

Evaluation of different genotypes of gaillardia (*Gaillardia pulchella* Foug.) under Jhalawar condition

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Abstract: An experiment was carried out at the Instructional Farm, Department of Floriculture and Landscaping, College of Horticulture & Forestry, Jhalrapatan, Jhalawar, (Agriculture University, Kota) during the period from March, 2017 to September, 2017 to study the performance of the twelve genotypes of gaillardia. The maximum plant height (81.03 cm) and leaf width (4.38 cm) were recorded in the genotype 'Genotype-3'. The genotype 'Genotype-2' produced the maximum number of primary branches per plant (18.87) fresh weight (1626.93 g) and dry weight (321.46 g) of plant was recorded in 'Genotype-2' respectively. The highest plant spread (73.70 cm) was recorded in the genotype 'Genotype-6'. The maximum leaf length (11.67 cm) was recorded in 'Genotype-7'. The maximum flower diameter (6.29 cm), days taken to first flower opening (42.60 days), days taken to 50 per cent flowering (64.93 days), number of flowers per plant (131.35), weight of flowers per plant (578.72 g), weight of flower per plot (45.89 kg), the highest flower yield per hectare (395.26 q/ha) were recorded in 'Genotype-11'.

Keywords: Gaillardia, Genotype, Dry weight, Spread and Pluckings

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I. Introduction

Gaillardia (*Gaillardia pulchella* Foug.) popularly known as 'Fire Wheel' or 'Blanket Flower', belong to the family Compositae and is native to Central and Western United States, having the basic chromosome number X=18 (Srivastava and Kandpal, 2006). There are about twenty eight species reported in the genus Gaillardia, but only two of them viz. *Gaillardia pulchella* (annual) and *Gaillardia aristica* (perennial) are under cultivation. The generic name Gaillardia was proposed by Mr. Gaillard de Marentoneau, a French botanist in 18th century. The plants possess brilliant daisy-like flowers with single, double and semi double forms (Cox and Klett, 1984). Flowers are small and numerous, born solitary at each node, showy heads are 4 to 6 cm in diameter having a long hairy stalk. Individual flowers in a capitulum are called florets. As a member of Asteraceae (Compositae) it has both ray (Pistillate) and disc florets (Hermaphrodite). The crop produce flowers in a wide range of colors such as yellow, orange, cream, scarlet, bronze, brick red, red tipped and red with yellow tipped and can be grown all around the year. Gaillardia is a perfect plant for flower beds, borders and corners. It is also used for garlands, bouquets and as loose flower.

II. Materials And Methods

The experiment was conducted at Instructional Farm of the Department of Floriculture and Landscaping, College of Horticulture & Forestry, Jhalrapatan, Jhalawar, Agriculture University, Kota (Rajasthan), during the year 2017-2018. Study the performance of the twelve genotypes of gaillardia ('Genotype-1', 'Genotype-2', 'Genotype-3', 'Genotype-4', 'Genotype-5', 'Genotype-6', 'Genotype-7', 'Genotype-8', 'Genotype-9', 'Genotype-10', 'Genotype-11' and 'Genotype-12'). These genotypes of gaillardia collected from different states of country (Rajasthan, Uttar Pradesh, Madhya Pradesh and Karnataka). The well decomposed vermicompost at the rate of 4 kg/sqm was recommended dose of NPK (100:80:60 g/m²) with applied at the time of bed preparation. Seeds are sown in nursery beds and 40 days old seedlings were transplanted in main field at spacing of 30 X 40 cm (plant to plant and row to row). The experiment was laid out in randomized block design with three replications.

