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Evaluation of dahlia cultivars under Aravalli hill conditions of Udaipur

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ABSTRACT

The present investigations were carried out with nine dahlia cultivars in randomized block design with three replications by planting 12 plants per replication. Minimum number of days required for flower bud initiation (81.60 DAT) and bud break (22.40 DAI) were recorded in cv. Jyotsna and complete flower opening (6.30 DAB) was recorded in cv. Korean Yellow. The maximum flowering duration (90.73 days) and maximum freshness of flower (7.73 days) on plant under open field conditions were recorded in cv. NT Pompon. The maximum number of flowers per plant (60.40), flower diameter (19.66 cm) and average weight of flower (62.69 g) were recorded in cvs. NT Pompon, Korean Yellow and Blackout respectively. In cv. NT Pompon, minimum flower diameter (11.20 cm) and flower weight (17.77 g per flower) were recorded. The maximum flower weight per plant (1072.56 g) was recorded in cultivar NT Pompon. On the basis of floral characters, yield and economic parameters cv. NT Pompon was found best under Udaipur conditions.

Key words: Cut flower, dahlia, bud break, bud initiation, freshness.

INTRODUCTION

Dahlia (*Dahlia variabilis* L.) belongs to family Asteraceae and is native to Mexico. Genus *Dahlia* has basic chromosome No. n = × = 8 and *Dahlia variabilis* is octaploid in nature, *i.e.* 2n = 64. Tubers of dahlia contain significant amount of inulin and fructose, and small quantities of medicinally active compounds, such as phytin and benzoic acid. Cut flower of pompon and miniature types stays fresh in flower vases for many days and also makes moderately good garlands. Its free flowering habit, wide spectrum attractive colour, shape, size and good keeping quality and easy transportation attracted the attention of flower growers. It has a great potential for export market especially during winter for European countries, which may fetch better market price. The dahlia is mostly preferred by florist and consumers, as they have different colour combinations, good yield potential and long vaselife. But the performance of the cultivars is mainly influenced by agro-climatic factors. There was no comprehensive report on the performance of dahlia cultivars for floral and yield parameters under the Aravalli hills conditions of Rajasthan, hence the present study was undertaken to find out the best cultivar for the region.

MATERIALS AND METHODS

The experiment was conducted at Horticulture Farm, Rajasthan College of Agriculture, MPUAT, Udaipur from October 2007 to April 2008. The place is situated at 24° 35' N latitude and 24° 42' E longitude at an altitude of 579.5 m above mean sea level. The region falls under agroclimatic zone IV A- subhumid southern plain and Aravalli hills of Rajasthan. The experiment was conducted on clayey loam soil with pH 8.4 and EC 0.54 dS/m under irrigated conditions. The cultivars used were Korean Blue (T_1), DRS (T_2), Korean White (T_3), Blackout (T_4), Korean Orange (T_5), Korean Yellow (T_6), Korean Bicolour (T_7), NT Pompon (T_8) and Jyotsna (T_9). The terminal rooted cuttings were planted at 90 cm × 75 cm (R × P) on October, 28, 2007 in bed size 4 m × 2 m with drip irrigation system in three replications and 9 varieties used as a treatment in randomized block design. The observations were recorded on various parameters, *viz.* number of days required for bud initiation, first flower bud break, complete flower opening, flowering duration, freshness of the flower on the plant under field condition, flower diameter, flowers per plant, weight of flower, flower weight per plant, flower colour and B: C ratio. The data were recorded on five plants and the mean values of the recorded data were statistically analyzed.

RESULTS AND DISCUSSION

Out of the nine cultivars evaluated for their floral and yield (Tables 1 & 2) parameters, bud initiation was earliest in case of Jyotsna (81.60 days) which was at par with cultivar NT Pompon (88.33 days), whereas it was very late in Korean Blue (101.47 days). The variation in number of days required for first bud initiation was primarily due to the different genetic constitution of cultivars and prevailing environmental

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Table 1. Floral and yield parameters of dahlia cultivars under sub-humid southern plains of Aravalli hills of Rajasthan.

