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Evaluation of Different Dahlia (*Dahlia variabilis* L.) Hybrids for Better Growth and Yield of Flowers under Prayagraj Agro Climatic Conditions

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present investigation entitled, Evaluation of Different Dahlia (*Dahlia variabilis* L.) Hybrids for Better Growth and Yield of Flowers under Prayagraj Agro Climatic Conditions was under taken in the Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P. during winter season (2022 to 2023). The experiment was laid out with nine hybrids each replicated thrice in Randomized Block Design. Among the nine hybrids, hybrid Eternity (H_2) reported significantly better performance in terms of plant growth parameters like plant height (89.93 cm), number of leaves per plant (133.87), number of branches per plant (11.53), average length of branches (59.67 cm) and stem diameter (2.61 cm). Whereas in terms of Yield parameters, hybrid Chandra Vaga (H_7) reported significantly better performance like number of flowers per plant (20.30), number of flowers per plot (121.80), flower yield per ha (73,08,000).

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1. INTRODUCTION

"Dahlia is one of the most popular perennials, with semi-hardy, bulbous blooms grown in many parts of the world. It is indigenous to Mexico and Central America and belongs to the Asteraceae family. Dahlia received its name from Cavanilles in the year 1791 to commemorate the work of a Swedish botanist, Dr. Andreas Dahl, a pupil of Linnaeus" [1].

"The height of dahlia plants varies from 30 to 180 cm, depending on the cultivar. Dahlia flowers consist of outer ray florets in which the male organs are modified into strap-shaped petals, arranged around a central disc of bisexual florets" [2]. They are often used for exhibitions, garden displays, and home décor and are easy to grow in both the ground and pots. They are frequently cultivated as garden plants and are widely used as cut flowers in floristry. Medium-sized flowers with strong, long stalks are mostly economical in markets [3-5].

"Dahlias are available in a wide variety of colours, shapes, and sizes, and their varietal richness is quite diverse, with new hybrids and varieties being produced every year. Dahlia hybridization has so far been done by commercial dahlia growers and amateurs in different parts of the world, mostly in America, New Zealand, Holland, and England" [6]. Given the potential of this crop and the wide range of diversity in dahlias, the present research, "Evaluation of Different Dahlia (*Dahlia variabilis* L.) Hybrids for Better Growth and Yield of Flowers under Prayagraj Agro Climatic Conditions," was done.

2. MATERIALS AND METHODS

The experiment was conducted during the winter season of the year 2022-2023 in the Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj, situated at 25º 8' N latitude and 81º 50' E longitudes at an elevation of 98 metres above sea level. The area of Prayagraj district comes under the subtropical belt in the south-east of Uttar Pradesh, which experiences extremely hot summers and fairly cold winters. The maximum temperature of the location reaches up to 46 °C–48 °C and seldom falls as low as 4 °C–5 °C. The relative humidity ranges between 20-94%. The average rainfall in this area is around 1013.4 mm annually. The experiment was laid out in a randomized block design with nine hybrids (i.e., Pue Shina, Eternity, Ripsita, Shching, Bharati, Donald Wand Mark, Chandra Vaga, Hirendranath, and Mahakali) each replicated three times. Cuttings were transplanted at 50 cm x 50 cm spacing. The observations like plant height, number of leaves per plant, number of branches per plant, average length of the branches, stem diameter, number of flowers per plant, number of flowers per plot, and flower yield per ha were recorded from tagged plants. The data collected for different parameters were statistically analysed using Gomez and Gomez's (1976) analysis of variance for a randomized block design.

3. RESULTS AND DISCUSSION

3.1 Growth Attributes

- Among all the hybrids, the maximum plant height was observed in the hybrid Eternity (89.93 cm). However, there was a significant difference among the hybrids. While the minimum plant height was observed in the hybrid Hirendranath (57.13 cm), Plant height is a genetically determined factor that varies depending on genotype as well as the influence of the growing environment, production technology, and cultural customs. A similar variation in plant height due to cultivars was also observed in dahlia by Shukla et al., [6].
- Among all the hybrids, the maximum number of leaves was observed in the hybrid Eternity (133.87). However, there was a significant difference among the hybrids. While the minimum number of leaves was observed in the hybrid Bharati (60.27), The functional components for photosynthesis are leaves, which have a significant impact on the growth of any crop. The variance in the number of leaves per plant among the cultivars is driven by variation in the rate of vegetative growth among the genotypes, which can be related to genetic makeup and may also have been influenced by agroclimatic conditions. Similar results were reported by Dhane and Nimbalkar, [7] and Mounika and Saravanan, [1] in Dahlia.

