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Evaluation of different Dahlia (*Dahlia variabilis* L.) cultivars for cut flower and garden display under Chhattisgarh plains

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Abstract

The experiment was conducted at the Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur from 2019-20 to 2020-21. Among the result significantly different vegetative parameters were observed plant height (86.13 cm) was recorded in Red New (T₁₃). Maximum number of leaves (46.50), leaf area (186.21 cm²), number of branches (8.06) were recorded in Ankita Pink (T₅). Maximum stem diameter (17.81 mm) was recorded in Matangini White (T₁₄) and maximum plant spread (41.42 cm) was recorded in Raja Bicolor (T₁₉), flower yield parameters such as maximum fresh weight of flowers (40.77 g) was observed in Babananda Yellow (T₂). The highest flower yield plant⁻¹ (517.50 g), flower yield plot⁻¹ (12.06 kg) and flower yield (28.88 t ha⁻¹) were observed in cv. T₅ (Ankita Pink).

Keywords: Dahlia, flower, yield, cultivars, Ankita pink

Introduction

Dahlia (*Dahlia variabilis* L.) is one of the most popular tuberous, rooted perennials, herbaceous blooming plant, esteemed for their spectacular attractive flowers, commonly known as “water cane” and “hollow stem flower” because of hollowness of its stems. Dahlia being known for its dignity and Royalty, it has no rival as a bedding plant for versatile beauty, even commercially and they regularly stay fresh for more than half a month relying upon cultivars (Bose *et al.*, 2003) [3]. Dahlia is well known bulbous flowering plant developed in different parts of the world for its wonderful fancy sprouts of changing shades of hues for the beautification of beds, borders and cut blooms. The chromosome number of *Dahlia variabilis* L. is 2n = 64. It belongs to the family Asteraceae, originated in Mexico and was declared the national flower of this country in 1963, which got its name by Cavanilles in the year 1791, to commemorate the work of Swedish Botanist Dr. Andreas Dahl, a pupil of Linnaeus. Being a well-known flower florists blossom, dahlia tubers were sold each year in millions in North America and Europe (Singh *et al.*, 1994) [13].

Dahlia is popular bulbous flower grown in many parts of the world for its beautiful ornamental blooms having varying shades of different colours, being useful as cut flower besides for the beautification of gardens (Vikas *et al.*, 2015) [19]. The modern dahlia cultivars offer a diversity of colors, shapes, sizes and it is very rich in its varietal wealth and every year there is an addition of new varieties; hence varietal evaluation becomes necessary to find out suitable variety for a particular region (Kumar and Yadav, 2005) [6].

Materials and Methods

The experiment was conducted at the Horticulture Research cum Instructional Farm, Deptt. of Flori. and Landsc. Archit., CoA, IGKV, Raipur during two consecutive years *i.e.* years 2019-20 and 2020-21. On the basis of prevailing climatic conditions, Raipur is characterized as slightly moist and sub-humid zone where the average annual rainfall received ranges from 1200 to 1400 mm, mostly concentrated during the period from the June to September and occasional light showers occurs during October to February. May is the hottest and December is the coolest month of the year, respectively. In general, weekly maximum temperature goes up to 46°C during summer season and minimum up to 6°C during winter. The soil of the research field was clay-loam in surface which is locally known as "Dorsa" and is neutral in response with the pH 7.1. For studying the evaluation and association analysis of the experimental during years all the twenty genotypes were grown in Randomized Block Design

with three replications. Standard package of practices of dahlia cultivation were followed for growing a healthy crop. Observations were recorded on five randomly selected plants. From the border plants were avoided.

The treatments were laid out in randomized block design with three replications. One month – old terminal cuttings were planted. The spacing between row - row and plant - plant was kept 45 cm x 45 cm. A light irrigation was given immediately after planting for better establishment of seedlings in the field. The experimental plots were irrigated at an interval of one week at initial stages and 10-12 days at later stages to maintain optimum moisture throughout the experimentation.

Results and Discussion

Data on different flower yield parameters were recorded and presented here.

Vegetative parameters

Plant height

From the data presented in Table 1.0 The data clearly revealed that the plant height (86.13 cm) was found significantly highest in Red New (T₁₃) which was statistically *at par* with T₆ (Pu Sinha Pink), T₁₅ (S. P. Romia Roy), T₁₇ (Prabhujee Bicolor), T₁₈ (Prime Minister Bicolor), while the lowest plant height was recorded in (T₈, 49.03 cm) Kenya Blue. Plant height was significantly influenced by different cultivar throughout the experimental period. The cultivar Red New was vigorous in growth and Kenya Blue was minimum plant height. Plant height being a genetically controlled factor, it varied among the cultivars as well as influence with growing environmental conditions, production technology and cultural practices. Similar variation in plant height in dahlia cultivars was also observed by Kumar *et al.* (2009)^[7], Vikash *et al.* (2015)^[19], Shukla *et al.* (2018)^[15], Mounika & Saravanan (2019)^[9] and Hedge *et al.* (2022).