Cultivar	Bud initiation (days)	Bud break (days)	Complete flower opening	Flowering duration (days) (days)	Freshness (days)	Flowers/ plant	Flower dia. (cm)	Flower weight	Flower yield/ plant (g) (g)	Flower colour
Blackout	95.60	29.73	8.87	89.00	6.13	16.07	16.56	62.69	1008.78	Blackish red
DRS	91.67	30.27	7.47	86.47	5.93	16.73	16.05	54.63	929.13	Purple-white tip
Jyotsna	81.60	22.40	9.57	77.13	5.00	16.40	17.79	56.05	936.26	Purple
Korean Bicolour	91.53	30.53	8.47	77.93	5.60	15.07	11.96	31.59	476.38	Red white
Korean Blue	101.47	27.60	7.0	77.07	4.73	26.80	12.46	25.93	694.46	Sky blue
Korean Orange	95.60	30.53	6.77	59.13	6.57	16.13	17.61	44.01	716.71	Orange
Korean White	96.87	31.33	6.80	85.87	5.40	8.13	14.65	48.85	395.55	White
Korean Yellow	95.80	29.33	6.30	76.47	4.80	8.80	19.66	48.18	421.79	Yellow
NT Pompon	88.33	27.90	8.73	90.73	7.73	60.40	11.20	17.77	1072.56	Red
CD at 5%	7.44	2.57	1.05	3.61	1.09	2.46	1.04	3.36	138.61	

Table 2. Relative economics of growing dahlia under Aravalli hills of Rajasthan.

Cultivar	Yield/ha		Gross return (Rs./ha)	Net return (Rs./ha)	B:C ratio
	No. of flowers	No. tubers			
Blackout	9697	31432	190996	72439	0.610
DRS	8930	30086	179558	61001	0.510
Jyotsna	9000	44215	222645	104088	0.870
Korean Bicolour	4578	26240	124500	5943	0.050
Korean Blue	6676	26914	147502	28945	0.240
Korean Orange	6889	21820	134350	15793	0.130
Korean White	3802	26914	118762	205	0.001
Korean Yellow	4055	27586	123308	4751	0.040
NT Pompon	10310	64688	297164	178607	1.500

Cost of production = Rs. 1,18,557

conditions during the period of crop growth. Similar studies by Mishra *et al*. (6) showed variation among varieties for bud initiation.

The number of days required for first flower bud break (petals start unfurling) was minimum in Jyotsna (22.40 days) and maximum in Korean White (31.33 days). The results are in conformity with the findings of Mishra *et al*. (6). This variation in number of days required for opening of first flower bud in various cultivars of dahlia is also due to different genetic make up and prevailing environmental conditions. The days required for complete flower opening after bud break was minimum in cv. Korean Yellow (6.30 days) followed by Korean Orange (6.77 days), while maximum in cv. Jyotsna (9.57 days) followed by cv. NT Pompon (8.73 days). This observation was in close conformity with the results of Mishra *et al*. (6). Similar findings were also noted by Mohanty *et al*. (7) in marigold, and Kumar and Yadav (4) in gerbera. This variation may be attributed because of varied genetic make up of different cultivars along with prevailing environmental conditions.

The significant variation with respect to duration of flowering was observed. From the Table 1 it is clear that maximum value was in NT Pompon (90.73 days) and minimum in Korean Orange (59.13 days), while cultivars Korean Bicolour, Jyotsna, Korean Blue and Korean Yellow were at par with each other. Similar

results were observed by Protich (10), *i.e.* more than 2 months, Pudelska and Hetman (11), *i.e.* 4.5-5 months, Lisichkova (5), *i.e.* greater than 2 months and Mousumee *et al*. (8) in dahlia. This variation in duration of flowering among various dahlia cultivars may be due to different genetic make up, which might be further modified by the prevailing environmental conditions during the field trial.

The freshness of flower on the plant under field conditions ranges from minimum in cv. Korean Blue (4.73 days) to maximum in cv. NT Pompon (7.73 days), while cultivars Korean Orange, Blackout and DRS were statistically at par with each other. This variation in dahlia cultivars may be due to different genetic make up of cultivars, influenced by the prevailing environmental conditions which affect physiological processes of the plant like cell turgidity, water loss through evapotranspiration and breakdown of the reserve food which governs the freshness of the flower under field conditions. These observations are in conformity with the earlier findings of Mishra *et al*. (6).

