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

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Abstract

The present experiment was conducted during 2023-2024 in the Department of Horticulture, ShUATS, Prayagraj (U.P.). The experiment of design was Randomized block design consisting 10 varieties with 3 replications with a view to find out the overall evaluation of different cultivars of dahlia viz. Kenya orange, Kamala 113, Black out, Espesta, Soumita, Matangani, Kenya White by W/P, Kenya White, Kenya Yellow and Yellow Kenya. On the basis of different growth and yield parameters. On the basis of the results obtained, it is concluded that out of 9th cultivars Kenya Yellow was found most promising with respect of plant height (81.6cm), number of leaves per plant (51.78), number of primary branches per plant (7.86), days taken for bud appearance (35.35 Days), flowering duration (14.49 Days) days, number of flowers per plant (9.71), diameter of flower (25.66cm), weight of single flower (86.08g), flower yield per plant (836.10g), flower yield per plot (7.52kg) and flower yield (88.25t/ha⁻¹) production.

Keywords: Varietal evaluation, dahlia, Kenya yellow, Espesta, Matangani, Kenya white

1. Introduction

Dahlia is one of the most prevalent perennials, with semi-hardy, bulbous sprouts developed in many parts of the world. It is innate to Mexico and Central America and has a place to the Asteraceae family. Dahlia gotten its title from Cavanilles in the year 1791 to commemorate the work of a Swedish botanist Dr. Andreas Dahl, an understudy of Linnaeus" Mounika *et al.*, (2019) [24].

Dahlia (*Dahlia variabilis* L.) is tuberous established half-hardy herbaceous perennials. Stems are mostly raised, branched, scabrous, having a place to the Family Asteraceae having it's local to Mexico. Dahlia was named in respect of the Swedish botanist Dr. Andreas Dahl, it was to begin with introduced into Madrid (Spain) in 1789 and other European nations. Dahlia was presented to India as early as 1857 beneath the support of the Agri Agricultural society of India (formerly, Regal Agri – Agricultural society of India) Calcutta. Separated from development in ground, Dahlia in pots is exceptionally well known in most parts of the nation. The other outstanding contributions of this society are the improvement of late cutting strategy of dahlia conservation and plant breeding.

The stature of dahlia plants changes from 31 to 180 cm depending upon the cultivar. Dahlia flowers comprise a number of external florets in which the male organs are alter into a strap shaped petal and organized a circular central disk of promiscuous florets. Really, the florets in dahlia have all the blossom colours, though the disk florets are by and large yellow. In twofold flowered cultivars more of the male organs get changed over in to beam petals with proportionate reduction in the number of disks.

Dahlias are accessible in a wide assortment of colours, shapes, and sizes, and their varietal richness is very assorted, with modern cross breeds and assortments being created each year. Dahlia hybridization has so distant been done by commercial dahlia cultivators and novices in diverse parts of the world, generally in America, Modern Zealand, Holland, and Britain.

2. Materials and Methods

The experiment was conducted during the winter season of the year 2023-2024 in the Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj, situated at 25° 8' N latitude

and 81° 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 45 °C–47 °C and seldom falls as low as 2 °C–4 °C. The relative humidity ranges between 20-94%. Average rainfall in this area is around to 1013.5 mm annually. The experiment was laid out in a randomized block design with 10 hybrids (i.e. Kenya orange, Kamala-113, Blackout, Espesta, Soumita, Matangani, Kenya White by W/P, Kenya White, Kenya Yellow and Yellow Kenya) each replicated three times. Cuttings were transplanted at 30X30 cm spacing. The observations like plant height, number of leaves per plant, number of branches per plant, Plant spread, number of flowers per plant, number of flowers per plot, and flower yield per ha were recorded from tagged plants. The data recorded during the course of investigation on growth components were subjected to two-way classification analysis of variance (ANOVA), where the 'F' test was significant for comparison of the treatment means, CD values were worked out at 5% probability level.

