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Evaluation of different dahlia hybrids (*Dahlia variabilis* L.) under Prayagraj agro-climatic condition

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Abstract

The present investigation entitled Evaluation of different dahlia (*Dahlia variabilis* L.) hybrids under Prayagraj Agro-Climatic Conditions was under taken in the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during November, 2023 – May, 2024. The experiment was laid out in Randomized Block Design (RBD) with 15 hybrids replicated thrice. The hybrid V9 (D.S.I.) was found to be significantly better in terms of plant height (72.5 cm), number of leaves per plant (70.9), stem diameter (2.32 cm), branch length (39.47 cm), Days taken for the flower bud appearance (74.5 days), flower diameter (16.7 cm), Flower stalk length (18.6 cm), number of flower per plant (21.3) flower yield per ha (7.2 lakh), vase life (7 days), and self-life (12.9 days), duration of flowering (27.6 days), no of tubers per plant (8.3), tuber yield per plant (192.2 g/ha), Tuber yield per hectare (9.4 tonnes) and highest B:C ratio (2.15).

Keywords: *Dahlia variabilis* L., Prayagraj agro-climatic conditions, randomized block design (RBD), dahlia hybrids, plant height, number of leaves per plant

Introduction

Dahlia is a half-hardy, perennial, herbaceous plant with tuberous root system and erect growing habit. Cultivars of dahlia are classified into Single, Double, Pompon, Cactus, Waterlily, Peony-flowered and dinner plate dahlias. A multitude of colors, great variation in size, ranging from miniatures (less than 2.5 cm across), to giant (more than 40 cm in diameter), attractive shape, various forms, prolific flowering and easy cultivation, have made them immensely popular. It offers a most extensive color range with two colors in same flower, because of accumulation of anthocyanin and other flavonoids on their ray florets. The Height of the plants varies from 30 cm to 180 cm depending on the cultivar.

Certain species of dahlias have medicinal and nutritional uses. Tubers of this plant contain significant amount of insulin and fructose, which is used in diagnosis of renal function. Seeds of dahlia are good source of fats and proteins (16% oil and 20.9-47% protein). The root exudate is nemato-toxic. The flower petals are used in salads. Rooting cooked and used as vegetable. A sweet extract of the tuber, called “Dacopa” is used as a beverage or as a flavoring.

The modern classification of dahlias has been refined through systematic breeding and genetic studies, leading to the establishment of various floral types, including cactus, pompon, and single dahlias, among others. Each type exhibits distinct morphological traits, influenced by the specific parent species involved in their hybridization. For instance, cactus dahlias, characterized by their spiky petals, are believed to have originated from a natural hybrid of *D. popenovii*, while single dahlias stem from simpler crosses primarily involving *D. coccinea*.

Materials and Methods

The experimental field is situated on the left side of Prayagraj - Rewa Road, near the river Yamuna, and is approximately 7 km away from Prayagraj city. All the facilities necessary for conducting the experiment, including labour and resources, which were necessary to carry out the experimental trail were readily available in the Department.

Table 1: Hybrid details used in the experiment

Notation	Name of hybrids	Flower colour
H ₁	Sister Nebatia	Pink
H ₂	Pusina	Red and yellow
H ₃	Soumita	Red
H ₄	Aviseke	Orange
H ₅	Sports	Light red
H ₆	Eternity Stipes	Light pink
H ₇	Akhanda Moni	Yellow
H ₈	Tufan	Dark red
H ₉	D.S.I.	Pink and white
H ₁₀	Donal Vedima	Purple
H ₁₁	Surarna Suparna	Light pink
H ₁₂	Matangine	Orange
H ₁₃	Good day	White
H ₁₄	Good News	Red and white
H ₁₅	Sachin	yellow and red

Results and Discussion

Vegetative Parameters

Plant high: Significantly taller plants (72.5cm) were observed in hybrid H₉ (D.S.I.) which was found to be at par with hybrid H₈ (Tufan, 69.7cm) while shorter plant (54.3cm) observed in hybrid H₄ (Aviseke). Plant height is a genetically determined factor that varies depending on genotype as well as is influenced by growing environment, production technology, and cultural practices. Plant height variation among the different hybrids may be due to the rapid meristematic activity during the early growth stages which results in more cell division and elongation in plants. Similar results on variation in plant height due to cultivars were also observed in dahlia by Amita *et al.* (2021) [1] in floribunda rose,

Number of leaves: Significantly more number of leaves (70.9) were observed in hybrids H₉ (D.S.I.) followed by hybrid H₄ (Aviseke, 63.3) while lesser number of leaves (53.4) were observed in the hybrid H₁ (Sister nebatia). 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 agro climatic conditions. Similar results in variation in number of leaves in different hybrids/cultivars were also observed by Henny *et al.* (2021) [3] in chrysanthemum.