The maximum number of flowers per plant was recorded in cv. NT Pompon (60.40) and minimum in Korean White (8.13), while cv. Korean White and Korean Yellow were statistically at par with each other. The variation in number of flowers per plant may be due to genetic variability among the different cultivars, which were tested under this trial. Another probable reason for variation in number of flowers per plant may be due to the effect of environmental conditions prevailing during field trial. Similar results were noted by Muthuswamy *et al*. (9), Joshi *et al*. (3), Pudelska and Hetman (11), and Mousumee *et al*. (8). The maximum flower diameter was recorded in cv. Korean Yellow (19.66 cm), while minimum in cv. NT Pompon (11.20 cm). Similar findings were obtained by Muthuswamy *et al*. (9), Mishra *et al*. (6), and Mousumee *et al*. (8). It may be concluded that variation in diameter of flower is mainly due to the genetic make up coupled with environmental conditions prevailing during the experimentation.

The maximum weight per flower was recorded in cv. Blackout (62.69 g) and minimum in cv. NT Pompon (17.77 g), while Korean White and Korean Yellow were statistically at par with each other. Variation in flower weight might be due to different genetic make up of the different cultivars. These findings were in conformity with the observation made by Joshi *et al.* (3) in dahlia. Similar results were also obtained by Sarkar and Ghimiraj (12), Kumar and Yadav (4) in gerbera and Aswath *et al*. (1) in crossandra. The significant differences among different dahlia cultivars was noted for flower weight per plant. The flower weight per plant was minimum in cv. Korean White (395.55 g) to maximum in cv. NT Pompon (1072.56 g), while the cvs. NT Pompon, Blackout and Jyotsna were at par with each others. The different genetic make up of the cultivar contributed different growth and yield attributing characters for flower weight per plant in cultivars of dahlia. Thus cvs. NT Pompon, Blackout and Jyotsna were found heavy yielder. Aswath *et al.* (1) reported similar results in *Crossandra undulaefolia*.

The variation in flower colour among distinct cultivars used for study showed different colours according to genetic make up and colouring pigment present in the variety. Red colour of flower is due to presence of anthocyanin pigment in NT Pompon and Blackout, orange colour is due to presence of anthocyanin on yellow background in Korean Orange and yellow colour of flower is due to chalcones and aurones colouring matter in Korean Yellow. It has also been reported that white colour of flower is due to flavonols and carotenoid pigment in Korean White, while purplish in Jyotsna and DRS and bluish colour in Korean Blue is due to presence of cyanidin pigment. The bicolouration of flower is due to mixing of two different monochrome coloured pigments in cv. Korean Bicolour as reported by Bhattacharjee (2). These findings are in conformity with results of Joshi *et al*. (3) on dahlia.

The relative economics calculated for different cultivars under study revealed that cv. NT Pompon is best with a gross income of Rs. 2,97,164 on the basis of flower yield, *i.e.* 10,310 kg and number of tubers i.e. 64,688 per hectare. The selling price for one kg of flower and per tuber was Rs.10.00 and 3.00, respectively. So the maximum net income of Rs. 1,78,607 per ha can be obtained from cv. NT Pompon, while the cost of cultivation comes to Rs.1,18,557 per hectare. Among various cultivars the net return per rupee investment (B:C ratio) is maximum, i.e., Rs.1.50 in cultivar NT Pompon, while it is minimum in Korean White i.e., Rs. 0.001. On the basis of yield and higher returns per rupee invested, cv. NT Pompon is best compared to other cultivars (Table 2). It may be concluded that cv. NT Pompon is the best, as this cultivar showed maximum flower duration, freshness of the flower, number of flowers per plant, flower weight per plant, B:C ratio, with minimum flower diameter and average flower weight. The cultivar Jyotsna required minimum number of days for first flower bud initiation and bud break, while maximum duration for complete flower opening under sub-humid southern plains and Aravalli hills of Udaipur (Rajasthan) conditions.

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