandani	36	57	19.71	8.63
V_8	Arka Amar	30	52	37.77	10.03
V_9	Arka Pratham	35	55	17.8	7.9
V_{10}	Smoky Lady	31	56	15.5	10.77
	F-TEST	S	S	S	S
	SE(d)±	2.83	0.979	0.14	0.39
	C D $_{0.05}$	1.42	2.016	6.26	1.75
	C.V.	5.15	1.229	9.26	11.28

Yield parameter

Number of flower per plant

Significantly, more number of flower per plant (44.93) was recorded in the variety V4(SHYMAL), followed by variety V7 (TOUCH DOWN, 37.29) whereas, the less number of flowe per plant recorded in V10 (PINK JEKR, 15.75).

The result indicated that highly significant difference among different cultivars with respect to flower produced per plant being genetically controlled factor, variation occurred due to the hereditary traits of different cultivar under prevailing environment. The result are in spikes per plant is in accordance with Dorajeerao *et al*. (2012) [6] and Khobragade *et al*. (2012) [13] in chrysanthemum.

Individual Flower weight(g)

Significantly, higher flower weight (3.5 g) was recorded in the variety V4 (SHYMAL), followed by variety V7 (TOUCH DOWN, 2.5) whereas, the lesser flower weight recorded in V10 (PINK JEKR, 0.5).

Flower yield (t/ha) - Significantly, more number of flower yield per hectare (8.21 t) was recorded in the variety V4 (SHYMAL), followed by variety V7 (TOUCH DOWN, 7.53 t) whereas, the less number of spike per hectare recorded in V3 (King's Ramsian, 1.23).

The higher yield might be due to increased morphological characters *viz*. plant height, a greater number of leaves which help in the production of more photosynthesis resulting in greater accumulation of dry matter which related to the production of a greater number of spikes per hectare. Similar results were also found by Singh *et al*. (2010) [16]

Conclusion

From the present investigation, it is concluded that variety SHYMAL was found to be best in terms of plant height and plant number of leaves, number of flowers per plant, duration of flowering and vase life of the flowers days taken to first bud initiation , numbers of flowers per hectare, Gross returns, net returns and benefit-cost ratio (2.66) were found to be best in SHYMAL

References

1. Kula S, Panchbhai DM, Nellipalli V, Bahadure RM. Effect of varieties and spacing on flower yield of cut *Chrysanthemum*. Advance in Life Sciences. 2016;5(5):1813-1817.
2. Beniwal BS. Studies on the effect of nutrients, pinching and spacing on growth, flowering and yield of *Chrysanthemum* (*Chrysanthemum morifolium*) cv. Flirt. Ph. D (Horticulture) Thesis, submitted to CCS Haryana Agricultural University; c2001.
3. Blanchard M, Runkle E. Use of a cyclic high-pressure sodium lamp to inhibit flowering of *Chrysanthemum* and velvet sage. Scientia Horticulturae. 2009;122:448-454.
4. Chung SO, Kim YJ, Lee KH, Lee CH, Noh HK. Growth characteristics of *Chrysanthemum* according to planting density. Korean Journal of Agricultural Science. 2017;44:604-612.
5. Desai N, Thirumala S. Effect of spacing and fertilizer levels on growth, flowering and spike yield in tuberose (*Polianthes tuberosa* L.) cv. Shringar under field experiment. International Journal of Research in Agricultural Sciences. 2015;2(6):262-267.
6. Dorajeerao AVD, Mokashi AN, Patil VS, Venugopal CK, Lingaraju S, Koti RV. Effect of plant spacing on yield and quality of garland *Chrysanthemum*. Karnataka Journal of Agricultural Sciences. 2012;25(2):229-231