- Among all the hybrids, the maximum number of branches per plant was observed in the hybrid Eternity (11.53), which was found to be at par with Chandra Vaga (10.40), while the minimum number of branches per plant was observed in the hybrid Mahakali (7.73). The variability in the number of branches in hybrids is related to genetic differences, as most of the features are determined by the genetic make-up of the varieties. Similar results were also reported by Shukla et al., [6] in Dahlia.
- Among all the hybrids, the maximum average length of branches was observed in the hybrid Eternity (59.67 cm), which was found to be at par with Donald Wand Mark (55.63), Bharati (55.20), and Mahakali (54.10 cm). While the minimum average length of branches was observed in the hybrid Hirendranath (39.63 cm). The difference in average length of branches might be attributed to various hybrids genetic composition and growth rates. It might have been influenced further by agro-climatic circumstances. Similar results were reported by Kumar et al., [8] in Dahlia.
- Among all the hybrids, the maximum stem diameter was observed in the hybrid Eternity (2.61 cm), which was found to be at par with Mahakali (2.54 cm), Hirendranath (2.53 cm), and Ripsita (2.53 cm). While the minimum stem diameter was observed in the hybrid Donald Wand Mark (1.65 cm). The diameter of the stem varies between genotypes because of differences in genetic composition and the impact of growing environmental factors. A similar variation in the stem diameter was recorded by Mounika and Saravanan [1].

Table 1. Growth parameters of dahlia hybrids under Prayagraj agro climatic conditions

S. No.	Name of the Hybrid	Plant height (cm)	Number of leaves per plant	Number of branches per plant	Average length of branches (cm)	Stem diameter (cm)
1	Pue Shina	71.67	103.83	8.87	47.30	1.68
2	Eternity	89.93	133.87	11.53	59.67	2.61
3	Ripsita	61.97	64.63	8.97	44.30	2.53
4	Shching	80.50	80.73	8.20	47.43	1.89
5	Bharati	77.97	60.27	9.77	55.20	2.22
6	Donald Wand Mark	75.93	65.73	9.53	55.63	1.65
7	Chandra Vaga	74.63	119.30	10.40	50.20	2.45
8	Hirendranath	57.13	99.77	8.60	39.63	2.53
9	Mahakali	72.50	94.83	7.73	54.10	2.54
	F-Test	S	S	S	S	S
	SEm (±)	1.03	3.60	0.49	2.07	0.04
	CD (5%)	3.08	10.79	1.46	6.22	0.11

Table 2. Yield parameters of dahlia hybrids under Prayagraj agro climatic conditions

S. No.	Name of the hybrid	Number of flowers per plant	Number of flowers per plot	Flower yield per ha
1	Pue Shina	14.53	87.20	523200
2	Eternity	15.20	91.20	547200
3	Ripsita	14.93	89.60	538800
4	Shching	14.73	88.40	530400
5	Bharati	17.73	106.40	638400
6	Donald Wand Mark	15.97	95.80	574800
7	Chandra Vaga	20.30	121.80	730800
8	Hirendranath	13.17	79.00	474000
9	Mahakali	11.63	69.80	418800
	F-Test	S	S	S
	SEm (±)	0.88	5.27	31642.69
	CD (5%)	2.63	15.80	94864.76

3.2 Yield Attributes

- Among all the hybrids, the maximum number of flowers per plant was observed in the hybrid Chandra Vaga (20.30) which was found to be at par with Bharati (17.73). While the minimum number of flowers per plant was observed in the hybrid Mahakali (11.63). The genetic composition and environmental circumstances in the Prayagraj region may be directly connected to the variance in the total number of flowers per plant. Similar results were also reported by Kumar et al., [9].
- Among all the hybrids, the maximum number of flowers per plot was observed in the hybrid Chandra Vaga (121.80), which was found to be at par with Bharati (106.40). While the minimum number of flowers per plot was observed in the hybrid Mahakali (69.80). The variation in the number of flowers per plot may be due to genetic variability among the different cultivars that were tested in this trial. Another probable reason for variation in number of flowers per plant may be due to the effect of environmental conditions prevailing during field trial. Similar results were noted by Joshi et al., [10].
- Among all the hybrids, the maximum flower yield per ha was observed in the hybrid Chandra Vaga (730800.00), which was found to be on par with Bharati (638400.00). While the minimum number of flowers per plot was observed in the hybrid Mahakali (418800.00). Flower yield per hectare increases in direct proportion to flower output per plant, flower weight, and blossom size. These discrepancies might be attributable to the fact that the performance of cultivars can vary depending on the meteorological conditions in the Allahabad region. Similar findings were reported by Shukla et al., [6].

4. CONCLUSION

Based on the present investigation, it is concluded that, out of nine hybrids, H_2 (Hybrid-Eternity) reported significantly better performance in terms of growth parameters but it showed fewer yields as compared to H_7 (Hybrid-Chandra Vaga). H_7 (Hybrid-Chandra Vaga) was found to be the most promising one in terms of yield parameters compared to other hybrids. Therefore, H_7 (Hybrid-Chandra Vaga) could be recommended to grow in Prayagraj agro climatic conditions for commercial purposes.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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