Plant Archives Vol. 26, No. 2, 2026 pp. 2319-2322 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2026.v26.no.2.318

EVALUATION OF DAHLIA (*Dahlia variabilis*) GENOTYPES FOR VEGETATIVE TRAITS

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(Date of Receiving-18-08-2026; Date of Revision-13-10-2026; Date of Acceptance-19-10-2026)

ABSTRACT

Fourteen dahlia genotypes (IIHRDS1 to IIHRDS14) were evaluated at Division of flower and medicinal crops ICAR-IIHR during November 2024 - January2025 for vegetative traits, namely plant height, plant spread in the EW and NS directions, number of branches per plant and leaf area. The genotypes differed significantly for all the traits studied. Plant height ranged from 42.33 cm in IIHRDS6 to 60.57 cm in IIHRDS4, with a mean of 54.11 cm, and IIHRDS4 was on par with IIHRDS11 (59.39 cm). Plant spread was maximum in IIHRDS6 in both directions (28.90 cm EW and 28.36 cm NS), whereas it was minimum in IIHRDS14 (16.23 cm) in the EW direction and in IIHRDS4 (18.23 cm) in the NS direction. The number of branches per plant was highest in IIHRDS2 (9.37) and lowest in IIHRDS8 (3.45), which was on par with IIHRDS6 (3.69). Leaf area was largest in IIHRDS11 (58.14 cm²) and smallest in IIHRDS5 (24.76 cm²). The tall genotypes IIHRDS4 and IIHRDS11 had a narrower spread, whereas the dwarf genotypes IIHRDS6, IIHRDS5 and IIHRDS13 spread the widest. These contrasting growth habits can be used to select genotypes suited to different uses.

Key words : Dahlia, Genotypes, Vegetative traits, Plant height, Leaf area.

Introduction

Dahlia (*Dahlia variabilis*) is a half-hardy, tuberous, herbaceous perennial of the family Asteraceae that originated in Mexico (Pandey *et al*., 2017). It was introduced into India in 1857 (Smith, 1971) and is now grown for garden display, exhibition and home decoration, both in the ground and in pots (Vikas *et al*., 2015; Hegde *et al*., 2022; Jat *et al*., 2024). Plant height ranges from 30 to 180 cm depending on the cultivar (Zala *et al*., 2023).

Modern dahlia cultivars vary widely in colour, size, form and plant habit, and the performance of a genotype differs with geography, season and growing environment (Zala *et al*., 2023). Evaluation is therefore the first step towards using germplasm, and genotypes better suited to a particular region have to be identified before they can be improved (Vikas *et al*., 2015; Zala *et al*., 2023). Dahlia genotypes have been evaluated for vegetative, floral and yield traits at Udaipur (Kumar *et al*., 2009; Mahawer *et al*., 2010) and Allahabad (Gupta *et al*., 2015; Baburao *et al*., 2018; Shukla *et al*., 2018) and in the dry zone of Karnataka (Verma and Kulkarni, 2017) and genetic variability among dahlia genotypes has also been assessed (Sree Devi *et al*., 2020).

Vegetative growth in terms of leaves, branches and plant spread has been linked to earlier flower bud emergence in dahlia (Jat *et al*., 2024), and plant height, spread and branching also decide whether a genotype suits pot culture, bedding or cut-flower production. Hence, the present study was undertaken to evaluate fourteen dahlia genotypes (IIHRDS1 to IIHRDS14) for vegetative traits.

Materials and Methods

The experiment was carried out at Division of flower and medicinal crops, ICAR-IIHR, Bengaluru during November 2024 - January 2025. Fourteen dahlia genotypes (IIHRDS1 to IIHRDS14) were grown in a Randomized complete block design with three replications at a spacing of 45 × 45 cm. Tubers were collected from different parts of India and maintained at ICAR-IIHR for this diversity studies.

Observations were recorded on five randomly selected plants per genotype in each replication at flowering stage for the following vegetative traits and averages were worked out. Plant height (cm) was measured from the ground level to the tip of the plant using standard measuring scale. Plant spread (cm) was measured in the EW and NS directions using standard measuring scale. The number of branches per plant was counted. Leaf area (cm²) was measured using LI 3100 leaf area meter.

The data were analysed statistically following Panse and Sukhatme (1985) and the standard error of the mean (SE(m)), critical difference at 5 per cent level of probability (CD @ 5%) and coefficient of variation (CV) were computed. Genotype means that differed by less than the CD were considered to be on par.

