



Correlation studies in gaillardia (*Gaillardia pulchella* Foug.) genotypes

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Abstract: The association between fifteen different growth and floral characters towards flower yield per plant were studied in eight *Gaillardia pulchella* Foug. genotypes under hill zone of Karnataka. The correlation studies revealed that highly significant and positive association of flower yield per plant was recorded with days taken for first flowering, duration of flowering, flower diameter, number of florets per plant, number of whorls of petals per flower and single flower weight. Also plant height, plant spread, number of branches, number of leaves and leaf area also showed significant and positive correlation with flower yield, indicating the possibility of simultaneous selection for these traits to improvement of yield and its attributing parameters in the Gaillardia.

Keywords: *Gaillardia pulchella*, Genotypes, Correlation, Growth and Floral characters, blanket flower

Introduction

Gaillardia (*Gaillardia pulchella* Foug.), commonly known as 'Blanket Flower' because of its wide array of color and patterns including Mexican blankets, gold-tipped with russet-red centers but recent introductions have expanded the color range further. Sometimes gaillardia is referred to as fire wheel or Indian blanket or brown-eyed susan in European countries (Helen *et al.*, 2007). It's belongs to the family of Asteraceae with basic chromosomes number of $X=18$ and $2n=36$ (Srivastava and Kandpal, 2006) and native to Florida and western United States (Anon, 2007). The generic name of gaillardia was proposed in honour of Gaillard de Marentonneau in 18th century, a French supporter of botany (Bailey, 1929). The genus *Gaillardia* are gaining importance due to their wide range of flower form and color and is a potential crop for loose flower in both dry land, hilly region and for landscaping (Johnkilmer, 1989). Genotype correlation provides a reliable measure of genetic association between the characters (Al-Jibourie *et al.*, 1958). However, correlation studies regarding their quality traits are negligible. So, in the present investigation an attempt was made to study the association between quality parameters in gaillardia.

Materials and Methods

The present experiment was carried out at experimental block of Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere, (University of Agriculture and Horticultural Sciences, Shivamogga) during the period from October 2014 to April 2015 to study the association between various characters towards the flower yield of eight gaillardia genotypes (table-1). The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. Forty five old seedlings were transplanted in ridges and furrow after irrigation and other

cultural practices are followed as per standard recommendations (Anon., 2008). The observations were recorded on five randomly tagged plants from each genotypes of each replication avoiding border plants. Observations were recorded on various parameters and statistically analyzed according to Al-Jibourie *et al.*, (1958).

Results and Discussion

Estimates of coefficients of correlation worked out at genotypic and phenotypic level for growth and flowering traits are presented in table 2 and 3. Character association on correlation is a measure of the degree of association between two characters. The genotypic correlation provides an estimate of inherent association between genes controlling any two characters. In the present study, it was observed that the genotypic correlation was more than the phenotypic correlation, indicating the presence of inherent association between various characters. Similar trend has been observed by Magar *et al.* (2010) in gerbera. The plant height produced at 90 DAT significantly correlated in positive direction with plant spread (E-W) at 90 DAT, plant spread (N-S) at 90 DAT, number of leaves at 90 days after transplanting, stem girth at 90 DAT, leaf area, diameter of flower, duration of flowering and flower yield per hectare both at genotypic and phenotypic level. Similar results were observed by Kumar (2011) in marigold and Vikas *et al.* (2011) in dahlia. However it showed non-significant correlation with other characters.

The plant spread (E-W) at 90 DAT had significant positive correlation with plant spread, number of branches per plant, number of leaves, stem girth, leaf area and flower yield per hectare, while it was positive and non significant for dry weight at 90 DAT. The number of branches produced per plant exhibited significant and positive association with number of leaves per plant, stem girth, leaf area, number flowers per plant, number of flowers per plot, flower

yield per plant and flower yield per hectare. Flower weight had significant and negative correlation with number of branches produced per plant at genotypic level. This trend was confirmed by Misra *et al.*, (2013) in chrysanthemum.

The number of leaves produced per plant showed significant positive correlation with stem girth, dry weight, leaf area, duration of

flowering and flower yield per hectare. Similar findings were reported by Vikas *et al.* (2011) in dahlia. The genotypic and phenotypic correlation of stem girth at 90 DAT was significantly positive correlated with leaf area, number of flowers per plot, flower yield per plant, duration of flowering, flower weight, and flower yield per hectare. Similar findings were reported by Vikas *et al.* (2011) in dahlia. The character dry weight had highly significant and positive association with number of leaves produced per plant and number of branches produced per plant at genotypic level. It was significantly negative association with diameter of flower and flower weight at genotypic level. Similar observations have been reported by Kumar (2011) and Gourishankaraya *et al.* (2005) in marigold. The leaf area showed significant and positive correlation with flower yield per hectare, dry weight, stem girth, number of leaves, number of branches produced per plant, plant spread and plant height. This is in line with the findings of Singh and Singh (2010) in marigold and in chrysanthemum by Punetha *et al.* (2012).

