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Performance of dahlia (*Dahlia variabilis* L.) genotypes for growth, disease and pest incidence

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Abstract

The experiment on “Performance of dahlia (*Dahlia variabilis* L.) genotypes for growth, disease and pest incidence” was carried out at the Department of Floriculture and Landscape Architecture, College of Horticulture, Sirsi, University of Horticultural Sciences, Bagalkot, Karnataka. Among 35 genotypes, genotype HUBD-26 recorded highest plant height (116.69 cm), plant spread (43.93 cm), leaf area index (3.63), stem girth (12.70 mm) and chlorophyll (54.19). Whereas, the genotypes like HUBD-6, HUBD-11, HUBD-17, HUBD-23, HUBD-26 and HUBD-27 were showed no incidence of fusarium wilt and powdery mildew. Regarding aphids and mites, there was no incidence was observed in the genotypes HUBD-17, HUBD-23, HUBD-26 and HUBD-27.

Keywords: HUBD-horticulture University of Bagalkot dahlia

Introduction

Dahlia (*Dahlia variabilis* L.) is tuberous rooted half hardy herbaceous perennial plant. Stems are mostly erect, branched, glabrous or scabrous, belonging to the family Asteraceae having its origin in Mexico. Dahlia was named in honor of the Swedish botanist Dr. Andreas Dahl, pupil of Linnaeus from where it was first introduced into Madrid (Spain) in 1789 and other European countries. The height of dahlia plants varies from 30 to 180 cm depending upon the cultivar. They are easy to grow both in ground and pot, and are extensively used for exhibition, garden display, home decoration and cut flowers of pompon and miniature types stay fresh in flower vases for many day and also make moderately good garlands (Baburao *et al.*, 2018) ^[1]. Dahlia is found predominantly in Mexico, but some species are found in South and Northern South America. Dahlia is a genus of the uplands and mountains, being found at elevations between 1,500 to 3,700 m, most species have limited ranges scattered throughout many mountain ranges in Mexico. In India, regions of Westerns Ghats, Himalayan foot hills and other heavy rain fall areas are suited for cultivation of dahlia. As the number of dahlia cultivars are continuously increasing, the newly constituted cultivars need to be more intensively monitored for novelty, distinctness, uniformity and stability. It is affected by some major pest like aphids and mites and diseases like fusarium wilt and powdery mildew. By considering the potentiality of the crop present investigation was carried out with the objective of performance of dahlia (*Dahlia variabilis* L.) genotypes for growth, disease and pest incidence.

Material and Methods

The present investigation done on performance of dahlia (*Dahlia variabilis* L.) genotypes for growth, disease and pest incidence was carried out at the Department of Floriculture and Landscape Architecture, College of Horticulture, Sirsi, University of Horticultural Sciences, Bagalkot, Karnataka. The design followed was randomized block design with two replications and having 35 genotypes of dahlia *viz.* HUBD-1 to HUBD-35. Observations were recorded on all the indicating parameters like, plant height (cm), plant spread (cm), leaf area index (LAI), crop duration (days), stem girth (mm) and chlorophyll content was measured by using spad meter from the three randomly selected matured leaves of top, middle and bottom respectively. The incidence of powdery mildew, fusarium wilt, aphid and mite has been quantified using the formula mentioned below and expressed in percentage (Salma *et al.*, 2014) ^[10].

$$\text{Incidence of disease} = \frac{\text{Total number of plants infected}}{\text{Total number of plant observed}} \times 100$$

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$$\text{Incidence of insect pest} = \frac{\text{Total number of plants infected}}{\text{Total number of plant observed}} \times 100$$

Results and Discussion

All the growth parameters in study were differed significantly (Table 1). Plant height was recorded maximum in genotype HUBD-26 (116.69 cm) which was on par with genotype HUBD-17 (111 cm). However, genotype HUBD-29 recorded the least plant height (66.44 cm). Whereas, plant height varied among the genotypes as well as influence of the growing environmental conditions, production technology and cultural practices. Similar variation in plant height due to cultivars was also observed in dahlia by Syamal and Kumar (2002) [13], Gupta *et al.* (2015) [4] and in chrysanthemum by Rajivkumar *et al.* (2007) [9]. The plant spread was recorded highest of 43.93 cm in genotype HUBD-26 which was found on par with genotypes HUBD-17 (42.80 cm) and HUBD-23 (41.33 cm) while, minimum of (35.35 cm) plant spread was noted in HUBD-25. This variation may be due to varietal differences and growth of the plant. Similar results were recorded by Kumar *et al.* (2010) [13] in dahlia and Singh *et al.* (2014) [12] in gerbera.