Number of leaves plant⁻¹

From the data presented in Table 1.0 The maximum number of leaves plant⁻¹ (46.50) was observed significantly superior in cultivar Ankita Pink (T₅), whereas minimum number of leaves plant⁻¹ (24.12) was observed in Gajanan Yellow (T₁). These variations in number of leaves among different cultivars at different stage might be due to the distinguished varietal genetic make-up of a particular cultivar as a result, variation in phenotypic expression are expected to occur under prevailing environmental condition. Similar trend was noticed by Ranchana *et al.* (2013)^[11], Hedge *et al.* (2022) in dahlia, Vijayalaxmi *et al.* (2021)^[20] in gerbera and Kumari *et al.* (2017)^[8] in China aster.

Leaf area (cm²)

From the data presented in Table 1.0 Data concerning to leaf area was found significantly maximum in cultivar Ankita Pink (T₅) was observed 186.21 cm² which was *at par* with cv. T₉

(Kenya Original). Likewise, the minimum leaf area (137.70 cm²) was noted in cultivar T₁₉ (Raja Bicolor). The variation in leaf area among the cultivars may be due to genetic make-up of the cultivars and environmental conditions. Similar variation was also observed by Raghupathi *et al.* (2017)^[12], Vijayalaxmi *et al.* (2021)^[20] in gerbera and Vikas *et al.* (2015)^[19], Verma & Kulkarni (2017)^[17], Mounika & Saravanan (2019)^[9] and Hedge *et al.* (2022) in dahlia.

Number of branches plant⁻¹

From the data presented in Table 1.0 Ankita Pink (T₅) resulted significantly maximum number of branches (8.06) was recorded followed by cv. T₁ (Gajanan Yellow), T₉ (Kenya Original), T₁₄ (Matangini White) & T₁₅ (S. P. Romia Roy). However, the minimum number of branches plant⁻¹ (4.68) was recorded in T₁₂ (Sachin Red). Number of branches was more in genotype Matangini White while, the Sachin Red recorded minimum branches. Such differences observed in production of branches among the varieties might be due to inherent genetic factors. The finding of present study is in accordance with those of Kumari *et al.* (2017)^[8] in China aster, Gupta *et al.* (2015)^[5], Verma & Kulkarni (2017)^[17] and Bajaraya *et al.* (2018)^[2] in dahlia.

Stem diameter (mm)

From the data presented in Table 1.0 Maximum stem diameter was observed significantly superior in cultivar Matangini White (T₁₄) being 17.81 mm, which was statistically *at par* with Prabhujee Bicolor (T₁₇). Likewise, the least stem diameter was found in Jishu Red (T₁₁) *i.e.* 9.40 mm). Stem diameter varied among the genotypes as well as influence of the growing environmental conditions, production technology and cultural practices. Cultivars Matangini White had higher stem diameter at later part of growth stages, whereas Jishu Red recorded the lowest stem diameter. Similar trend was observed by Mahantesh *et al.* (2018)^[10], Kumar *et al.* (2019) and Mounika & Saravanan (2019)^[9] in dahlia.

Plant spread (cm)

From the data presented in Table 1.0 Maximum plant spread in cv. Raja Bicolor (T₁₉) *i.e.* 41.42 cm which was statistically *at par* with Gajanan Yellow (T₁), Kenya Yellow (T₃), Ankita Pink (T₅), Raja New Blue (T₇), Kenya Blue (T₈), Kenya Original (T₉), Anita Orange Red with Gold (T₁₀), Jishu Red (T₁₁), Sachin Red (T₁₂), Prime Minister Bicolor (T₁₈). Glory of India Bicolor (T₂₀) However, the minimum plant spreading (34.76 cm) was found in cv. Babananda Yellow (T₂). This may due to differences in growth and vigour among the cultivars caused by genetic constitution and environmental effect. Similar results were recorded by Vetrivel *et al.* (2018)^[18], Kumar *et al.* (2009)^[7], Verma *et al.* (2017)^[17], Ramya *et al.* (2019)^[14], Hedge *et al.* (2022) in Dahlia and Souvija *et al.* (2019)^[16] in Marigold.