Stem girth: Significantly wider stem girth (2.32 cm) were observed in the hybrid H₉ (D.S.I.) which was found to be at par with hybrid H₁₃ (Good Day, 2.14 cm) while smaller stem girth (1.81cm) were observed in hybrid H₇ (Akhanda Moni). Variation in stem girth in different dahlia hybrids may be because of differences in genetic composition, habitat type and the impact of ambient growing factors, or it might be related to cultural practices such as pinching, which enhance the partition distribution of nutrients towards the lower sections of the plant. Similar results were recorded by Mounika and Saravanan (2019) [5] in dahlia and in chrysanthemum by Srilatha *et al.* (2015) [8].

Branch length: Significantly longer branches (39.47 cm) were observed in the hybrid H₉ (D.S.I.) followed by hybrid H₁₄ (Good News, 38.12 cm) while shorter branches (32.41 cm) were observed in hybrid H₆ (Eternity Stipes). The difference in branch length might be attributed to various hybrids' genetic composition and growth rates. It might

have been influenced further by agro- climatic circumstances. Similar variation in branch length was also noted by Kumar *et al.* (2022) [4] in dahlia.

Floral parameters

No. of days taken for flower bud appearance: Significantly more number of days taken for flower bud appearance (62.4 days) were observed in the hybrids H₄ (Akhanda Moni), followed by hybrids H₁₂ (Matangine, 62.6 days), while less number of days taken for flower bud appearance (74.5 days) were observed in hybrid H₉ (D.S.I.). Variation in number of days required for flower bud initiation development is mostly attributed to the genetic makeup of cultivars and the prevailing environmental circumstances throughout crop growth. The hybrids adapting well to the given agro-climatic conditions might have performed better while hybrids struggling to adapt might have performed poorly. This result is in conformity with the finding by Chandrashekaraiyah *et al.* (1973) [2] in rose.

Flower diameter: Significantly bigger flowers (16.7 cm) were observed in the hybrid H₉ (D.S.I.) which was found to be at par with hybrid H₁ (Sister Nebatia, 14.7 cm), H₄ (Aviseke, 16.7 cm), H₇ (Akhanda Moni, 16 cm), H₁₃ (Good Day, 15.8 cm), H₁₄ (Good News, 15.6 cm) and H₁₅ (Sachin, 15.1 cm), while smaller flowers (11.6 cm) were observed in hybrid H₂ (Pusina). Difference in flower diameter among different hybrids might be due to genetic reasons as genetic character varies from hybrid to hybrid or availability of more carbohydrates during development of buds in one hybrid as compared to the others.

Flower stalk length: Significantly longer flower stalk (18.6 cm) was observed in the hybrid H₉ (D.S.I.), which was found to be at par with hybrid H₁₃ (Good Day, 17.7 cm), while shorter flower stalk (10.9 cm) was observed in hybrid H₆ (Eternity Stipes). Variation in flower stalk length among the hybrids might be attributed to the fact that their genetic character varied from hybrid to hybrid and the prevailing environmental conditions. Particular hybrid may possess characteristics that promote elongated stem growth. Similar findings were reported by Kumar *et al.* (2022) [4] in dahlia.

Vase life: Significantly higher vase life (7.0 days) was observed in hybrid H₉ (D.S.I.) which was found to be at par with hybrid H₁ (Sister Nabatia, 6.4), H₂ (Pusina, 6.9), H₆ (Eternity Stipes, 6.8) and H₇ (Ahanda Moni, 6.3 days), while lesser vase life (4.7 days) were observed in hybrids H₁₁ (Surarna suparna). Variation in vase life of flower in different hybrids might be due to difference in carbohydrate levels in flowers of different hybrids, their genetic makeup and environmental conditions prevailing during the trial period. Further, vase life is also affected by transpiration and respiration rate of the hybrids. Variation in vase life in different hybrids/varieties have also been reported by Roopa *et al.* (2018) [6].