2.1 Treatments

The treatment included a cultivar of dahlia they were

Treatment code	Cultivars
V ₁	Kenya orange
V ₂	Kamala 113
V ₃	Black out
V ₄	Espesta
V ₅	Soumita
V ₆	Matangani
V ₇	Kenya White By W/P
V ₈	Kenya White
V ₉	Kenya Yellow
V ₁₀	Yellow Kenya

3. Results and Discussion

The results obtained during the present Investigation are presented in this chapter under appropriate headings with the observation concerning various aspect of Growth and yield attributes of Dahlia cultivars. Data recorded during

experimental period were analyzed statistically and the results have been summarized in table (Table 1 and Table 2).

3.1 Vegetative Characteristics

3.1.1 Plant Height (cm)

cultivars Kenya yellow showed with maximum plant height (81.67cm). Whereas cultivars Espesta out the minimum plant height (57.44cm) showed. However, Kenya Orange, Kamala-113, Kenya yellow Blackout are found statistically at par to Kenya yellow. Similar variation in plant height due to cultivars was also observed in dahlia by (Syamal and Kumar, 2002) ^[36], and Vikas *et al.*, (2015) ^[38], in China aster by (Munikrishnappa, 2013) ^[3], in Gladiolus and Shukla *et al.*, (2018) ^[30] in Dahlia.

3.1.2 Number of Leaves / Plant: cultivar Kenya yellow showed the maximum number of leaves per plant (51.78) and whereas the minimum number of leaves per plant (34.92) was found in Espesta. However, Kenya orange and Kamala 113 are found statistically at par to Kenya yellow. Similar variation in plant height due to cultivars was also observed in dahlia by (Syamal and Kumar, 2002) ^[36], and Vikas *et al.*, (2015) ^[38], in China aster by (Munikrishnappa, 2013) ^[3], in Gladiolus Shukla *et al.*, (2018) in Dahlia ^[30].

3.1.3 Plant spread (cm)

Cultivars Kenya yellow showed the maximum plant spread (61.40cm). Whereas Espesta showed the minimum plant spread (61.40cm). However, Kamala 113 and Kenya orange are found statistically at par to Kenya yellow. Similar results were also reported by Kumar *et al.*, (2009) ^[15] and Shukla *et al.*, (2018) ^[30] found in Dahlia.

3.1.4 Number of primary branches/plants

Cultivars Kenya yellow showed the maximum number of primary branches per plant (7.86). Whereas Espesta showed the minimum number of primary branches per plant (5.42). However, Kenya orange and Kamala 113 are found statistically at par to Kenya yellow. Similar results were reported by Dhane and Nimbalkar (2002) ^[9] and Shukla *et al.*, (2018) ^[30] in Dahlia.

Table 1: Vegetative Characteristic of Dahlia Hybrids under Prayagraj Agro-Climatic Conditions

Cultivars	Plant height (cm)	Number of leaves per plant	Plant spread (cm)	Number of primary branches per plant
Kenya orange	78.92	48.86	85.39	7.52
Kamala 113	77.39	46.91	83.39	7.17
Black out	72.84	41.71	80.30	6.80
Espesta	57.44	34.92	61.40	5.42
Soumita	74.97	46.88	77.02	6.34
Matangani	70.20	45.26	72.90	6.35
Kenya White by W/P	69.10	43.49	74.43	5.79
Kenya White	71.45	45.33	72.34	5.64
Kenya Yellow	81.67	51.78	86.67	7.86
Yellow Kenya	66.26	41.72	69.05	5.52
F-Test	S	S	S	S
SEd	0.87	0.58	1.43	0.10
CD at 5%	1.84	1.23	3.01	0.21
CV (%)	1.49	1.60	2.30	1.90

3.2 Floral Characteristics

3.2.1 Day to first bud Appearance

Minimum days taken for bud appearance (35.35) were observed in cultivar Kenya yellow and the maximum

(46.09) Days were observed in cultivars Espesta. However, Kenya orange and Kamala-113 are found statistically as par to Kenya yellow. The varieties have shown significant difference with respect to the number of days taken for first

flower bud emergence, it may be due to its better growth and development in terms of maximum number of leaves, branches and plant spread which resulted in higher production accumulation of sugar leading to switching of vegetative phase in reproductive phase. Similar results were also reported by (Dhane and Nimbalker 2002)^[9], (Kumar *et al.*, 2009)^[15], and (Mahawer *et al.*, 2010)^[21] found in Dahlia.