The flower diameter exhibited significant and positive correlation with duration of flowering and flower weight, stem girth,

Table-1: Details of the genotypes used in study were

Genotypes	Type	Colour
Arabhavi Gaillardia Collection-1 (AGC-1)	Double	Yellow
Arabhavi Gaillardia Collection-2 (AGC-2)	Double	Reddish centre with outer yellow
Dharwad Gaillardia Collection-1 (DGC-1)	Double	Bright yellow
Dharwad Gaillardia Collection-2 (DGC-2)	Double	Red tinged with yellow
Sarpan Gaillardia Collection-1 (SGC-1)	Double	Bright red
Sarpan Gaillardia Collection-2 (SGC-2)	Double	Bright pink
Sarpan Gaillardia Collection-3 (SGC-3)	Double	Bright yellow
Sarpan Gaillardia Collection-4 (SGC-4)	Double	Yellow tinged with red

Table-2: Genotypic correlation coefficient for growth, flowering and yield characters in gaillardia genotypes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.000	0.952**	0.927**	0.382*	0.687**	0.614**	0.275	0.825**	0.526**	0.022	-0.002	0.352*	0.643**	0.362*	0.727**
2		1.000	1.001**	0.569**	0.699**	0.705**	0.327*	0.842**	0.461**	-0.054	-0.042	0.240	0.638**	0.312*	0.664**
3			1.000	0.612**	0.735**	0.758**	0.288	0.794**	0.397**	-0.020	-0.058	0.279	0.737**	0.288	0.646**
4				1.000	0.628**	0.659**	0.428**	0.624**	-0.291	0.522**	0.469**	0.431**	0.459**	-0.397**	0.690**
5					1.000	0.538**	0.747**	0.854**	-0.182	-0.039	-0.091	0.245	0.523**	-0.168	0.504**
6						1.000	0.045	0.517**	0.566**	0.366*	0.569**	0.643**	0.976**	0.441**	0.706**
7							1.000	0.708**	-0.455**	-0.366*	-0.299*	-0.287	-0.070	-0.405**	0.081
8								1.000	0.934**	-0.062	-0.050	0.100	0.344*	-0.021	0.623**
9									1.000	-0.116	0.197	0.196	0.582**	1.001**	0.310*
10										1.000	0.893**	0.842**	0.298*	-0.301*	0.667**
11											1.000	0.801**	0.402**	-0.007	0.641**
12												1.000	0.765**	0.002	0.825**
13													1.000	0.473**	0.647**
14														1.000	-0.012

Table-3: Phenotypic correlation coefficient for growth, flowering and yield characters in gaillardia genotypes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.000	0.905***	0.821**	0.302*	0.664***	0.508**	0.281	0.800***	0.427**	-0.015	-0.003	0.338*	0.591**	0.335*	0.688***
2		1.000	0.942**	0.478**	0.675***	0.538**	0.298*	0.811***	0.337*	-0.047	-0.034	0.223	0.598**	0.280	0.627**
3			1.000	0.508**	0.698***	0.554**	0.253	0.748***	0.273	-0.015	-0.030	0.274	0.607**	0.232	0.560**
4				1.000	0.571**	0.517**	0.342*	0.571**	-0.197	0.481**	0.412**	0.392**	0.296*	-0.333*	0.615***
5					1.000	0.455**	0.721***	0.848***	-0.144	-0.039	-0.087	0.231	0.432*	-0.162	0.483**
6						1.000	0.083	0.423*	0.352*	0.303*	0.455**	0.450**	0.691***	0.451**	0.536**
7							1.000	0.666***	-0.328*	-0.351*	-0.287	-0.264	-0.057	-0.318*	0.084
8								1.000	0.037	-0.058	-0.048	0.114	0.277	-0.032	0.594**
9									1.000	-0.094	0.128	0.184	0.455**	0.795***	0.161
10										1.000	0.866***	0.812***	0.253	-0.287	0.634**
11											1.000	0.725***	0.355*	-0.013	0.625**
12												1.000	0.576**	-0.020	0.726**
13													1.000	0.411**	0.541**
14														1.000	-0.001
15															1.000

