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Performance of different gaillardia genotypes in respect of growth, flowering, quality and yield parameters

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Abstract

The present investigation was carried out to assess the performance of eight *Gaillardia pulchella* foug. Genotypes (Market, LOCAL 1, LOCAL 2, LOCAL 3, LOCAL 4, LOCAL 5, LOCAL 6 and LOCAL 7) for their growth, flowering, yield and quality characters. Significant differences were observed for all 12 characters studied. The results revealed that maximum height of plant was recorded in genotype in LOCAL 5 (70.94 cm), branches plant⁻¹ in LOCAL 1 (20.53), plant spread 64.99 cm in East-West direction and 66.51 cm in North-South direction in LOCAL 2 and leaf area (17.81 cm²) in LOCAL 6. As regards flowering parameters viz., days to first flower bud initiation (64.20 days), days to 50 per cent flowering (76.73 days) and days to first harvesting of flowers (84.73 days) were recorded early in genotype Market. However, significantly maximum days to opening of flower (8.93 days), flowering span (52.26 days) was recorded in genotype LOCAL 4. As regards yield and quality parameters viz., yield of flower ha⁻¹ LOCAL 2 (65.80 q), weight of flower ha⁻¹ LOCAL 2 (4.8 g), shelf life LOCAL 2 (3.63 days).

Keywords: Gaillardia, genotypes, growth, flowering, yield, quality

Introduction

Gaillardia, commonly known as Blanket Flower or Fire Wheel, belong to the family Compositae and is a native to Central and Western United States. The plants possess brilliant daisy-like flower with single, double and semi double forms. The large centres of flowers are rose-purple and the densely frilled petals are yellow, orange, crimson or copper scarlet. The genus was in honour of Gaillard de Marentoneau, an 18th century French botanist. Out of twenty species available in the genus gaillardia, only two species, *Gaillardia pulchella*, is annual and *Gaillardia aristata*, is a perennial are under cultivation. Flowers are small and numerous, born in solitary, usually showy heads which is stated as capitulum with 4 to 6 cm in diameter. Individual flowers in a capitulum are called florets which ranged from one to ten according with cultivars or genotypes. As a member of Asteraceae it has both ray and disc florets which are pistillate and hermaphrodite, respectively. The crop produce flowers in a wide range of colors such as yellow, orange, cream, scarlet, bronze, brick-red, red and can be grown all around the year. The present investigation was carried out to study the performance of gaillardia genotypes

Materials and methods

An experiment entitled "Performance of different gaillardia genotypes in respect of growth, flowering, quality and yield parameters" was carried out at the farm of Horticulture Section, College of Agriculture, Nagpur during August, 2015 to February, 2016. Experiment was laid out in randomized block design with three replications and eight genotypes viz., Market, LOCAL 1, LOCAL 2, LOCAL 3, LOCAL 4, LOCAL 5 and LOCAL 6, LOCAL 7.

The experimental land was ploughed once, cross-wise harrowing was done for clod crushing and soil was brought into the fine tilth. At the time of land preparation, well rotten FYM @ 10 tonnes ha⁻¹ was mixed uniformly in the soil before last harrowing. The field was laid out with flat beds of the dimensions of 3.0 m X 3.6 m.

The raised beds of 7 m length and 1 m width and 15 cm height were prepared for raising the seedlings of Gaillardia. The seeds were sown on raised beds on 24nd August, 2015 in the line by keeping 8 cm distance within two lines.

Immediately after seed sowing nursery beds were irrigated with the help of water can. Regular watering was given in the morning till the seedlings were ready for transplanting. Seedlings were allowed to grow in the nursery beds up to 30 days and then transplanting was done.

An application of FYM @ 10 tonnes ha⁻¹ was mixed at the time of last harrowing in the field prior to application of chemical fertilizers.

The recommended dose of fertilizer (100: 50: 50 kg NPK ha⁻¹) was applied to all the plots in the form of urea, single super phosphate and muriate of potash. Out of this, full dose of phosphorous and potassium and 1/2 dose of nitrogen were applied at the time of transplanting. The remaining dose of nitrogen was applied in two split doses, first dose was given at 30 days and second dose was given at 45 days after transplanting.