Table 1: Evaluation of Dahlia cultivars for growth parameters (pooled data of three years, 2019-20 to 2020-21)

Tr. no.	Treatments (Cultivars)	Plant height (cm)	Number of leaves	Leaf area (cm ²)	Number of branches	Stem diameters (mm)	Plant spread (cm)
T ₁	Gajanan Yellow	59.26	24.12	185.53	7.50	13.37	38.97
T ₂	Babananda Yellow	58.87	34.51	184.20	4.92	13.34	34.76
T ₃	Kenya Yellow	64.87	27.27	142.52	5.58	14.77	38.63
T ₄	Blackout Black	69.55	28.86	173.69	7.09	12.94	37.75
T ₅	Ankita Pink	63.70	46.50	186.21	8.06	12.11	39.92

T ₆	Pu Sinha Pink	71.90	29.33	148.38	7.00	13.32	37.90
T ₇	Raja New Blue	51.83	27.30	181.19	5.93	15.12	38.81
T ₈	Kenya Blue	49.03	37.47	145.91	5.36	15.93	39.05
T ₉	Kenya Original	52.70	32.29	139.06	7.63	14.63	39.37
T ₁₀	Anita Orange Red with Gold	49.73	33.50	160.29	5.09	13.46	40.05
T ₁₁	Jishu Red	79.64	29.74	184.95	6.06	9.40	40.72
T ₁₂	Sachin Red	66.27	38.67	165.33	4.68	13.46	39.82
T ₁₃	Red New	86.13	32.50	159.17	5.37	14.80	37.50
T ₁₄	Matangini White	62.97	33.30	159.11	7.52	17.81	37.93
T ₁₅	S. P. Romia Roy	73.50	29.28	143.86	7.60	13.13	35.50
T ₁₆	Suparna New Bicolor	68.80	38.57	162.23	5.80	12.63	37.83
T ₁₇	Prabhujee Bicolor	67.07	30.03	171.23	4.94	15.87	37.84
T ₁₈	Prime Minister Bicolor	72.03	25.10	178.72	6.17	12.21	38.30
T ₁₉	Raja Bicolor	58.27	30.59	137.70	4.91	12.42	41.42
T ₂₀	Glory of India Bicolor	61.50	29.20	179.61	6.66	13.63	39.35
	SEm (±)	3.43	1.09	7.29	0.25	0.72	1.17
	CD (P=0.05%)	9.84	3.14	20.88	0.74	2.07	3.36

Yield parameters

Fresh weight of flowers (g): It is revealed from the data presented in the table 2.0 that the significantly maximum fresh weight of flowers (40.77 g was observed in Babananda Yellow (T₂) which was statistically *at par* with Ankita Pink (T₅) However, the minimum fresh weight of flowers 24.46 g was in obtained in Raja New Blue (T₇).

On perusal of resulted of present in resulted it is clearly supported by the variation among the cultivars was mainly because of different flower size. Weight of individual flower is another important character.

The variation among the varieties was mainly because of increased flower size and ray florets. Also resulted similar result by Baburao *et al.* (2018) [1], Kumar *et al.* (2009) [7], Vikash *et al.* (2015) [19], Raghupathi *et al.* (2017) [12] and Mounika & Saravanan (2019) [9] in Dahlia.

Flower yield plant⁻¹ (g) /Plot⁻¹ (kg) / ha⁻¹ (kg): From the data

presented in Table 2.0 and fig. 1.0 revealed that the significantly highest flower yield plant⁻¹ (517.50 g, flower yield plot⁻¹ (12.06 kg & flower yield t ha⁻¹ (28.88 t ha⁻¹ were observed in cv. T₅ (Ankita Pink) whereas, the lowest flower yield plant⁻¹ (122.48 g), flower yield plot⁻¹ (3.11 kg, flower yield t ha⁻¹ (6.84 t ha⁻¹ was noted in cv. Raja New Blue (T₇). Among all the cultivar Ankita Pink resulted the maximum flower yield plant⁻¹, plot⁻¹ and t ha⁻¹ which may be attributed to increased number of branches and number of leaves under this cultivar which ultimately helped in accumulation of more photosynthesis and production of good number of flowers. This may also be associated with genetic make-up of plant as well as environmental conditions prevailing during crop growth. However, the minimum flower yield plant⁻¹, plot⁻¹ and t ha⁻¹ was noted under cv. Raja New Blue. Similar finding also reported by Gupta *et al.* (2015) [5], Shukla *et al.* (2018) [15], Verma & Kulkarni (2017) [17] in dahlia.