7. Dorajeerao AVD, Mokashi AN. Growth analysis as influenced by planting geometry in garland *Chrysanthemum* (*Chrysanthemum coronarium* L.) Global Journal of Bioscience and Biotechnology. 2013;2(1):21-26.
8. Fisher RA, Yates F. The Design of Experiments: Statistical Principles for Practical Applications. New York: Hafner Publishing Company. Harper JL. Population biology of plants. Academic Press, New York, USA; 1977. https://www.indiastat.com/data/agriculture/chrysanthemum
9. Jena S, Mohanty CR. Effect of spacing on growth and flowering of annual *Chrysanthemum* (*Chrysanthemum coronarium* L.). The Pharma Innovation Journal. 2021;10(2):495-498.
10. Joshi A, Dahiya DS, Baloda S, Sharma JR. Effect of time of planting and spacing on growth, flowering and yield of annual *Chrysanthemum*. International Journal of Tropical Agriculture. 2016;34(7):2303-2308.
11. Kahar SAB, Mahmud TMM. Growth, flowering and cut flower quality of spray *Chrysanthemum* (*Chrysanthemum morifolium* Ramat) cv. V720 at different planting densities. Journal of Tropical Agriculture and Food Science. 2005;33(2):177-184.
12. Kale GL. Effect of levels of nitrogen and phosphorus with different spacings on growth and yield of annual *Chrysanthemum* (*Chrysanthemum coronarium* Linn). M.Sc. (Agriculture) Thesis, submitted to Mahatma Phule Krishi Vidyapeeth, Rahuri; c2007.
13. Khobragade RK, Bisen S, Thakur RS. Effect of planting distance and pinching on growth, flowering and yield of china aster (*Callistephus chinensis*.) cv. Poornima. Indian Journal of Agricultural Science. 2012;82(4):334–339.
14. Koley S, Sarkar MM. Measurement of PAR and its impact on *Chrysanthemum* (*Chrysanthemum morifolium* Ramat). The Bioscan. 2013;8(1):169-172.
15. Kour R. Flowering production is affected by spacing and pinching in *Chrysanthemum* cv. Flirt. International Journal Agriculture Sciences. 2009;5(2):588-589.
16. Malam VR, Singh SP, Ahlawat TR, Mathukia RK, Jat G. Effect of spacing and crop duration on growth, flowering and bulb production in tuberose (*Polianthes tuberosa* L.) cv. Double. The Journal of Horticultural Sciences. 2010;5(2):134-137.
17. Mali GL, Moond SK, Choudhary A, Bola PK, Chaudhary P. Effect of planting geometry and nitrogen on growth, flowering and yield of *chrysanthemum* (*Chrysanthemum coronarium* L.). The HortFlora Research Spectrum. 2016;5(1):48-52.
18. Mohammed S, Wilson LA, Prendergast N. Guava meadow orchard: Effect of ultra-high density planting and growth regulators on growth, flowering and fruiting. Tropical Agriculture. 1984;61:297-301.
19. Mounika Y, Dorajeerao AVD, Reddy PVK, Salomi S, Umakrishna K. Effect of spacing and planting season on growth and leaf yield of sacred basil (*Ocimum sanctum*). The Pharma Innovation Journal. 2021;10(8):552-556.
20. Nagdeve NS, Khobragade HM, Thakare AA, Gajbhiye RP, Mandhare KS. Effect of plant spacing and pinching on growth and flower yield of annual *Chrysanthemum*. International Journal of Chemical Studies. 2021;9(1):491-495.
21. Prakash A, Kumar M, Kumar A, Kumar M, Gupta A, Badal DP. Performance and flower characterization of *Chrysanthemum* (*Dendranthema grandiflora* Tzvelev) genotype under the agro-climatic region of western Uttar Pradesh. International Journal of Chemical Studies. 2018;6(5):1439-1442.
22. Pratibha C, Gupta YC, Dhiman SR, Gupta RK. Effect of planting dates and spacing on growth and flowering of French marigold Sel. 'FM – 786'. African Journal of Agricultural Research. 2018;13(37):1938-1941.
23. Priyanka TK, Kamble BS, Subiya RK, Anuradha RW, Gasti VD. An interactive study of spacing and different levels of nutrients on flowering and yield attributes of crossandra (*Crossandra undulaefolia* Salisb.). Journal of Pharmacognosy and Phytochemistry. 2018;7(1):487-490.
24. Sahu JK, Tamrakar SK, Lakpale R, Tirkey T. Effect of planting geometry and plant growth regulators on growth and flowering of *Chrysanthemum*. Agriways. 2021;9(1):17-20.
25. Sainath. Influence of spacing, fertilizer and growth regulators on growth, seed yield and quality in annual *Chrysanthemum* (*Chrysanthemum coronarium*). M.Sc. (Agriculture) Thesis, submitted to University of Agricultural Sciences, Dharwad; 2009.
26. Sanwal D. Effect of different spacings and pinching levels on vegetative growth, flower yield and quality of pyrethrum (*Chrysanthemum cinerariaefolium* Vis.) cv. Avadh. M.Sc. (Agriculture) Thesis, submitted to G.B. Pant University of Agriculture & Technology, Pantnagar, Uttaranchal; 2005.
27. Shruthi, Sarvanan. Effect of spacing and foliar application of micronutrients on growth, flowering and yield of china aster (*Callistephus chinensis* L.). Journal of Pharmacognosy and Phytochemistry. 2019;8(2):439-442.
28. Treder K, Kneller EL, Allen EM, Wang Z, Browning KS, Miller WA. The 3′ cap-independent translation element of Barley yellow dwarf virus binds eIF4F via the eIF4G subunit to initiate translation. Rna. 2008 Jan 1;14(1):134-147.
29. Lalmuanpuii R. Diversity and phytochemical study of some wild edible vegetables in Aizawl District of Mizoram (Doctoral dissertation, Mizoram University); c2021.
30. Balan B, Dhaulaniya AS, Jamwal R, Sodhi KK, Kelly S, Cannavan A, *et al*. Application of Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) spectroscopy coupled with chemometrics for detection and quantification of formalin in cow milk. Vibrational Spectroscopy. 2020 Mar 1;107:103033.
31. Khan SA, Yu Z, Belhadi A, Mardani A. Investigating the effects of renewable energy on international trade and environmental quality. Journal of Environmental management. 2020 Oct 15;272:111089.
32. Subramanyam S, Blumstein A. Conjugated ionic polyacetylenes. 3. Polymerization of ethynylpyridinium salts. Macromolecules. 1991 May;24(10):2668-2674.
33. Gill AP, Atwal AS. Controlled environment for the commercial growing of roses in Punjab. Indian Journal of Ecology. 1976;3(1):74-77.