



PERFORMANCE AND CORRELATION STUDIES IN DAHLIA (*Dahlia variabilis* L.)

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ABSTRACT

The association between fourteen vegetative and floral parameters along with their magnitude towards number of flowers per plant was studied among twenty five accessions of dahlia. Correlations revealed that number of flowers per plant had positive and highly significant correlation with plant height, number of leaves, leaf area, stem girth, number of days for flower bud initiation, number of days for flowering, diameter of flower, number of ray florets per flower, individual flower weight, longevity of flower and vase life. Since these associations are in desirable direction and selection of these traits may ultimately improve the yield.

KEYWORDS: Correlation, dahlia, accessions.

INTRODUCTION

Dahlia is one of the most popular bulbous flower grown in many parts of the world for its beautiful ornamental blooms of varying shades of colours for the beautification of gardens and cut flowers. It is a flowering plant from Mexico belonging to family compositae. Plants come in a wide array of sizes/ forms from as low as 12 inches to as tall as 6-8 feet with flowers ranging from half-inch to giant sizes. The blooms are curvaceous, spiky with single or double forms. Colours range from white to red, orange to yellow, pink to dark purple and shades thereof. Dahlias last long as cut flowers.

Dahlias can be annuals which flower the first year from seed or perennials which take longer to mature and flower. It is easy to grow except in cold conditions or extreme hot dry weather. Dahlias are easy to grow both in field and in pot and are extensively used for exhibition, garden display and home decoration. For exhibition and garden display all types of dahlias are used. Dwarf growing types are suitable for beds and borders (pure / mixed borders). Large flowering dahlias in pots are popular for terrace garden or *verandah* display. The long stemmed flowers of various forms and colours are used in flower arrangement. Cut flowers of pompon and miniature types stay fresh in flower vases for many days and also better to make moderately good garlands.

MATERIAL AND METHODS

The experiment was carried out at New Garden, Floriculture unit of Main Agricultural Research Station, Department of Horticulture, Dharwad. The experiment was laid out in completely randomized design with three replications. Tubers collected from different places were kept in warm humid condition for 24 hours to initiate sprouting. The dahlia tubers were planted in pots of 12"X 9" in size on twenty fifth June 2007, at the rate of one tuber per pot. Details of accessions used in study were as follows:

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|---------|---------------------|
| Sl. No. | Accession numbers A |
| 1. | Accession No. 1 |

- | | |
|-----|------------------|
| 2. | Accession No.2 |
| 3. | Accession No. 3 |
| 4. | Accession No. 4 |
| 5. | Accession No. 5 |
| 6. | Accession No. 6 |
| 7. | Accession No. 7 |
| 8. | Accession No. 8 |
| 9. | Accession No. 9 |
| 10. | Accession No. 10 |
| 11. | Accession No. 11 |
| 12. | Accession No. 12 |
| 13. | Accession No. 13 |
| 14. | Accession No. 14 |
| 15. | Accession No. 15 |
| 16. | Accession No. 16 |
| 17. | Accession No. 17 |
| 18. | Accession No. 18 |
| 19. | Accession No. 19 |
| 20. | Accession No. 20 |
| 21. | Accession No. 21 |
| 22. | Accession No. 22 |
| 23. | Accession No. 23 |
| 24. | Accession No. 24 |
| 25. | Accession No. 25 |

RESULTS AND DISCUSSION

Performance of different dahlia accessions:

Accession number 16 was vigorous in its growth through out the growth period in terms of plant height. Where as Accession number 8 was dwarf and recorded minimum plant height. Similar variations in plant height was also reported by Mishra *et al.* (1987) in dahlia.

Leaves are the functional units for photosynthesis, which greatly influence the growth and flower yield of any crop. Number of leaves produced per plant was maximum in Accession number 16. The production of increased number of leaves in these cultivars may be due to increased plant height. The accession number 8 produced lesser number of leaves. Similar results were reported by Dhane and Nimbalkar (2002) in dahlia.

Leaf area was significantly influenced by the accessions. Among the different accessions, leaf area was more in Accession number 16 and least in Accession number 8. Similarly variation with in the accessions was also observed by Shruthi *et al.* (2006) in gerbera.

Stem girth should be more to have sturdiness of the plant. Otherwise the weak, thin stem may lead to lodging of plants in windy situations. Accession number 16 recorded higher stem girth and in Accession number 8 recorded the lowest strength.

