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Correlation studies in *Tagetes erecta* L.

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Abstract

The correlation study is an important aspect in the selection programme and can make the breeder to select the correlated and uncorrelated response. The experimental material consisted of 31 diverse genotypes collected from different places of India and the experiment was conducted at Western block, Horticultural College and Research Institute, Periyakulam during two seasons of August, 2013 to November, 2013 and December, 2013 to March, 2014 and experiment was laid out under Randomized Block Design with three replications. Plant height had positive significant correlation, whereas positive non significant correlation was found for characters such as germination percentage, internodal length, days to flowering, bud diameter, buds per plant, number of flowers, flower diameter, flower stalk length, flower stalk girth, shelf life and individual flower weight.

Keywords: *Tagetes erecta*, correlation, direct and indirect effect

Introduction

Marigold is known for its bright orange colored flowers as well as its numerous medicinal properties. Marigold is grown mainly in March and April and is known to grow rapidly. Today it is one of the most sought commercial flower grown world over and in India as well, accounting for more than half of the nation's loose flower production. It is native of south and Central America, precisely Mexico. Till date, very little research work has been done towards the crop improvement. It has been reported that, marigold genotypes exhibit a lot of variation for growth and flower yield (Nalawadi, 1982). Important species of African marigold are Giant Double African Orange, Giant Double African Yellow, Cracker Jack, Climax, Golden age. There are different varieties of the plant and they are divided into four basic species. These include African Marigold, French Marigold, Triploids, and Single Marigold. Marigold cultivation controls the nematode population in soil and is used for making mosquito repellent products (Gupta *et al.* 2001). In India, marigold ranks first among the loose flowers followed by chrysanthemum, jasmine and crossandra (Kavitha and Anburani, 2009) [8]. Although a recent upsurge in the cultivation of marigold is evident, large efforts towards varietal improvement and increased yields lack realization. Health benefits and therapeutic uses of marigold flowers as well as the leaves of the marigold include it being beneficial in minimizing the number of tumors in the case of breast cancer as well as in the prevention of the development of new cancer cells. Correlation coefficient is the significant selection parameter in plant breeding. It is used to find out the degree (strength) and direction of relationship between two or more variables. In plant breeding, correlation coefficient analysis measures the mutual relationship between various plant characters and determines the component character, on which, selection can be based for genetic improvement in yield, which is a very complex phenomenon.

Materials and Method

The experimental material consisted of 67 genotypes collected from different places of India out of which 31 genotypes belongs to the species *Tagetes erecta* which was grown in Randomized Block Design with three replications at Western block Horticultural College and Research Institute, Periyakulam, during two seasons of August, 2013 to November, December to March, 2014 by raising them in Randomized block design replicated thrice. The field was ploughed twice thoroughly and leveled properly. Bunds and channels were laid and ridges and furrows were formed. Sixty seven genotypes were raised in a randomized block design (RBD) with three replications in two seasons. The plants were transplanted on one side of ridges with a spacing of 40 x 30 cm (*Tagetes erecta*). The observations on growth parameters were taken at peak flowering, where as flower yield and its attributing characters were taken at full bloom stage. Observations of five plants in each row were recorded for twenty quantitative characters

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viz., germination percentage, plant height, internodal length, number of branches per plant, days to flowering, bud appearance, bud diameter, buds per plant, number of flowers per plant, flower diameter, flower stalk length, flower stalk girth, duration of flowering, days to harvest, shelf life, crop duration, individual flower weight, flower yield per plant, xanthophyll content and carotenoid content. Correlation and path analysis shows the extent of association between yield and its components and also bring out relative importance of genotypic and phenotypic correlation coefficients, were calculated by the method suggested by Panse and Sukhatme (1967) [11]. The variance and covariance components were utilized to calculate genotypic correlation coefficients as outlined by Aljibour *et al.* (1958) & Dewey and Lu (1959) [5].

Results and Discussion

The correlation study is an important aspect in the selection programme and can make the breeder to select the correlated and uncorrelated response. Moll and Stuber (1975) suggested that correlation among the traits enhanced the rate and efficiency of selection of quantitative traits.