III. Results And Discussion

Performance of gaillardia genotypes for vegetative characters

The results (Table 1) revealed that highly significant differences in vegetative characters among the gaillardia genotypes. The maximum plant height was recorded in 'Genotype-3' (81.03 cm) followed by 'Genotype-7' (79.03 cm), while the minimum (67.93 cm) was noted in 'Genotype-12'. The variation in plant height among the various genotypes might be due to genetic and environmental factors. The results find support from reports of Kishan *et al.* (2008), Kumar *et al.* (2007), Diltat *et al.* (2005) in chrysanthemum. The genotype 'Genotype-2' produced the maximum number of primary branches per plant (18.87) being at par with 'Genotype-10' (18.53) whereas 'Genotype-1' produced the minimum number of primary branches (14.73). Variation for this character may be due to genetic behavior of the genotypes. The results also find support from findings of Agale and Dawane (2016), Bhaskarwar *et al.* (2016) and Tamut and Kulkarni (2013), in gaillardia. The genotype 'Genotype-6' recorded the maximum (73.70 cm) plant spread, whereas the minimum (62.69 cm) was recorded by 'Genotype-10'. The variation in plant spread among the various genotypes might be due to genotypic traits and environmental interaction. Similar findings have been reported by Singh *et al.* (2017) in chrysanthemum, Agale and Dawane (2016), Bhaskarwar *et al.* (2016) and Girangeet *et al.* (2016) in gaillardia. The 'Genotype-2' produced the maximum weight (1626.93 g), while the minimum (929.33 g) in 'Genotype-11'. The maximum (321.46 g) plant dry weight was recorded in 'Genotype-2', while the minimum (183.18 g) dry weight observed in 'Genotype-7'. This was mainly attributed by increased growth characters such as plant height, plant spread and production of higher number of branches and leaves in dry matter contents. Similar results were reported by Girangeet *et al.* (2016) in gaillardia and Choudhary *et al.* (2014) in marigold. Highly significant differences were showed by the genotypes for leaf length with the maximum leaf length (11.67 cm) in 'Genotype-7' and the minimum (8.26 cm) in 'Genotype-6'. The maximum leaf width of (4.38 cm) was recorded in 'Genotype-3' that was significantly higher over all the genotypes, whereas the minimum leaf width of (3.53 cm) noted in 'Genotype-9' which was at par with 'Genotype-10' (3.58 cm) and 'Genotype-2' (3.59 cm). The variation in leaf length among the genotypes might be due to variation in their genetic constitution that could have leading to differential rates of photosynthesis. Similar finding has been reported by Vasudevan and Rao, (2010) in gerbera, Pal and George (2002) and Kunigunda (2004) in chrysanthemum.

Performance of gaillardia genotypes for flowering and yield characters

Gaillardia genotypes highly significant for flowering and yield parameters (Table 2). Days taken to first flower opening and days taken to 50 per cent flowering recorded were advanced in the 'Genotype-11' (42.60 days and 64.3 days) which was at par to 'Genotype-3' (45.45 days and 67.93 days), while the 'Genotype-12' identified as highest days taken to first flower opening (65.93 days and 84.33 days). The variation days taken to first flower opening and days taken to 50 per cent flowering among the genotypes could be due to their genetic makeup and genotype environment interactions leading to varied rates. These results are in conformity with the reports of Bhaskarwar *et al.* (2016) and Girangeet *et al.* (2016) in gaillardia and Zosiamliana *et al.* (2013) in China aster. The maximum flower diameter was (6.29 cm) reported in 'Genotype-11' which was at par to 'Genotype-10' (6.00 cm), whereas the minimum was reported in 'Genotype-12' (4.95 cm) being at par to 'Genotype-8' (5.35 cm). The flower diameter might be due to inherent character of individual genotype. Similar variations have been reported previously by Reddy *et al.* (2016), Talukdar *et al.* (2006) in chrysanthemum, Tamut and Kulkarni (2013) in gaillardia. The highest number of flowers per plant was recorded in 'Genotype-11' (131.53) followed by 'Genotype-7' (117.93), while the minimum number of flowers per plant (82.46) was recorded in 'Genotype-8'. The variation in number of flowers per plant might be due to the genetic constitutions of genotypes. However, it may be directly related to the number of branches per plant and recurrent blooming habit due to their genetic makeup. Similar results have been founded by Suvija *et al.* (2016), Uddin *et al.* (2015), in chrysanthemum, Ajeetkumar *et al.* (2015) in dahlia. The maximum weight of flowers per plant and weight of flowers per plot (578.72 g and 45.89 kg) was noted in 'Genotype-11' which was at par with genotypes 'Genotype-10' (413.54 g and 32.99 kg), while the minimum was recorded in 'Genotype-2' (102.67 g and 8.07 kg). The highest flower yield per plant was recorded in the genotype 'Genotype-11' (395.26 q) followed by 'Genotype-10' (284.18 q), while the lowest yield of flower per hectare was observed in 'Genotype-2' (69.51 q). The estimated flower yield per hectare in various genotypes was closely associated with fresh flower weight, number of flower per plant and number of branches per plant increased the flower yield per hectare. The variation in flower weight is due to increased flower size and presence of fairly more number of ray florets and thickness of ray florets (Swaroop *et al.*, 2008) in chrysanthemum. Several findings also reported by Ajeetkumar *et al.* (2015) in dahlia, Tamut and Kulkarni (2013) in gaillardia.