This plant height, number of leaves, leaf area and stem girth shows that Accession number 16 is better suited for zone 8 of Northern Karnataka.

The accessions have shown significant difference with respect to the number of days taken for flower bud initiation. The Accession number 22 was the earliest to initiate flower bud and Accession number 18 was the least. These variations may be attributed to the fact that the performance of accessions may vary with the climatic conditions prevailing in a particular area. Mishra *et al.* (1987) reported similar results in dahlia.

Number of days for flowering was less in Accession number 22 hence; this variety may be considered to be early flowering. Flowering was late in Accession number 18. Variations in flower characters were expected due to varietal differences. Dhane and Nimbalkar (2002) reported similar results in dahlia.

Duration of flowering was significantly influenced by the accessions. Among the different accessions, duration of flowering was more in Accession number 14 and Accession number 21 had the lowest, as evidenced by Mishra *et al.* (1987) in dahlia and Negi *et al.* (1988) in china aster.

Flower characters are important with regard to cut flower production in dahlia. The accessions under study have shown significant differences with regard to cut flower production in dahlia. The accessions under study have shown significant differences with respect to diameter of flower, number of ray florets per flower, length of the stalk, vase life and longevity of the flower.

Diameter of flower was maximum in Accession number 10 and accession number 17, where as, it was less in Accession number 3. The variation among the cultivars was mainly because of genetical factors. Variations expected among the accessions of dahlia. Dhane and Nimbalkar (2002) reported similar results in dahlia.

In the present investigation Accession number 15 and Accession number 12 recorded higher number of ray florets per flower. Variations were due to varietal characters, which attributed to their genetical make up. Similar variations have been reported previously in dahlia (Dhane and Nimbalkar 2002).

Longer stalk length is a desirable character in dahlia. In present investigation, the longest stalk length was recorded in the Accession number 21 and Accession number 3. Shortest stalk length was recorded in Accession number 4. Nair and Shiva (2003) observed same results in gerbera.

For garden display, longevity is important factor. The preference of gardener depends on longevity of the accessions. In the present studies, accessions have shown significant differences. Longevity was maximum in Accession number 16, where as, minimum longevity was

recorded in Accession number 8 as evidenced by Mishra *et al.* (2001) in dahlia.

For a good cut flower, vase life is another important factor and the preference of consumer depends on the vase life of the flower along with the other good qualities like stalk length and number of ray florets per flower. In the present investigation, accessions have shown significant differences for vase life. Maximum vase life period was observed in Accession number 16 and Accession number 7 where as, it was minimum in Accession number 8. It is mainly due to varietal characters. Dhane and Nimbalkar (2002) observed similar results in dahlia.

Weight of individual flower is another important character. The importance of weight comes in to picture during cut flower handling. Weight of flower was highest in Accession number 10 where as, lowest flower weight recorded by Accession number 3. The variation among the accessions was mainly because of increased flower size. Bhattacharyya *et al.* (1976) and Mishra *et al.* (1987) reported similar results in dahlia

Number of flowers per plant was maximum in Accession number 16 and Accession number 13. Increased number of flower was because of varietal genetical factor. It was recorded lowest number of flowers was recorded in Accession number 8. Mishra *et al.* (1987 and 2001) in dahlia observed variation in flower number.

Correlations for flower yield per plant

The values of correlation co-efficient at genotypic level for the characters studied with respect to yield are presented (Table 2).

Plant height

Plant height was significantly correlated in positive direction with number of leaves (0.98), leaf area (0.955), stem girth (0.941), number of days for flowering (0.809), individual flower weight (0.558), and number of flowers per plant (0.947) at $p=0.01$. It had significant ($p=0.05$) and positive correlation with No. of ray florets/flower (0.401), vase life (0.424). It was significant and negative correlation with duration of flowering (-0.50). Plant height showed positive significant relationship with number of leaves that in turn was significantly associated with most of flower related traits and yield. The results are in agreement with the results obtained by Suman *et al.* (1980) in dahlia. In addition, Rao (1982) and Asish *et al.* (2004) reported significant and positive association of plant height with flower diameter in China aster and anthuriums respectively.

Number of leaves

Number of leaves produced per plant had significant ($p=0.01$) and positive association with leaf area (0.955), stem girth (0.903), number of days for flowering (0.818), individual flower weight (0.579) and number of flowers /plant (0.904) and negative correlation with duration of flowering (-0.576). It had significant ($p = 0.05$) and positive correlation with number of ray florets/flowers (0.47) and vase life (0.425).