Correlation Analysis

The association of component characters of yield may provide information about the likely consequences of selection for simultaneous improvement of desirable characters. Genotypic correlation between yield of different traits in *Tagetes erecta* is represented in Table 1. In the present investigation, plant height had positive significant correlation, whereas positive non significant correlation was found for characters such as germination percentage, internodal length, days to flowering, bud diameter, buds per plant, number of flowers, flower

diameter, flower stalk length, flower stalk girth, shelf life and individual flower weight and negative significant association was found for traits viz., number of branches, bud appearance, duration of flowering and crop duration in *Tagetes erecta*. The work was in accordance with the research findings of Namita *et al.* (2009) [10] in marigold; Swapna *et al.* (2012) in rose; Vishnu priya *et al.* (2015) [18] and Bharathi *et al.* (2014) [3] in marigold.

Path Co Efficient Analysis

Direct Effect

Direct and indirect effects of different traits on yield in *Tagetes erecta* is given in Table 2. In the present day, it was observed that the germination percentage, plant height (0.2324), number of branches (0.0267), buds per plant (2.5322), flower stalk girth (0.2175), shelf life (0.7717), crop duration (0.0716) and individual flower weight (0.5558) exerted the highest positive and direct effect on flower yield. The negative direct effect on flower yield was exerted by internodal length (-0.0391), days to flowering (-0.0566), bud appearance (-0.5391), bud diameter (-0.0831), number of flower per plant (-2.4916), flower diameter (-1.1525), flower stalk length (-0.0263), duration of flowering (-0.1332), day of harvest (-0.1273). The residual effect is 0.399. The findings are in line with the results of Rao *et al.* (1982) [12]; Mohanty *et al.* (2003) [9]; Singh *et al.* (2005) [13], Deepti *et al.* (2008) [4], Gupta (2009) [7]; Namita *et al.* (2009) [10] in marigold; Swapna *et al.* (2012) in rose; Swarup *et al.* (1973) [16] in hollyhock; Gowda *et al.* (2002) [6]; Vanlalruati *et al.* (2013) [17] in tuberose; Balaram *et al.* (2009) [2] in gladiolus; Shiragur *et al.* (2004) [15] in carnation.

Table 1: Genotypic correlation between yield of different traits in *Tagetes erecta*

Characters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Yield
1	1.000	0.321	0.419	0.134	0.032	-0.290	0.420	0.153	0.155	0.234	0.212	0.209	0.204	-0.127	0.292	-0.384	0.168	0.289*
2		1.000	0.034	-0.041	0.585	-0.500	0.501	0.325	0.325	0.441	0.438	0.244	0.205	-0.157	0.377	-0.346	0.498	0.524*
3			1.000	0.162	-0.041	-0.115	0.183	-0.054	-0.057	-0.259	0.021	0.156	0.089	-0.395	-0.211	-0.303	0.176	0.334*
4				1.000	-0.085	0.417	-0.199	0.087	0.086	-0.196	0.221	-0.295	-0.055	0.015	0.086	-0.149	-0.114	-0.025**
5					1.000	-0.371	0.496	0.313	0.310	0.497	0.167	0.348	-0.018	0.031	0.410	-0.207	0.620	0.401*
6						1.000	-0.649	-0.349	-0.350	-0.647	-0.287	-0.391	-0.054	0.091	-0.534	0.138	-0.550	-0.636*
7							1.000	0.259	0.259	0.409	0.421	0.365	0.021	-0.402	0.255	-0.141	0.380	0.419
8								1.000	1.000	0.283	0.342	-0.158	0.118	-0.010	0.408	-0.398	0.148	0.262**
9									1.000	0.290	0.346	-0.152	0.114	-0.004	0.415	-0.401	0.146	0.260**
10										1.000	0.348	0.536	-0.190	0.322	0.911	-0.126	0.433	0.275*
11											1.000	0.363	-0.062	-0.234	0.427	-0.491	0.133	0.290
12												1.000	-0.322	-0.019	0.397	-0.352	0.317	0.286
13													1.000	-0.085	-0.247	-0.226	0.051	-0.055*
14														1.000	0.376	0.040	0.025	-0.239*
15															1.000	-0.210	0.360	0.325*
16																1.000	-0.188	-0.242
17																	1.000	0.733*