Highest leaf area index was registered in the genotype HUBD-26 (3.63) and HUBD-17 (3.63). While, minimum was recorded in HUBD-29 (1.67). Similar variation was observed by Shruti *et al.* (2004) [11] in gerbera and Prashanta *et al.* (2016) [8] in tuberose. Stem girth should be more to have sturdiness of the plant. Otherwise, the weak and thin stem may lead to lodging of plants in windy situations. The stem girth was recorded maximum of 12.70 mm in genotype HUBD-26 and minimum stem girth of 8.35 mm was noticed in HUBD-34. Similar trend was observed by Yadav *et al.* (2007) [15] in chrysanthemum genotypes. The chlorophyll was highest in genotype HUBD-26 (54.19). Whereas, genotypes HUBD-17 (53.89), HUBD-23 (52.62) and HUBD-27 (51.57)

was found at par with HUBD-26. While minimum chlorophyll content was noticed in HUBD-1 (36.23). Similar results were obtained in China aster by Chowdhuri *et al.* (2015) [3] and Uddin *et al.* (2015) [14] in chrysanthemum.

The data pertaining to the incidence of disease and insect pest in dahlia genotypes is presented in table 2. Among the genotypes HUBD-6, HUBD-11, HUBD-17, HUBD-23, HUBD-26 and HUBD-27 were recorded was no incidence of fusarium wilt. Whereas, maximum incidence of wilt was observed in HUBD-18 (65 per cent). There was no incidence of powdery mildew was observed in genotypes HUBD-6, HUBD-7, HUBD-11, HUBD-17, HUBD-23, HUBD-26, HUBD-27, HUBD-31 and HUBD-34. While, maximum powdery mildew incidence was observed in genotypes HUBD-18 and HUBD-29 about 60 per cent. The variation in percentage of disease incidence among the dahlia genotypes may be due to genetic makeup of genotypes and mechanism developed within the genotype against the disease causing organism and growing conditions. The similar results were obtained by Munde *et al.* (2019) [6] in gladiolus for fusarium wilt disease. While, Bradshaw *et al.* (2017) [2] reported for powdery mildew in chrysanthemum. Among the genotypes HUBD-5, HUBD-9, HUBD-12, HUBD-17, HUBD-20, HUBD-23, HUBD-26, HUBD-27, HUBD-28, HUBD-33 and HUBD-34 were registered no incidence of aphid. Whereas, maximum aphid incidence of aphid was observed in HUBD-30 (75 per cent). There was no incidence of mite was observed in genotypes HUBD-6, HUBD-17, HUBD-23, HUBD-26 and HUBD-27. While, maximum mite incidence was observed in genotypes HUBD-16 about 72.50 per cent. The variation in the incidence of insect pests among the genotypes may be due to genotypes character and field condition. Similar findings were obtained by Norboo *et al.* (2018) [7] in rose.

Table 1: Performance of dahlia genotypes for growth attributes

Genotypes	Plant height (cm)	Plant spread (cm)	LAI	Stem girth (mm)	Chlorophyll
HUBD-1	72.50	37.83	2.49	8.75	36.23
HUBD-2	76.09	36.45	2.55	9.10	48.44
HUBD-3	84.50	38.00	2.79	9.40	44.80
HUBD-4	95.50	37.88	2.58	9.50	49.04
HUBD-5	99.00	37.03	2.45	8.80	49.52
HUBD-6	100.81	39.88	2.94	10.15	50.86
HUBD-7	87.50	36.85	2.89	9.40	43.06
HUBD-8	80.07	36.29	2.36	9.25	44.97
HUBD-9	100.00	38.09	2.49	8.75	45.38
HUBD-10	77.92	36.20	2.02	9.55	44.14
HUBD-11	71.00	35.93	2.22	8.85	40.29
HUBD-12	96.78	37.25	2.39	9.50	47.46
HUBD-13	83.28	36.08	2.87	9.35	49.50
HUBD-14	70.00	36.20	2.78	9.25	42.01
HUBD-15	85.50	36.79	2.92	9.30	51.36
HUBD-16	85.05	36.35	2.32	9.60	46.90
HUBD-17	111.00	42.80	3.63	11.60	53.89
HUBD-18	73.00	36.85	2.27	9.05	45.08
HUBD-19	80.00	35.93	2.86	9.70	50.20
HUBD-20	89.45	38.10	3.18	9.40	44.85
HUBD-21	95.86	35.63	3.32	8.90	41.93
HUBD-22	79.61	35.83	1.70	8.45	47.49
HUBD-23	106.50	41.33	3.25	10.95	52.62
HUBD-24	87.50	37.25	2.52	9.75	42.10
HUBD-25	78.44	35.35	2.79	8.60	46.94
HUBD-26	116.69	43.93	3.63	12.70	54.19