Leaf area

The character leaf area had highly significant ($p=0.01$) and positive association with stem girth (0.976), number of days for flowering (0.769) and number of flowers /plant (0.957). It had significant at $p = 0.05$ and had positive

association with individual flower weight (0.489), and negative correlation with duration of flowering (-0.432).

Stem girth

The character stem girth had highly significant ($p=0.01$) and positive association with number of days for flowering (0.741), individual flower weight (0.549) and number of flowers/plant (0.907). It had negative correlation with duration of flowering (-0.527). It had positively significant at $p=0.05$ with no of ray florets/flower (0.428).

Number of days for flower bud initiation

Number of days for flower bud initiation had significant and positive association with vase life (0.627) at $p=0.01$ and positive association at $p=0.05$ with longevity of flower (0.49) at $p=0.05$.

Number of days for flowering

The character number of days for flowering had significant ($p=0.01$) and positive association with number of flowers/plant (0.843) and vase life (0.523).

Duration of flowering

Duration of flower had significant ($p=0.01$) and negative correlation with number of ray florets/flower (-0.774), individual flower weight (-0.742) and with number of flowers /plant (-0.551). It had significant ($p=0.05$) and negative correlation with diameter of flowering (-0.424).

Diameter of flowering

Diameter of flower had significant ($p=0.05$) and positive association with number of ray florets/flower (0.452) and with individual flower weight (0.477).

Number of ray florets/flower

The character had highly significant ($p=0.01$) and positive correlation with individual flower weight (0.902). It had significant ($p=0.05$) and positive correlation with number of flowers/plant (0.408).

Stalk length of the flower

The Stalk length of the flower had significant at $p=0.05$ and negative correlation with vase life (-0.427).

Individual flower weight

The weight of the flower was found to be highly significant ($p=0.01$) and were positively correlated with number of flower/plant (0.551).

Longevity of flower

The Longevity of flower had significant ($p=0.01$) and positive value with Vase life (0.421).

Vase life

Vase life had significant ($p=0.05$) and positive association with number of flowers per plant (0.423).

Hence it can be concluded that leaf area (0.957), plant height (0.947), stem girth (0.907), number of leaves

(0.904), number of days for flowering (0.843) and individual flower weight (0.551) according to the order of merit decencies greater weightage during selection for number of flower in dahlia.

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Performance and correlation studies in Dahlia