Significance at 5 % level

Names of characters

1. Germination percentage	2. Plant height	3. Internodal length	4. Number of branches
5. Days to flowering	6. Bud appearance	7. Bud diameter	8. Buds per plant
9. Number of flowers per plant	10. Flower diameter	11. Flower stalk length	12. Flower stalk girth
13. Duration of flowering	14. Days to harvesting	15. Shelf life	16. Crop duration
17. Individual flower weight	18. Flower yield per plant		

Table 2: Direct and Indirect effects on different traits on yield in *Tagetes erecta*

Characters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0.05551	0.07458	-0.01641	0.00357	-0.00180	0.15628	-0.03498	0.38802	-0.38570	-0.26998	-0.00559	0.04547	-0.02723	0.01623	0.22502	-0.02754	0.09320	0.289
2	0.01781	0.23248	-0.00135	-0.00111	-0.03311	0.26975	-0.04171	0.82219	-0.80877	-0.50870	-0.01154	0.05308	-0.02732	0.01999	0.29066	-0.02481	0.27654	0.524
3	0.02326	0.00800	-0.03917	0.00432	0.00232	0.06203	-0.01522	-0.13563	0.14140	0.29798	-0.00054	0.03396	-0.01189	0.05032	-0.16312	-0.02169	0.09785	0.334
4	0.00741	-0.00964	-0.00633	0.02677	0.00484	-0.22489	0.01658	0.22143	-0.21426	0.22543	-0.00583	-0.06415	0.00736	-0.00193	0.06609	-0.01066	-0.06350	-0.025
5	0.00176	0.13594	0.00161	-0.00229	-0.05662	0.19987	-0.04125	0.79267	-0.77311	-0.57335	-0.00440	0.07577	0.00240	-0.00389	0.31604	-0.01482	0.34448	0.401
6	-0.01609	-0.11632	0.00451	0.01117	0.02099	-0.53912	0.05396	-0.88360	0.87225	0.74589	0.00756	-0.08512	0.00719	-0.01155	-0.41240	0.00988	-0.30544	-0.636
7	0.02334	0.11657	-0.00716	-0.00533	-0.02808	0.34970	-0.08319	0.65595	-0.64564	-0.47151	-0.01109	0.07943	-0.00274	0.05121	0.19676	-0.01013	0.21095	0.419
8	0.00851	0.07548	0.00210	0.00234	-0.01773	0.18812	-0.02155	2.53222	-2.49168	-0.32613	-0.00901	-0.03436	-0.01565	0.00127	0.31488	-0.02853	0.08207	0.262
9	0.00859	0.07546	0.00222	0.00230	-0.01757	0.18874	-0.02156	2.53231	-2.49160	-0.33389	-0.00912	-0.03297	-0.01524	0.00046	0.32009	-0.02874	0.08091	0.260
10	0.01300	0.10261	0.01013	-0.00524	-0.02817	0.34890	-0.03403	0.71654	-0.72180	-1.15254	-0.00916	0.11659	0.02529	-0.04099	0.70287	-0.00903	0.24039	0.275
11	0.01179	0.10185	-0.00080	0.00592	-0.00946	0.15484	-0.03504	0.86608	-0.86332	-0.40090	-0.02633	0.07897	0.00827	0.02977	0.32929	-0.03518	0.07415	0.290
12	0.01160	0.05672	-0.00611	-0.00789	-0.01972	0.21095	-0.03037	-0.39989	0.37756	-0.61770	-0.00956	0.21755	0.04284	0.00241	0.30621	-0.02521	0.17626	0.286
13	0.01135	0.04768	-0.00350	-0.00148	0.00102	0.02910	-0.00171	0.29758	-0.28506	0.21884	0.00163	-0.06997	-0.13320	0.01082	-0.19072	-0.01620	0.02860	-0.055
14	-0.00707	-0.03648	0.01547	0.00040	-0.00173	-0.04889	0.03344	-0.02516	0.00909	-0.37085	0.00615	-0.00411	0.01132	-0.12739	0.28995	0.00287	0.01385	-0.239
15	0.01619	0.08756	0.00828	0.00229	-0.02319	0.28810	-0.02121	1.03316	-1.03341	-1.04968	-0.01124	0.08632	0.03292	-0.04786	0.77174	-0.01504	0.19997	0.325
16	-0.02133	-0.08049	0.01185	-0.00398	0.01170	-0.07429	0.01176	-1.00792	0.99925	0.14516	0.01293	-0.07652	0.03010	-0.00510	-0.16192	0.07167	-0.10463	-0.242
17	0.00931	0.11567	-0.00689	-0.00306	-0.03509	0.29627	-0.03157	0.37391	-0.36269	-0.49849	-0.00351	0.06899	-0.00685	-0.00318	0.27766	-0.01349	0.55581	0.733