3.2.2 Flowering duration (Days)

Maximum flowering duration (14.49) days were found in cultivars Kenya yellow and whereas the minimum flowering duration (10.66) days were found in Espesta. However, Kenya orange and Kamala 113 are found statistically at par to Kenya yellow. The variation among the varieties was mainly because of genetical factors or may be due to cultural operations like disbudding and pinching. Variations expected among the varieties of Dahlia. Similar results were also reported by (Dhane and Nimbalker 2002)^[9], (Kumar *et al.*, 2009)^[15], and (Mahawer *et al.*, 2010)^[21] found in Dahlia.

3.2.3 Number of flowers / plants

A study of data reveals maximum number of flowers per plant (9.71) were found in Kenya yellow. Whereas Espesta minimum number of flowers per plant (6.17). However, Kenya orange and Kamala 113 are found statistically at par to Kenya yellow. The variation in number of flower plant may be due to genetic variability and effect of environmental conditions among the different cultivars of dahlia, which were tested under this trial. The similar results were observed in dahlia by Vikas *et al.* (2015)^[38], Baburao *et al.* (2018)^[2] and Mounika & Saravanan (2019)^[24].

3.2.4 Flower diameter (cm)

The maximum diameter of flower (25.66cm) were found in cultivar Kenya yellow and cultivars Espesta were found in the minimum flower diameter (21.12cm). However, Kenya orange, Black out, yellow Kenya, Soumita

and Kamala 113 are found statistically at par to Kenya yellow. These results are in conformity with the results reported earlier in dahlia by Safeena *et al.* (2019), Mahawer *et al.* (2010)^[21], Baburao *et al.* (2018) and Sree Devi (2020)

3.2.5 Weight of single flowers (g)

Maximum weight of single flower (86.08g) were found in cultivar Kenya yellow. Whereas the minimum weight of single flower was found in cultivar Espesta (61.38g). However, Kenya orange is found statistically at par to Kenya yellow. Similar results were also reported by (Kumar *et al.*, 2009)^[15] and Shukla *et al.*, (2018)^[30] in Dahlia.

3.2.6 Flower yield per plant (g): A study of data of reveals that maximum flower yield per plant (836.10g) were found in cultivar Kenya Yellow. Whereas the minimum flower yield per plant (378.75g) were found in Espesta. Followed by Kenya orange, Kamala 113 and Yellow Kenya. Similar results were also reported by (Kumar *et al.*, 2009)^[15] and Shukla *et al.*, (2018)^[30] in Dahlia.

3.2.7 Flower yield per plot (kg)

A study of data of reveals that maximum flower yield per plot (7.52kg) were found in cultivar Kenya Yellow. Whereas the minimum flower yield per plot (3.40kg) were found in Espesta. However, Kenya orange, Black out, yellow Kenya, Soumita and Kamala 113 are found statistically at par to Kenya yellow. Similar results were also reported by (Kumar *et al.*, 2009)^[15] and Shukla *et al.*, (2018)^[30] in Dahlia.

3.2.8 Flower yield (t/ha⁻¹)

A study of data reveals that maximum flower yield (88.25 t/ha⁻¹) was found in cultivar Kenya yellow. Whereas the minimum flower yield (39.97 t/ha⁻¹) were found in Espesta. However, Kenya orange, Black out, yellow Kenya, Soumita and Kamala 113 are found statistically at par to Kenya yellow. Similar results were also reported by (Kumar *et al.*, 2009)^[15] and Shukla *et al.*, (2018)^[30] in Dahlia.