Results and Discussion

The genotypes differed significantly for all the vegetative traits studied (Table 1). The variation may be attributed to the genetic make-up of the genotypes and to the environmental conditions prevailing at the site (Vikas *et al*., 2015; Zala *et al*., 2023).

Plant height (cm)

Plant height varied from 42.33 cm in IIHRDS6 to 60.57 cm in IIHRDS4, with a mean of 54.11 cm (Fig. 1). IIHRDS4 was the tallest and was on par with IIHRDS11 (59.39 cm), followed by IIHRDS8 (58.07 cm) and IIHRDS12 (58.04 cm). Eight genotypes (IIHRDS4, IIHRDS11, IIHRDS8, IIHRDS12, IIHRDS10, IIHRDS9, IIHRDS14 and IIHRDS7) were taller than the mean. IIHRDS6 was the shortest and was significantly shorter than IIHRDS5 (46.02 cm) and IIHRDS13 (47.65 cm), which were on par with each other. Similar variation in plant height among dahlia genotypes was reported by Mishra *et al*. (1987), Syamal and Kumar (2002), Vikas *et al*. (2015) and Shukla *et al*. (2018). The range recorded here (42.33 to 60.57 cm) lies on the lower side of the ranges of 73.67 to 140.33 cm reported by Vikas *et al*. (2015) and 57.44 to 81.67 cm reported by Jat *et al*. (2024), which may reflect differences in genotypes and growing conditions.

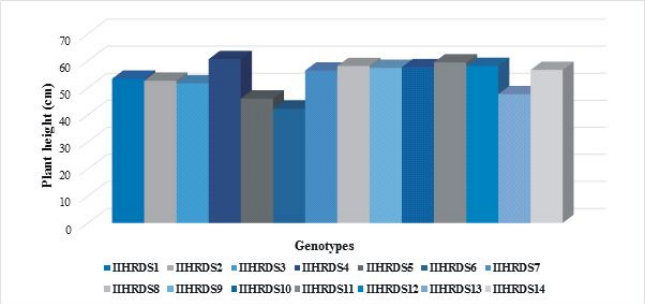


Fig. 1 : Mean performance of plant height (cm) in dahlia genotypes.

Plant spread EW (cm)

Plant spread in the EW direction ranged from 16.23 cm in IIHRDS14 to 28.90 cm in IIHRDS6, with a mean of 23.41 cm. IIHRDS6 was on par with IIHRDS13 (28.54 cm), IIHRDS5 (28.21 cm), IIHRDS3 (26.18 cm), IIHRDS2 (25.06 cm) and IIHRDS1 (24.40 cm). The minimum spread was recorded in IIHRDS14, which was on par with IIHRDS4 (18.67 cm), IIHRDS11 (20.68 cm), IIHRDS8 (21.02 cm) and IIHRDS12 (21.23 cm). In the NS direction, plant spread ranged from 18.23 cm in IIHRDS4 to 28.36 cm in IIHRDS6, with a mean of 23.46 cm. IIHRDS6 was on par with IIHRDS13 (27.92 cm) and IIHRDS5 (27.77 cm), whereas IIHRDS4 had the narrowest spread, followed by IIHRDS11 (20.12 cm). In general, the taller genotypes (IIHRDS4, IIHRDS11, IIHRDS8 and IIHRDS12) had a narrower spread, and the dwarf genotypes (IIHRDS6, IIHRDS5 and IIHRDS13) had the widest spread in both directions. Similar variation in plant spread was reported in dahlia by Kumar *et al*. (2009) and Shukla *et al*. (2018). Jat *et al*. (2024) recorded spreads of 61.40 to 86.67 cm, which are much larger than those recorded here and may be due to differences in genotypes and growing conditions.

Number of branches per plant

The number of branches per plant ranged from 3.45 in IIHRDS8 to 9.37 in IIHRDS2, with a mean of 6.89. IIHRDS2 produced the highest number of branches, followed by IIHRDS10 (8.55), IIHRDS3 (8.34), IIHRDS4 (8.12) and IIHRDS1 (8.02). Nine genotypes had more branches than the mean. IIHRDS8 produced the fewest branches and was on par with IIHRDS6 (3.69); both were far below the other genotypes, the next lowest being IIHRDS14 (5.16). Variation in the number of branches among dahlia genotypes was also reported by Dhane and Nimbalkar (2002) and Shukla *et al*. (2018). The range recorded here (3.45 to 9.37) was wider than the 5.42 to 7.86 primary branches reported by Jat *et al*. (2024).