HUBD-27	102.00	41.15	3.13	10.55	51.57
HUBD-28	81.00	37.60	1.93	9.30	48.37
HUBD-29	66.44	35.65	1.67	9.40	40.64
HUBD-30	93.16	36.70	2.41	8.65	45.99
HUBD-31	88.00	35.20	2.62	9.55	49.07
HUBD-32	94.06	36.78	2.53	9.45	41.75
HUBD-33	86.31	36.70	2.04	9.50	47.37
HUBD-34	78.03	35.38	2.20	8.35	44.61
HUBD-35	78.68	36.13	2.17	9.40	40.47
Mean	87.18	37.35	2.60	9.48	46.37
S.Em±	3.20	1.03	0.11	0.28	0.99
CD at 5%	9.21	2.97	0.33	0.82	2.85
CV	5.20	3.91	6.18	4.25	3.02

Table 2: Incidence of disease and insect pest in dahlia genotypes

Genotypes	Wilt (%)	Powdery mildew (%)	Aphid (%)	Mite (%)
HUBD-1	10.00	41.00	25.00	10.00
HUBD-2	20.00	31.00	45.00	20.00
HUBD-3	47.50	20.00	30.00	30.00
HUBD-4	42.50	25.00	35.00	15.00
HUBD-5	45.00	20.00	0.00	37.50
HUBD-6	0.00	0.00	10.00	0.00
HUBD-7	17.50	0.00	40.00	25.00
HUBD-8	9.50	35.00	30.00	40.00
HUBD-9	22.00	45.00	0.00	62.50
HUBD-10	40.00	29.00	20.00	42.50
HUBD-11	0.00	0.00	35.00	55.00
HUBD-12	17.50	25.00	0.00	40.00
HUBD-13	20.00	22.50	25.00	20.00
HUBD-14	35.00	15.00	10.00	35.00
HUBD-15	20.50	30.00	40.00	55.00
HUBD-16	42.50	30.00	35.00	72.50
HUBD-17	0.00	0.00	0.00	0.00
HUBD-18	65.00	60.00	40.00	57.50
HUBD-19	55.00	22.50	45.00	42.50
HUBD-20	62.50	22.00	0.00	12.50
HUBD-21	45.00	25.00	60.00	25.00
HUBD-22	15.00	10.00	10.00	55.00
HUBD-23	0.00	0.00	0.00	0.00
HUBD-24	55.00	30.00	10.00	10.00
HUBD-25	45.00	15.00	40.00	15.00
HUBD-26	0.00	0.00	0.00	0.00
HUBD-27	0.00	0.00	0.00	0.00
HUBD-28	60.00	47.50	0.00	55.00
HUBD-29	61.00	60.00	25.00	22.50
HUBD-30	10.00	50.00	75.00	37.50
HUBD-31	40.00	0.00	25.00	37.50
HUBD-32	35.00	20.00	20.00	37.50
HUBD-33	15.00	40.00	0.00	10.00
HUBD-34	42.50	0.00	0.00	7.50
HUBD-35	10.00	45.00	35.00	15.00
Mean	28.73	23.30	21.86	28.57
S.Em±	2.96	2.64	2.66	3.04
CD at 5%	8.51	7.60	7.64	8.73
CV	14.58	16.05	17.19	15.03

Conclusion

On the basis of present study, it is concluded that, among thirty five genotypes HUBD-26 registered highest plant height, plant spread, leaf area index, stem girth and chlorophyll. Whereas, there was no incidence of fusarium wilt, powdery mildew, aphids and mites in the genotypes like HUBD-17, HUBD-23, HUBD-26 and HUBD-27.

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