Table 2: Floral Characteristics of Dahlia Hybrids under Prayagraj Agro-Climatic Conditions

Cultivars	Day to first bud Appearance	Flowering duration (Days)	Number of flowers / plants	Flower diameter (cm)	Weight of single flowers (g)	Flower yield per plant (g)	Flower yield per plot (kg)	Flower yield (t/ha ⁻¹)
Kenya orange	34.81	14.25	9.18	25.36	81.41	747.60	6.72	78.91
Kamala 113	35.76	13.38	9.05	24.91	79.67	721.06	6.49	76.11
Black out	36.39	13.46	8.49	24.09	76.02	646.11	5.81	68.2
Espesta	46.09	10.66	6.17	21.12	61.38	378.75	3.40	39.97
Soumita	39.37	12.25	7.45	24.42	74.09	552.66	4.97	58.33
Matangani	38.08	11.38	7.64	24.28	70.05	535.43	4.81	56.51
Kenya White by W/P	40.74	12.55	7.26	22.50	71.96	522.43	4.70	55.14
Kenya White	38.37	12.31	7.37	23.81	76.34	562.85	5.06	59.41
Kenya Yellow	35.35	14.49	9.71	25.66	86.08	836.10	7.52	88.25
Yellow Kenya	39.11	11.22	7.18	24.62	79.24	569.20	5.12	60.08
F-Test	S	S	S	S	S	S	S	S
SEd	0.82	0.22	0.13	0.37	1.09	13.93	0.12	1.47
CD at 5%	1.73	0.46	0.27	0.78	2.29	29.27	0.26	3.09
CV (%)	2.63	2.13	1.99	1.90	1.77	2.81	2.81	2.81

4. Conclusion

On the basis of the results obtained, it is concluded that out of 10 cultivars Kenya Yellow was found most promising with respect of plant height (81.67cm), number of leaves per plant (51.78), number of primary branches per plant (7.86),

days taken for bud appearance (35.35), flowering duration (14.49) days, number of flowers per plant (9.71), diameter of flower (25.66cm), weight of single flower (86.08g), flower yield per plant (836.10g), flower yield per plot (7.52kg) and flower yield (88.25 t/ha⁻¹) production.