Leaf area

Leaf area ranged from 24.76 cm² in IIHRDS5 to

Table 1 : Mean performance of vegetative traits in dahlia genotypes.

Genotypes	Plant height (cm)	Plant spread EW (cm)	Plant spread NS (cm)	Number of branches per plant	Leaf area (cm^2)
IIHRDS1	53.34	24.40	23.88	8.02	53.68
IIHRDS2	52.62	25.06	24.86	9.37	32.65
IIHRDS3	51.65	26.18	25.67	8.34	33.41
IIHRDS4	60.57	18.67	18.23	8.12	42.12
IIHRDS5	46.02	28.21	27.77	6.30	24.76
IIHRDS6	42.33	28.90	28.36	3.69	37.27
IIHRDS7	56.38	23.15	22.79	7.07	34.15
IIHRDS8	58.07	21.02	20.85	3.45	42.26
IIHRDS9	57.33	22.89	22.24	7.68	54.57
IIHRDS10	57.61	22.58	22.03	8.55	25.19
IIHRDS11	59.39	20.68	20.12	7.38	58.14
IIHRDS12	58.04	21.23	20.75	7.24	47.79
IIHRDS13	47.65	28.54	27.92	6.08	28.24
IIHRDS14	56.60	16.23	23.00	5.16	48.93
SE(m)	0.78	1.87	0.36	0.10	0.62
CD @ 5%	2.21	5.29	1.02	0.28	1.75
CV	2.49	13.80	2.67	2.50	2.68

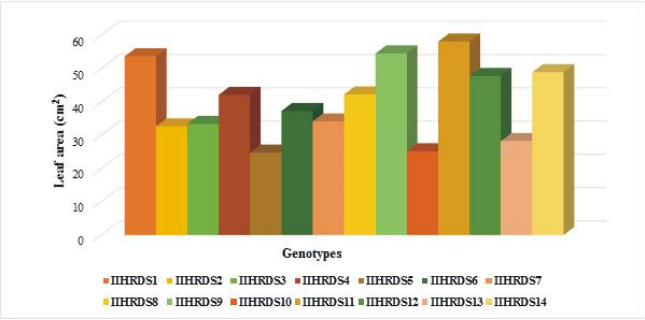


Fig. 2 : Mean performance of leaf area (cm^2) in dahlia genotypes.

58.14 cm^2 in IIHRDS11, with a mean of 40.23 cm^2 as depicted in figure 2. IIHRDS11 had the largest leaf area, followed by IIHRDS9 (54.57 cm^2) and IIHRDS1 (53.68 cm^2), which were on par with each other. IIHRDS5 had the smallest leaf area and was on par with IIHRDS10 (25.19 cm^2), followed by IIHRDS13 (28.24 cm^2). Seven genotypes (IIHRDS11, IIHRDS9, IIHRDS1, IIHRDS14, IIHRDS12, IIHRDS8 and IIHRDS4) had a leaf area above the mean. IIHRDS11 combined the largest leaf area with a plant height of 59.39 cm, indicating vigorous vegetative growth. Significant variation in leaf area among dahlia genotypes was reported by Vikas *et al*. (2015), who recorded 30.86 to 72.89 cm^2, a range comparable to, though higher than, that of the present study.

Thus, IIHRDS4 and IIHRDS11 were the tallest genotypes, IIHRDS6, IIHRDS13 and IIHRDS5 had the widest spread, IIHRDS2 produced the most branches and IIHRDS11 had the largest leaf area. The wide variation among the genotypes for these traits, which is mainly attributable to their genetic make-up, offers scope for selecting genotypes suited to pot culture, bedding or cut-flower production.

Conclusion

The fourteen dahlia genotypes differed significantly for all the vegetative traits studied. IIHRDS4 (60.57 cm) and IIHRDS11 (59.39 cm) were the tallest and IIHRDS6 (42.33 cm) was the shortest. IIHRDS6, IIHRDS13 and IIHRDS5 had the widest spread in both directions, whereas the tall genotypes IIHRDS4, IIHRDS11, IIHRDS8 and IIHRDS12 had a narrower spread. IIHRDS2 produced the most branches (9.37), and IIHRDS11 had the largest leaf area (58.14 cm^2) together with a plant height of 59.39 cm, indicating vigorous vegetative growth. The tall genotypes may be suited to cut-flower production and the dwarf, wide-spreading genotypes to pot culture and bedding, which should be confirmed against their floral and yield performance.

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