Flower yield (lakh/ha): Significantly longer flower yield (7.2 days) was observed in hybrid H₉ (D.S.I.) which was found to be at par with hybrid H₁₃ (Good Day, 6.8 days), while flower yield (4.9 days) was observed in hybrid H₂ (Pusina). 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.*, 2018)^[7].

Table 1: Vegetative parameters of different dahlia hybrids

Notation	Name of the Hybrid	plant height	No. of leaves	stem diameter	Branch length
H ₁	Sister Nebatia	60.1	53.4	1.84	34.4
H ₂	Pusina	59.5	56.5	1.82	33.3
H ₃	Soumita	58.4	56.6	1.83	32.6
H ₄	Aviseke	54.3	63.3	1.91	35.3
H ₅	Sports	59.4	55.6	1.93	33.1
H ₆	Eternity Stipes	61.6	59.5	2.00	32.4
H ₇	Akhanda Moni	64.9	55.7	1.84	34.1
H ₈	Tufan	69.7	62.6	1.86	35.2
H ₉	D.S.I	72.5	70.9	2.29	39.4
H ₁₀	Donal Vedima	59.9	59.4	2.06	36.3
H ₁₁	Surarna Suparna	56.9	59.7	1.96	37.1
H ₁₂	Matangine	57.3	60.1	1.97	36.4
H ₁₃	Good day	59.2	60	2.15	37.4
H ₁₄	Good News	60.2	56.7	2.07	38.1
H ₁₅	Sachin	63.5	61.1	2.05	34.4
F Test		S	S	S	S
SE(d) ±		3.1	2.3	0.024	0.030
CD _{0.05}		6.39	4.74	0.050	0.061
CV		6.21	4.75	1.510	0.102

Table 2: Flowering parameters of different dahlia hybrids

Notation	Name of the Hybrid	No of days taken for flower bud appearance	Flower diameter	Flower stalk length	Vase life	Flowering yield (lakh/ha)
H ₁	(Sister Nebatia)	63.3	14.7	13.1	6.4	5.0
H ₂	(Pusina)	71.5	11.6	12.1	6.9	4.9
H ₃	(Soumita)	64.5	12.6	14.1	6.1	5.4
H ₄	(Aviseke)	67.6	16.7	11.8	5.1	5.2
H ₅	(Sports)	65.8	13.6	12.9	5.9	5.0
H ₆	(Eternity Stipes)	65.2	13.5	10.9	6.8	5.5
H ₇	(Akhanda Moni)	62.4	16	13.6	6.3	5.7
H ₈	(Tufan)	70.6	13.9	12.7	6	6.0
H ₉	(D.S.I.)	74.5	16.7	18.6	7	7.2
H ₁₀	(Donal Vedima)	66.7	13.3	14.1	6.1	6.0
H ₁₁	(Surarna Suparna)	65.1	13.8	13	4.7	5.8
H ₁₂	(Matangine)	62.6	13.7	14	5.7	6.4
H ₁₃	(Good Day)	64.8	15.8	17.7	5.7	6.8
H ₁₄	(Good News)	68.7	15.6	16.4	5.2	6.7
H ₁₅	(Sachin)	66.9	15.1	16.7	6.1	6.7
F Test		S	S	S	S	S
SE(d) ±		1.05	1.22	0.72	0.4	0.178
CD _{0.05}		2.17	2.52	1.49	0.8	0.367
CV		1.95	10.38	6.26	8.7	3.713

Conclusion

It is concluded from the present investigation that 15 dahlia hybrids under study showed significant variation in all the parameters observed. The variety V₉, (D.S.I.) recorded significantly performed better in parameters like plant height, No. of leaves per plant, stem girth, branch length, number of days taken for flower bud appearance, number of flower per plant, flower yield per plant, flower diameter, flower stalk length, vase life, self-life, duration of flowering, No. of tubers per plant, tuber yield per plant, Tuber yield per hectare, cost of cultivation, gross income, net income and highest B:C ratio was also seen in this variety, that is 2.15.

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