Observations were recorded on growth parameters viz., height of plant, number of branches plant⁻¹, plant spread, leaf area and flowering parameters viz., days to first flower bud initiation, days to opening of flower, days to 50 per cent flowering, days to first harvesting, flowering span and yield hectare⁻¹ and growth parameters viz., weight of flower, shelf life and collected data were statistically analyzed as per method suggested by Panse and Sukhatme (1978).

Results and discussion

Growth parameters

Data from table 1 revealed that, at the stage of 75 days after transplanting, the significantly maximum plant height was recorded in genotype LOCAL 5 (70.94 cm) and minimum plant height was recorded in genotype LOCAL 3 (65.71 cm) which was at par with LOCAL 3.

At 75 days after transplanting, significantly maximum number of branches plant⁻¹ was recorded in genotype LOCAL 1 (20.53). Whereas, significantly minimum number of branches plant⁻¹ was recorded in LOCAL 5 (17.13).

The plant spread at North-South direction was significantly maximum in LOCAL 2 (66.51 cm) over the rest of the genotypes. Whereas, minimum plant spread was recorded in LOCAL 5 (50.98 cm). The plant spread at East-West direction was significantly maximum in LOCAL 2 (64.99 cm) over the rest of the genotypes. However, minimum plant spread was recorded in LOCAL 5 (59.35 cm).

The genotype LOCAL 6 (17.81cm) had significantly maximum leaf area at 50 percent flowering as compared to other genotypes. However, minimum leaf area at 50 percent flowering stage was recorded in the genotype LOCAL 2 (8.43 cm).

These results might be due to the differences among the genotypes for height of plant and number of branches plant⁻¹ might be due to the differential genetic makeup and varied growth rate among the genotypes of gaillardia. The variation in plant spread and leaf area at 50 per cent flowering stage of gaillardia genotypes might be attributed due to the genetic differences of the genotypes used as the most of the characters are governed by the genetic makeup of the plant.

Similar results were recorded by Bharathi and Jawaharlal (2014) [3]. They revealed that, highest plant height was recorded in cv. Dharmapuri Local in marigold. Narsude *et al.* (2010) [6] reported that, maximum plant height and plant spread was recorded in cv. Pakharsangavi Local. However, maximum number of branches plant⁻¹ was recorded in genotype Tuljapur Local-1 in marigold. Raghuvanshi and Sharma (2011) [7] reported that, maximum plant height recorded in cv. Safari Queen. However, maximum plant

spread was noticed in cv. Harmony Boy in marigold. Wankhede *et al.* (2004) [10] noticed that, maximum plant height was recorded in gerbera cv. Charmander. Whereas, maximum leaf area was recorded in gerbera cv. Savannah under shade net conditions. Arulmani *et al.* (2015) [11] revealed that, maximum plant height (58.38 cm), number of branches plant⁻¹ (14.17) were recorded in DGC-2. However, maximum plant spread both at E-W (53.29 cm) and N-S (51.35 cm) direction and leaf area (6046.68 cm²) was recorded in genotype AGC-I in gaillardia.

Flowering parameters

Data from table 1 revealed that, early flower bud initiation was recorded in genotype LOCAL 4 (55.67 days) However, delayed flower bud initiation (64.20 days) was recorded in Market.

The minimum days to opening of flower were observed in genotype LOCAL 3 (7.97 days). However, significantly maximum days to opening of flower were observed in genotype LOCAL 4 (8.93 days).

Significantly minimum days to 50% flowering were observed in genotype LOCAL 1 (68.87 days). However, significantly maximum days to 50% flowering were observed in genotype Market (76.73 days).

The genotype LOCAL 3 (76.87 days) took significantly minimum days to first harvesting of flowers. However, significantly minimum days to first harvesting of flowers were taken by genotype Market (84.73 days).

The genotype LOCAL 4 (52.26 days) took significantly maximum flowering span as compared to other genotypes. However, significantly minimum days for flowering span were taken by genotype LOCAL 6 (50.20 days).

The different period required for first flower bud initiation and days to opening of flower in gaillardia genotypes might be due varied growth rate and their genetic makeup. The days to 50% flowering and days to first harvesting are might be due to earliness in first flower bud initiation and days to opening of flower. The genotype LOCAL 4 (55.24 days) took significantly maximum flowering span. This might be due to their varied growth rate and genetic makeup.