5. References

- Bajaraya B, Kanawjia A, Jaysawal N, Dubey A, Parveen S, Pawaiya S. Performance of different cultivars of Dahlia (*Dahlia variabilis* L.) under agro-climatic conditions of Gwalior. J Pharmacogn Phytochem. 2018;7(6):98-102.
- Sony BD, Kullur Lagamanna R, Manavi GH, Prasad VM. Evaluation of different hybrids for floral and yield parameters of Dahlia (*Dahlia variabilis* L.) grown under Allahabad agroclimatic condition. J Pharmacogn Phytochem. 2018;SP1:141-142.
- Sony BD, Kullur Lagamanna R, Manavi GH, Prasad VM. Evaluation of different hybrids for growth and tuberous root parameters of flowers of Dahlia (*Dahlia variabilis* L.) grown under Allahabad agroclimatic condition. Int J Curr Microbiol App Sci. 2017;6(12):2013-2016.
- Baburao DS, Kullur LR, Manavi GH, Prasad VM. Evaluation of different hybrids for floral and yield parameters of Dahlia (*Dahlia variabilis* L.) grown under Allahabad agro-climatic condition. J Pharmacogn Phytochem. 2018;(1):141-142.
- Hegde BN, Shirol AM, Harshavardhan M. Performance of dahlia (*Dahlia variabilis* L.) genotypes for floral and yield attributes. Pharma Innov J. 2022;11(3):950-952.
- Hegde BN, Shirol AM, Harshavardhan M, Pavan Kumar P, Sayeed Wajeed R Mulla, Vijaymahantesh. Evaluation of dahlia (*Dahlia variabilis* L.) genotypes for quality, yield and shelf life. Pharma Innov J. 2022;11(2):2722-2724.
- Chandrashekar SY, Naik BH, Kulkarni BS, Jagadeesha RC. Characterization of Asiatic Lily Genotypes for Flowering and Quality Parameters under Protected Conditions. Int. J Curr Microbiol App Sci. 2018;7(09):75-81.
- Damke MM, Jadhav BI, Hedaril CV, Patil VS. Performance of chrysanthemum varieties for flower production under Akola conditions. PKV Res J. 2006;16(1):18-20.
- Dhane AV, Nimbalkar CA. Growth and flowering performance of some Dahlia varieties. J Maharashtra Agric Univ. 2002;27(2):210-211.
- Dhane AV, Nimbalkar CA. Growth and flowering performance of some Dahlia varieties. J Maharashtra Agric Univ. 2002;27(2):210-211.
- Chanchal D, Markam PS, Tamrakar SK, Qureshi A. Studies on performance of various cultivars of African marigold (*Tagetes erecta* L.) with different planting geometry on growth and yield under agro-climatic situation of Northern Bastar of Chhattisgarh. Pharma Innov J. 2021;10(9):2115-1217.
- Katwate SM, Patil MT, Bhujbal BG. Performance of newly evolved hybrids of Chrysanthemum. J Maharashtra Agri Uni. 2003;45(1):287-288.
- Katwate SM, Patil MT, Bhujbal BG. Performance of newly evolved hybrids of Chrysanthemum. J Maharashtra Agri Uni. 2003;45(1):287-288.
- Gupta KA, Jaiswal KN, Saravanan S. Varietal evaluation of different hybrids of dahlia (*Dahlia variabilis* L.) under Allahabad agro-climatic conditions. Int. J Agric Sci. Res (IJASR). 2015;5(1):55-58.
- Kumar L, Mahawer LN, Shukla AK, Kaushik RA, Upadhyay B. Performance of Dahlia (*Dahlia variabilis* L.) cultivars for vegetative, floral and relative economic parameters under sub humid southern plains and Aravalli hills of Udaipur. Indian J Agric Sci. 2009;79(10):816-820.
- Lalan K, Mahawer LN, Shukla KA, Kaushik RA, Upadhyay B. Performance of dahlia (*Dahlia variabilis* L.) cultivars for vegetative, floral and relative economic parameters under sub-humid southern plains and Aravalli hills of Udaipur. Indian J Agric Sci. 2009;79(10):816-820.
- Vijay K, Singh SR, Mahender P, Ojha MD, Singh AP, Verma RK, et al. Varietal performance of marigold (*Tagetes* spp.) under sub-tropical condition of Bihar. J Pharmacogn Phytochem. 2020;9(3):922-924.
- Vijay K, Singh RS, Pal M, Ojha MD, Verma RB, Verma RK, et al. Growth and flower yield attributes of African marigold (*Tagetes erecta* L.) as influenced by planting geometry and varieties. J Pharmacogn Phytochem. 2019;8(1):819-822.
- Lalan K, Mahawer LN, Kumar SA, Kaushik RA, Upadhyay B. Performance of dahlia (*Dahlia variabilis* L.) cultivars for vegetative, floral and relative economic parameters under sub humid southern plains and Aravalli hills of Udaipur. Ind. J Agri Sci. 2009;79(10):816-20.
- Kumar S, Prasad VM, Topno SE. Varietal Evaluation in Marigold (*Tagetes* spp.) Under Prayagraj Agro Climatic Conditions. Int. J Environ Climate Change. 2023;13(10):1904–1908.
- Mahawer LN, Lalan Kumar Shukla, AK Bairwa, HL. Evaluation of dahlia cultivars under Aravalli hill conditions of Udaipur. Ind J Horti. 2010;67(2):234-237.
- Manjula BS, Nataraj SK, Pruthvi Hegde P, Ganiseti Anitha, Ayesha N. Evaluation of Dahlia Genotypes (*Dahlia variabilis* L.) for Growth, Yield and Quality Traits Under Hill Zone of Karnataka. Environ Ecol. 2017;35(4C):3158-3161.
- Nishtha M. Varietal evaluation of African marigold (*Tagetes erecta*) under Prayagraj agroclimatic conditions. Pharma Innov J. 2022;11(1):1220-1224.
- Mounika T, Saravanan SS. Response of Different Varietal Evaluation of Dahlia (*Dahlia variabilis* L.) Under Prayagraj Agro-climatic Conditions. Int J Curr Microbiol App Sci. 2019;8(08):2389-2397.
- Netam M, Sharma M, Shukla G, Abhilash. The growth performance of marigold (*Tagetes erecta* L.) Under Chhattisgarh plains agro-climatic condition. J Pharmacogn Phytochem. 2019;SP2:235-237.
- Patel P, Bahadur V, Topno SE, Prasad VM, Kerketta A. Evaluation of Summer Marigold Hybrids for Agro Economic Traits under Prayagraj Agro-Climatic Condition. Int. J Plant Soil Sci. 2023;35(17):1-6.
- Patokar Manoj J, Gajbhiye RP, Siddhi P, Bhute PN. Yield and Quality of African marigold as Influenced by Different Varieties under Vidarbha Conditions. Int. J Curr Microbiol App Sci. Special Issue. 2018;6:1493-1498.
- Shivani RA, Prasad VM, Mahesh MK. Evaluation of Different Dahlia (*Dahlia variabilis* L.) Hybrids for Better Growth and Yield of Flowers under Prayagraj Agro Climatic Conditions. Int. J Plant Soil Sci. (IJPSS). 2023;35(16):287-291.
- Shrikant S, Tamrakar KS, Saxena Ritu R, Sharma Gaurav. Estimation of performance in marigold