IV. Conclusion

On the basis of results of the present experiment the following conclusion may be drawn. Under the agro-climatic conditions of sub-humid region of Rajasthan, out of 12 genotypes tested. The maximum plant height and number of primary branches were recorded in 'Genotype-10' and 'Genotype-3' respectively. The 'Genotype-11' was found superior in characters such as days taken to first flower opening, days taken to 50 per cent flowering, flower diameter, fresh flower weight, number of flowers per plant, weight of flowers per plant, weight of flowers per plot and estimated flower yield per hectare.

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Table 1: Performance of gaillardia genotypes for vegetative characters under Rajasthan district, Jhalawar

S. No.	Name of genotypes	Plant height (cm)	Number of primary branches	Plant spread (cm)	Leaf length (cm)	Leaf width (cm)	Plant fresh weight (g)	Plant dry weight (g)
1.	Genotype - 1	78.40	14.73	68.29	10.78	3.91	958.06	187.90
2.	Genotype - 2	75.86	18.87	69.95	10.64	3.59	1626.93	321.46
3.	Genotype - 3	81.03	18.00	66.54	10.49	4.38	1312.80	263.31
4.	Genotype - 4	72.39	15.33	68.47	9.33	4.04	1210.87	212.84
5.	Genotype - 5	71.40	16.20	73.31	10.78	3.82	1052.33	198.49
6.	Genotype - 6	74.86	17.33	73.70	8.26	4.15	1201.67	216.53
7.	Genotype - 7	79.03	15.53	63.40	11.67	3.74	938.13	183.18
8.	Genotype - 8	75.49	17.40	66.27	10.27	3.75	1264.33	240.88
9.	Genotype - 9	73.60	18.00	65.33	10.17	3.54	1357.33	270.40
10.	Genotype - 10	74.40	18.53	62.69	9.10	3.58	1003.67	202.88
11.	Genotype - 11	78.26	18.33	63.75	8.48	3.68	929.33	164.50
12.	Genotype - 12	67.93	16.93	68.54	11.27	4.28	1554.00	290.72
	Mean	75.22	17.10	67.52	10.11	3.87	1200.79	229.46
	SEm±	0.70	0.31	0.62	0.29	0.11	29.30	3.74
	CD 5%	2.06	0.93	1.81	0.86	0.31	85.94	10.98

Fig. 1: Performance of gaillardia genotypes for vegetative characters under Rajasthan district, Jhalawar