These results are in close agreement with the results of Singh *et al.* (2003) [9]. They observed that, maximum flowering duration was recorded in marigold cv. 'Orange Gate'. Rao *et al.* (2005) [8] reported that, maximum duration of flowering was recorded in marigold cv. Orange Double. Arulmani *et al.* (2015) [11] reported that, minimum days taken for first flower appearance and days taken for 50 per cent flowering were observed in gaillardia cv. DGC-2. Bhuyar *et al.* (2004) [4] reported that gerbera cultivar Ruby Red showed best results in terms of bud initiation of flower under fan and pad cooling system of polyhouse conditions.

Yield parameter

Data from table 1 revealed that, significantly maximum yield of flowers hectare⁻¹ was recorded in LOCAL 2 (65.80q). The minimum yield of flowers hectare⁻¹ was produced by genotype Market (42.38q).

The differentiating ability of yield of flowers hectare⁻¹ in various gaillardia genotypes could be attributed to their individual genetic potential. Similar results were also reported by Atramet *et al.* (2015) [2]. They noted that, highest number of flowers plot⁻¹ and yield of flowers hectare⁻¹ were recorded in rose cv. Alliance.

Quality parameter

Data from table 1 revealed that, significantly maximum weight of flowers hectare⁻¹ was recorded in LOCAL 2 (4.8 g). The minimum weight of flowers hectare⁻¹ was produced by genotype Market (3.0 g).

The variation in average weight of flower might be due to the variation in size, length of flower and number of petals flower⁻¹. Similar results were also reported by Similar variation in weight of flower was also reported by Narsudeet *al.* (2010) [6] in African marigold and Kumar (2014) [5] in chrysanthemum.

Data from table 1 revealed that, significantly maximum shelf life of flowers was recorded in LOCAL 2 (3.63 days). The minimum shelf life of flowers was produced by genotype LOCAL 4 (2.678 days).

LOCAL 2 recorded maximum shelf life of flower. This might be due to more vegetative growth, early initiation of flowering and more diameter of flower which might have helped the flower to last longer at ambient temperature. Similar results were also reported by Raghuvanshi and Sharma (2010) [7] in French marigold.

Table 1: Growth, flowering and yield as influenced by gaillardia genotypes

Treatments	Plant height (cm) (90 DAT)	Branches plant ⁻¹ (75 DAT)	Plant spread at 50% flowering (cm)		Leaf area at 50% flowering (cm ²)	Days to first flower bud initiation (days)	Days to opening of flower (days)	Days to 50% flowering (days)	Days to first harvesting (Days)	Flowering span (Days)	Yield of flowers ha ⁻¹ (q)	Weight of flower (g)	Shelf Life (Days)
			N-S	E-W									
T ₁ -Market	70.35	18.73	60.3	61.5	12.10	64.2	8.80	76.73	84.73	51.27	42.4	3.0	3.60
T ₂ -LOCAL 1	68.27	20.53	65.0	64.6	13.50	57.5	8.03	68.87	80.00	49.73	56.9	4.0	3.47
T ₃ -LOCAL 2	67.79	20.47	65.2	65.0	8.43	58.5	8.60	73.07	81.07	51.40	65.8	4.8	3.63
T ₄ -LOCAL 3	65.71	19.33	62.9	61.4	14.41	57.9	7.97	72.00	76.87	50.40	63.3	4.2	3.33
T ₅ -LOCAL 4	69.79	17.73	61.7	59.7	17.53	55.7	8.93	69.07	77.07	52.27	57.1	4.0	2.67
T ₆ -LOCAL 5	70.94	17.13	60.2	59.3	17.81	59.3	8.47	74.80	82.80	51.47	54.0	3.6	3.20
T ₇ -LOCAL 6	68.45	17.53	64.0	63.4	12.89	60.2	8.50	73.40	78.73	50.20	52.2	3.5	3.07
T ₈ -LOCAL 7	69.38	18.25	63.5	62.9	15.52	58.9	8.27	70.58	79.58	50.58	61.5	4.2	3.39
SE (m) ±	1.49	1.53	1.13	1.08	1.27	1.32	1.01	1.49	1.30	1.65	1.66	0.69	0.51
CD at 5%	4.55	4.66	3.44	3.28	3.87	4.02	3.06	4.52	3.96	5.03	5.04	2.10	1.56

*DAT- Day after transplanting

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