TABLE 1 Performance of dahlia accessions on different characters

Accessions	Plant height (cm)	No. of leaves	Leaf area (cm ²)	Stem girth (cm)	No. of days for flower bud initiation	No. of days for flowering	Duration of flowering	Diameter of flower (cm)	No. of ray florets/flower	Stalk length of the flower (cm)	Individual flower weight	Longevity of flower	Vase life	No. of flowers/plant
1	109.33	43.67	44.35	1.33	52.0	60.3	36.0	14.3	128.0	14.7	6.3	5.7	25.5	24.7
2	107.33	43.65	41.23	1.35	53.7	62.3	41.0	13.2	118.7	8.0	10.7	5.7	22.2	24.0
3	99.00	41.60	36.01	1.30	46.0	58.7	45.3	8.6	93.3	22.2	6.7	6.0	14.5	18.7
4	101.67	43.67	37.13	1.32	52.3	63.3	41.0	14.8	115.3	5.2	9.7	5.3	21.2	19.3
5	118.67	48.75	56.17	1.42	56.0	66.7	45.7	18.5	151.3	19.0	9.3	5.3	23.2	28.0
6	93.83	39.00	31.19	1.28	51.7	62.0	52.0	11.1	56.7	7.8	6.7	4.3	15.7	16.0
7	98.67	40.33	34.50	1.29	58.0	68.8	49.0	11.1	105.3	5.8	12.3	6.7	19.8	18.0
8	73.67	37.67	30.86	1.27	50.0	61.3	52.3	13.7	74.7	20.0	4.0	3.0	13.7	14.0
9	111.00	45.00	45.66	1.36	48.0	64.0	43.3	12.2	124.7	11.8	9.0	5.3	23.5	24.7
10	103.00	43.67	38.10	1.32	54.7	63.3	41.7	19.3	137.3	17.0	11.3	4.7	26.8	21.0
11	105.33	43.00	39.83	1.34	58.0	68.4	44.7	16.3	113.7	17.2	10.0	6.0	22.2	22.0
12	135.00	49.00	59.01	1.44	60.0	66.0	40.3	13.9	183.3	6.3	10.7	4.7	29.3	29.7
13	111.33	45.67	45.89	1.37	55.7	66.7	39.7	10.8	112.7	11.5	12.3	5.7	18.5	24.7
14	114.67	48.33	54.44	1.41	45.7	56.3	63.3	14.6	152.0	12.7	9.3	5.0	28.3	27.7
15	103.00	43.67	38.11	1.33	51.3	60.7	43.5	17.2	271.3	15.5	8.3	4.7	24.5	21.0
16	140.33	49.65	72.89	1.46	56.7	66.0	42.3	13.3	118.7	15.8	14.7	6.7	24.8	37.3
17	113.67	47.67	48.16	1.41	52.7	59.5	58.3	18.0	110.0	15.5	14.0	6.3	26.5	27.3
18	109.67	44.33	45.33	1.36	67.3	74.3	41.3	11.3	84.0	12.5	11.7	5.0	16.8	24.7
19	99.33	42.00	36.31	1.30	49.7	61.0	52.0	10.8	83.7	12.8	13.3	4.3	17.8	19.0
20	104.33	43.67	38.20	1.33	57.3	66.3	50.7	14.2	96.0	15.3	11.0	6.0	16.2	21.7
21	97.00	39.60	32.83	1.28	50.0	64.3	32.0	13.1	116.0	22.7	7.7	5.0	21.2	17.7
22	101.33	43.00	36.57	1.31	42.0	54.7	53.3	12.7	59.7	13.8	11.3	5.7	17.8	19.0
23	98.33	40.33	32.98	1.29	57.3	65.7	49.3	17.0	84.7	16.2	6.0	4.3	17.8	18.0
24	112.00	45.67	46.10	1.41	58.0	68.7	40.3	17.6	144.3	6.8	11.0	6.3	25.5	25.3
25	123.00	48.50	56.35	1.44	47.0	58.5	40.7	11.1	124.0	21.0	9.0	4.7	25.8	29.0
Mean	107.38	44.11	43.13	1.35	53.24	63.51	43.92	13.94	118.37	13.89	9.45	5.28	21.56	22.9
S.Em±	2.71	0.96	0.89	0.01	1.61	1.60	1.57	0.31	2.09	1.15	0.75	0.49	0.51	1.91
CD at 5 %	7.71	2.75	2.54	0.03	4.60	4.56	4.50	0.87	5.97	3.29	2.16	1.40	1.46	5.45

TABLE 1 Correlation matrix between number of flower and other characters as influenced by different dahlia genotypes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1.00	0.98**	0.955**	0.941**	0.276	0.809**	-0.5*	0.137	0.401*	-0.148	0.558**	0.107	0.424*	0.947**
2		1.00	0.955**	0.903**	0.15	0.818**	-0.576**	0.27	0.47*	-0.077	0.579**	0.123	0.425*	0.904**
3			1.00	0.976**	0.189	0.769**	-0.432*	0.076	0.352	-0.018	0.489*	0.158	0.374	0.957**
4				1.00	0.212	0.741**	-0.527**	0.196	0.428*	-0.08	0.549**	0.229	0.377	0.907**
5					1.00	0.25	-0.207	0.169	0.085	-0.34	-0.067	0.49*	0.627**	0.279
6						1.00	-0.288	0.065	0.266	-0.198	0.386	0.033	0.523**	0.843**
7							1.00	-0.424*	-0.774**	0.035	-0.742**	-0.294	-0.189	-0.551**
8								1.00	0.452*	0.082	0.477*	-0.081	0.016	0.174
9									1.00	-0.045	0.902**	0.083	0.267	0.408*
10										1.00	-0.079	-0.1	-0.427*	-0.035
11											1.00	-0.093	0.2	0.551**
12												1.00	0.421*	0.222
13													1.00	0.423*
14														1.00

* Significant at p=0.05 level ** Significant at p=0.01 level @ - Character DAP=Days after Planting

1. Plant height
2. Number of leaves
3. Leaf area
4. Stem girth
5. No of days for flower bud initiation
6. No of days for flowering
7. Duration of flowering
8. Diameter of flower
9. Number of ray florets/flower
10. Stalk length of the flower
11. Individual flower weight
12. Longevity of flower
13. Vase life
14. Number of flowers/plant