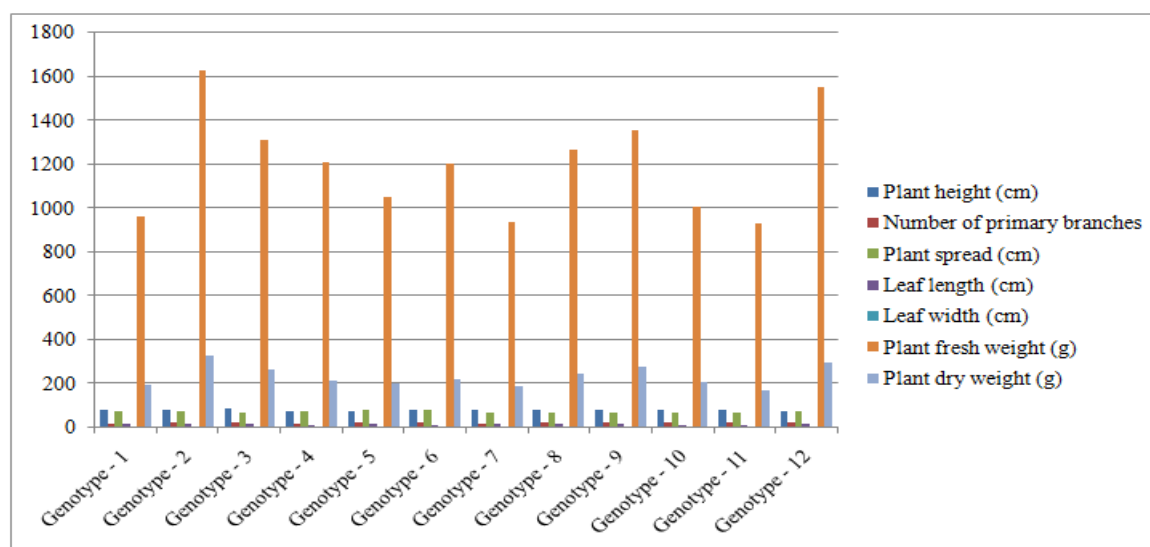


Table 2: Performance of gaillardia genotypes for flowering and yield characters under Rajasthan district, Jhalawar

S. No.	Name of genotypes	days taken to first flower opening	Days taken to 50 per cent flowering	Flower diameter (cm)	Number of flowers per plant	Weight of flowers per plant (g)	Weight of flowers per plot (kg)	Estimated flower yield per hectare (q)
1.	Genotype - 1	56.40	77.87	5.67	96.40	346.70	27.57	237.44
2.	Genotype - 2	50.00	74.07	5.40	78.40	102.67	8.07	69.51
3.	Genotype - 3	45.45	67.93	5.88	104.20	233.07	18.51	159.46
4.	Genotype - 4	52.53	74.03	5.58	82.46	342.77	27.26	234.79
5.	Genotype - 5	50.47	75.40	5.50	90.40	304.03	24.21	208.58
6.	Genotype - 6	49.33	72.47	5.65	94.46	331.59	26.42	227.59
7.	Genotype - 7	47.20	67.53	5.65	117.93	385.65	30.79	265.17
8.	Genotype - 8	48.13	70.87	5.35	75.60	237.35	18.91	162.90
9.	Genotype - 9	45.60	68.20	5.94	92.46	281.75	22.44	193.25
10.	Genotype - 10	47.00	72.80	6.00	106.40	413.54	32.99	284.18
11.	Genotype - 11	42.60	64.93	6.29	131.53	578.72	45.89	395.26
12.	Genotype - 12	65.93	84.33	4.95	87.46	129.66	10.32	88.89
	Mean	50.05	72.54	5.66	96.48	307.29	24.45	210.58
	SEm±	0.55	0.69	0.11	0.60	3.46	30.60	2.63
	CD 5%	1.63	2.03	0.34	1.78	10.15	89.76	7.71

Fig. 2: Performance of gaillardia genotypes for flowering and yield characters under Rajasthan district, Jhalawar