- genotypes based on vegetative growth, reproductive and yield traits. *Pharma Innov J.* 2021;10(12):2389-2393.
30. Prashant S, Prasad VM, Burondkar Saad S, Ainarkar Abdulraqueeb A. Evaluation of dahlia hybrids (*Dahlia variabilis* L.) under Allahabad agro climatic conditions. *J Pharmacogn Phytochem.* 2018;7(5):1109-1113.
 31. Sree Devi M, Seetharamu GK, Patil BC, Hanchinamani CN, Kukanoor L, Satish, *et al.* Assessment of genetic variability among Dahlia (*Dahlia variabilis* L.) genotypes for productivity and quality traits. *J Pharmacogn Phytochem.* 2020;9(4):3134-3137.
 32. Burnett SE, Peterson BJ, Oliveira I, Bowers T. Comparison of Dahlia Cultivars for Cut Flower Production in the Northeastern United States. *Am Soc. Hort. Sci.* 2023.
 33. Suvija NV, Nithin S, Sreya B. Evaluation of African Marigold (*Tagetes erecta* L.) in Summer Rice Fallows of Wayanad, India. *Int. J Curr Microbiol App Sci.* 2019;8(07):2158-2161.
 34. Syamal MM, Kumar A. Genetic variability and correlation studies on Dahlia. *J Ornamental Hort. New Ser.* 2002;5(1):40-42.
 35. Verma Jyoti, Kulkarni Balaji S. Evaluation of Dahlia Genotypes for Growth and Yield Characters under Dry Zone of Karnataka. *Int J Curr Microbiol App Sci.* 2017;6(11):402-409.
 36. Vikas DM, Patil VS, Dorajeerao AVD. Evaluation of Dahlia genotypes based on vegetative and quality characters. *Plant Archives.* 2015;15(1):283-286.
 37. Vikas HM, Patil VS, Agasimani AD, Praveen Kumar DA. Studies on genetic variability in Dahlia. *Int. J Nat Sci.* 2011;2(2):372-375.
 38. Yilmaz AKÇA, Şüheda B. Determination of Adaptation Capabilities of Some Dahlia Varieties In Tokat /Turkey. *Ecol. J Math Eng. Nat Sci. (EJONS).* 2024;8(1):57-65.
 39. Zala KR, Chitroda RL. Tuber production and growth factors in dahlia (*Dahlia variabilis* L.) varieties in Saurashtra region of Gujarat. *Pharma Innov J.* 2023;12(12):2183-2185.
 40. Zala KR, Karetha KM, Patel VS, Solanki KS. Evaluation of different dahlia (*Dahlia variabilis* L.) varieties in Saurashtra region of Gujarat. *Pharma Innov J.* 2023;12(9):1553-1555.
 41. Zala R, Makwana SM, Patel VS, Solanki KS. Genetic Variability Analysis, Correlation Coefficient and Path Coefficient Analysis of Dahlia (*Dahlia variabilis* L.) Varieties in Saurashtra Region of Gujarat, India. *Int. J Plant Soil Sci.* 2023;35(21):259-266.