Residual effect= 0.399 Bold faced hexagonal values are direct effects

Names of Character

1. Germination percentage	2. Plant height	3. Internode length	4. Number of branches
5. Days to flowering	6. Bud appearance	7. Bud diameter	8. Buds per plant
9. Number of flowers per plant	10. Flower diameter	11. Flower stalk length	12. Flower stalk girth
13. Duration of flowering	14. Days to harvesting	15. Shelf life	16. Crop duration
17. Individual flower weight	18. Flower yield per plant		

Reference

- Al-Jibouri HA, Miller PA, Robinson HF. Genotypic and environmental variances and covariance in and upland cotton cross of interspecific origin. *Agron. J.* 1958; 50: 633-636.
- Balaram MV, Janakiram T. Correlation and path co efficient analysis in gladiolus. *J Ornamental. Hort.* 2009; 12:22-29.
- Bharathi T, Jawaharlal M, Kannan M, Manivannan N, Raveendran. Correlation and path analysis in African marigold (*Tagetes erecta* L.). 2014; 9(4):1673-1676.
- Deepti S, Misra KK, Correlation studies among various floral attributes of marigold (*Tagetes* spp). 2008; 40(1).
- Dewey DR, Lu KU. A correlation path co efficient analysis of components of crested wheat grass production. *Agron. J.* 1959; 51:515-18.
- Gowda JVN. Correlation studies in tuberose. National symposium on Indian Floriculture in the New Millennium, Bangalore, India, 2002, 54.
- Gupta AK, Saini Gupta RKMM, Verma RK, Krishna A. Studies on genetic variation for xanthophyll content in African marigold (*Tagetes erecta*) germplasm. *J Med. and Aro. Plant Sci.* 2009; 31(1):33-38.
- Kavitha R, Anburani A. Genetic diversity in African marigold genotypes. *Journal of Ornamental Horticulture.* 2009; 5(2):344-345.
- Mohanty CR, Niharikapattanaik Mishra M, Mohapatra A. Correlation studies in African marigold. IN: *Natl. Symposium on Recent Advances in Indian Floriculture*, Nov: 12-14, KAU, Kerala, 2003.
- Namita Pal SK, Bharadwaj C, Prasad KV, Raju DVS. Studies on character association and path analysis of quantitative traits among parental lines of marigold. (*Tagetes erecta* and *Tagetes patula*) and their interspecific F₁ hybrids. *Ind J Hort.* 2009; 66(3):348-352.
- Panse VG, Sukhatme BV. *Statistical Methods for Agricultural Workers.* ICAR Publication, New Delhi, 1967, 100-109, 152-161.
- Rao MT. Studies on genetic and variability and correlation in China aster (*Callistephus chinensis* (L.) Nees). M.Sc. (Agri.) Thesis, UAS, Bangalore, 1982.
- Singh D, Singh AK. Correlation and Path Coefficient analysis in marigold (*Tagetes* spp). *Prog. Hort.* 2005; 37(2):385-388.
- Sapna P, Kanwar PS, Prasad KV, Satyavathi C, Tara, Namita. Character association and path coefficient analysis in rose (*Rosa hybrid*). *Ind. J Hort.* 2012; 69(2):231-238.
- Shiragur M, Shirol AM, Reddy BS. Correlation studies in carnation, *Karnataka J Agr. Sci.* 2004; 17(3):631-632.
- Swarup V, Raghav SPS, Balakrishnan KA. Genetic studies in hollyhock. *Ind. J Genet.* 1973; 33(3):366-370.
- Vanlalruati, Mandal T, Pradhan S. Correlation and path coefficient analysis in tuberose. Department of Floriculture and Landscaping, Faculty of Horticulture. *J Crop and Weed.* 2013; 9(2):44-49.
- Vishnupriya AK, Jawaharlal M, Kannan M, Manivannan N. Variability studies in African marigold (*Tagetes erecta* L.). *The Bioscan.* 2015; 10(1):407-409.