Where: *Significant at p = 0.05 probability (0.294), ** Significant at p = 0.01 probability (0.380), DAT- Days after transplanting, 1- Plant height (90 DAT) (cm), 2-Plant spread (E-W) (90 DAT) (cm), 3-Plant spread (N-S) (90 DAT) (cm), 4-Number of branches (90 DAT), 5-Number of leaves (90 DAT), 6-Stem girth (90 DAT) (mm), 7-Dry weight (90 DAT) (g), 8-Leaf area (cm²), 9-Flower diameter (cm), 10-Number of flower/plant, 11-Number of flower/plot, 12-Flower yield/plant, 13-Duration of flowering, 14-Individual flower weight (g), 15-Flower yield/ha

plant spread and plant height. Similar results were reported by Vikas *et al.* (2011) in dahlia and in chrysanthemum by Punetha *et al.* (2012). Negative and significant correlations were shown by dry weight of plant. The number of flowers produced per plant exhibited significant and positive correlation with stem girth, number of flowers per plot, number of flowers produced per plant, number of branches and flower yield per hectare at both genotypic and phenotypic levels. Similar results were reported by Karuppaiah and Kumar (2010) in marigold. However it showed non-significant correlation with other characters. The number of flowers produced per plot showed significant and positive correlation with flower yield per plant and flower yield per hectare at both genotypic and phenotypic level. It had significant and positive correlation with number flowers per plant, duration of flowering and number of genotypic level. At phenotypic level number of flowers produced per plot had significant and positive correlation with number of flowers per plant, stem girth and number of branches per plant.

Flower yield per plant showed significant and positive correlation with duration of flowering, flower yield per hectare, number of flowers per plot, number of flowers per plant, stem girth and number of branches at both genotypic and phenotypic level. Similar findings were reported by Anuja and Jahnavi (2012) in marigold.

References

- Al-jbourie, H.A., Miller, P.A. and Robinson, H.F: Genetic and environmental variance in an upland cotton crosses on inter-specific origin. *Agron. J.*, **50**: 633-637 (1958).
- Anonymous: U.S. department of agriculture. The plant database (2007).
- Anonymous: Package of practices for horticulture crops (In Kannada). Univ. Agri. Sci., Dharwad, p. 167 -168 (2008).
- Anuja, S. and Jahnavi, K: Correlation and path co-efficient analysis in French marigold. *Asian J. Hort.*, **7**: 269-271 (2012).
- Bailey, L. H: *The Std. Cyclopedia. Hort.* The MacMillan Company, New York (1929).
- Gourishankarayya, M., Hedge, L., Reddy, B. S. and Mulge, R: Correlation and path co-efficient analysis in African marigold (*Tagetes erecta* L.). *Karnataka J. Hort.*, **1**: 22-27 (2005).
- Helen, D., Hammond, Richard, K. S., Sandra, B. W. and Jeffrey, G. N: Evaluation of gaillardia cultivars and ecotypes for landscape performance in North-Central Florida. *SNA. Res. conference*, **52**: 204-209 (2007).
- Johnkilmer: The annual encyclopedia. Crescent Books, New York, p. 77 (1989).
- Kumar, J: Correlation and path analysis in African marigold (*Tagetes erecta* L.). *J. Orn. Hort.*, **14**: 447-483 (2011).
- Karuppaiah, P. and Kumar, P.S.: Correlation and path analysis in African marigold (*Tagetes erecta* L.). *Elec. J. Plt. Breeding*, **1**: 217-220 (2010).
- Magar, S.D., Warade, S.D., Nalge, N.A. and Nimbalkar, C.A.: Correlation and path analysis studies in gerbera (*Gerbera jamesonii*). *Int. J. Plant Sci.*, **5**: 553-555 (2010).
- Misra, S., Mandal, T., Vanlalruati. and Das, S.K.: Correlation and path coefficient analysis for yield contributing parameters in spray chrysanthemum. *J. Hort. Letters.*, **3**: 14-16 (2013).
- Punetha, P., Rao. V.K., Dhami, V. and Kumar, S.: Correlation and path analysis in chrysanthemum. *J. Orn. Hort.*, **15**: 216-221 (2012).
- Singh, A.K. and Singh, D.: Genetic variability, heritability and genetic advance in marigold. *Indian J. Hort.*, **67**: 132-136 (2010).
- Srivastava, R. and kandpal, K.: Gaillardia. In: S.K Bhattacharjee (ed), advances in ornamental horticulture Vol. I, *Pointer Publisher*, Jaipur, p. 294-304 (2006).
- Vikas, H. M., Patil, V. S., Agasimani, A. D. and Praveenkumar, D. A.: Performance and correlation studies in dahlia (*Dahlia variabilis* L.). *I.J.S.N.*, **2**: 379-383 (2011).