Table 2: Evaluation of Dahlia cultivars for flower yield parameters (pooled data of three years, 2019-20 to 2020-21)

Tr. No.	Treatments (Cultivars)	Fresh weight of flowers (g)	Flower yield plant ⁻¹ (g)	Flower yield plot ⁻¹ (kg)	Flower yield (t ha ⁻¹)
T ₁	Gajanan Yellow	29.72	193.00	4.26	9.38
T ₂	Babananda Yellow	40.77	237.83	3.76	8.74
T ₃	Kenya Yellow	30.78	308.45	4.91	11.38
T ₄	Blackout Black	32.57	342.81	6.86	16.93
T ₅	Ankita Pink	33.28	570.50	12.06	28.88
T ₆	Pu Sinha Pink	26.69	227.23	4.72	10.78
T ₇	Raja New Blue	24.46	122.48	3.11	6.84
T ₈	Kenya Blue	32.72	448.35	8.80	21.74
T ₉	Kenya Original	28.80	274.98	5.68	14.04
T ₁₀	Anita Orange Red with Gold	32.65	307.64	5.40	15.07
T ₁₁	Jishu Red	29.48	315.26	4.78	11.11
T ₁₂	Sachin Red	29.67	290.17	5.32	14.38
T ₁₃	Red New	31.44	338.16	5.86	13.80
T ₁₄	Matangini White	27.63	296.40	5.73	14.15
T ₁₅	S. P. Romia Roy	34.22	271.30	4.42	9.88
T ₁₆	Suparna New Bicolor	28.91	425.58	8.18	21.43
T ₁₇	Prabhujee Bicolor	30.52	196.62	4.18	9.78
T ₁₈	Prime Minister Bicolor	34.65	263.95	4.28	10.04
T ₁₉	Raja Bicolor	34.54	293.54	6.11	14.31
T ₂₀	Glory of India Bicolor	27.65	220.34	4.88	11.28
	SEm (±)	1.57	11.90	0.40	0.84
	CD (P=0.05%)	4.51	34.09	1.16	2.42

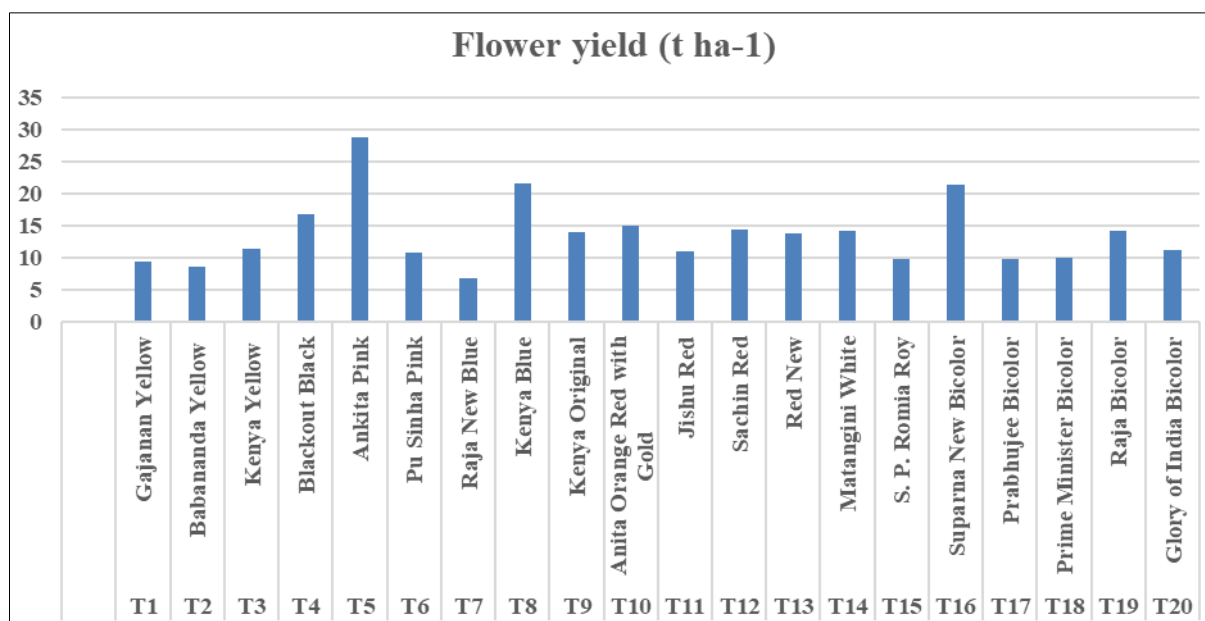


Fig 1: Evaluation of different Dahlia cultivars for flower yield parameters (pooled data of three years, 2019-20 to 2020-21)

Conclusion

On the basis of the above findings, dahlia cultivars from the overall performance and association studies of varied characters the dahlia, namely Ankita Pink for among parameters followed cultivars namely, Red New, Matangini White, Raja Bicolor may be preferred for cut flower production and garden display under Chhattisgarh plains.

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