



Research Notes

Correlation and path analysis in african marigold (*Tagetes erecta* L.)

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Abstract

An investigation was carried out with 34 genotypes of African marigold to assess association of yield components and their direct and indirect effects on flower yield. Results of correlation analysis indicated that the flower yield per plant was found to be significantly and positively correlated with number of branches per plant, flower size, flower weight, number of flowers per plant and xanthophylls content. Days to first flowering showed a negative association with flower yield per plant. Path analysis has shown that number of flowers per plant and xanthophylls content showed high positive direct effects. Medium level of direct effect was recorded by flower diameter. Other characters recorded low or very low direct effects. Thus, the present study indicated that flower diameter, number of flowers per plant and xanthophylls content are important characters in deciding the flower yield per plant. Hence these characters may be considered as selection indices in marigold breeding programme.

Key words: *African Marigold (Tagetes erecta L.)*, *Correlation*, *Path analysis*

Marigold (*Tagetes erecta* L.) gained popularity among the growers due to its easy culture, wide adaptability, different colour, shape, size and good keeping quality with a short duration. It is used for making garlands, wreaths and religious offerings and also ideal for garden display both in beds and pots. It has also medicinal value. The main breeding objectives in marigold are high yield, early maturity, good shape, attractive colour, flower size and xanthophylls content. Less work has been done towards the genetic improvement of this plant for economic characters. Further, these economic characters are not only polygenically controlled but also considerably influenced by the fluctuating environmental conditions. Hence, an attempt was made to study correlation and path analysis in 34 genotypes of African Marigold including local and released varieties.

The present investigation was carried out at Floriculture Complex, Department of Horticulture, Faculty of Agriculture, Annamalai University during the period 2002-2004. Thirty four genotypes of

African marigold (*Tagetes erecta* L.) collected from diverse sources were used for the present study. Among the genotypes, 14 local genotypes from Thiruvannamalai District, 7 local genotypes from Madurai district, 5 local genotypes from Dindugul district, 5 local genotypes from Chidambaram taluk (Cuddalore district) and 2 from Coimbatore and one from Bangalore were collected. These were evaluated in a field experiment under Randomized Block Design with three replications. Twenty plants were maintained in each replication with a spacing of 20 X 30 cm between row and plant respectively. Cultural practices including need based plant protection measures were followed as per recommendations (Yadav and Bose, 1983).

Observations were recorded on three randomly tagged plants from each genotype in each replication. The mean values of the three plants in each replication were utilized for statistical analysis. Observations were recorded on the following characters viz., plant height, stem girth, number of branches per plant, days to first flowering, flower diameter (cm), flower size (cm), flower weight (g), number of flowers per plant, flower yield per plant and xanthophylls content. The simple correlation coefficients were worked out by following the method of Al-Jibouri *et al.* (1958). Path co-efficient

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analysis was done as suggested by Dewey and Lu (1959) to partition the simple correlation co-efficient into direct and indirect effects.

In any crop improvement programme, an understanding of the association between yield and its component is necessary. Thus correlation coefficient based on heritable part of the value provides an efficient basis for selection. With this objective in view, the correlation coefficients between yield and its components and inter correlation among the yield components were estimated.

The results showed that the flower yield per plant had positive and significant correlation with the number of branches per plant, flower diameter (cm), flower size (cm), flower weight (g), number of flowers per plant and xanthophylls content. This is in agreement with the reports by More (1980), Jhon *et al.* (2002) in gladiolus and Mohanty *et al.* (2003) in African marigold. However the association between flower yield per plant and days to first flowering had significant and negative. Among these correlated yield component traits, number of branches per plant had positive association with plant height, stem girth, flower diameter, flower stalk length and flower weight. Flower diameter had positive association with flower size, flower weight, number of flowers per plant and xanthophylls content. Flower size had positive association with flower weight and xanthophylls content but negative association with flower stalk length. Flower weight had positive association with xanthophylls content and xanthophylls content. The character days to first flowering had negative association with flower diameter, flower stalk length and xanthophylls content but positive association with plant height. These results are in agreement with the findings Anuradha and Gowda (1992) in gladiolus, Sreekala *et al.* (2002) in African marigold and Shiva *et al.* (2008) in Anthurium. Hence based on the correlation studies, the characters number of branches per plant, days to first flowering, flower diameter, flower size, flower weight, number of flowers per plant and xanthophylls content are the selection indices for flower yield per plant.

Path analysis was used in the present investigation to partition the direct and indirect effects that contribute to flower yield per plant. The residual effect of 0.59 indicates that some more characters need to be included in the path analysis. Among the direct effects on flower yield per plant, number of flowers per plant and xanthophylls content showed high positive direct effects. Medium level of direct effect was recorded by flower diameter. Other characters recorded low or very low direct effects.

This is in agreement with the findings of Deka and Paswan (2002) in chrysanthemum and Sanyat Misra *et al.* (2003) in carnation. In general all characters had low or very low indirect effect via other characters on flower yield per plant. The negatively correlated character days to first flowering had very low direct effect. Hence this character has no influence on the flower yield per plant. Thus, path analysis has shown that traits like flower diameter, number of flowers per plant and xanthophylls content are important characters in deciding the flower yield per plant. Hence these characters may be considered as selection indices in marigold breeding programme.

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Table 1. Simple correlation co-efficient on yield, yield attributes and xanthophylls content in African marigold (*Tagetes erecta* L.)

Characters	Stem girth	Number of branches per plant	Days to first flowering	Flower diameter	Flower size	Flower stalk length	Flower weight	Number of flowers per plant	Flower yield per plant	Xanthophylls content
Plant height	0.744**	0.509**	0.240*	0.172	-0.055	0.262**	0.288**	0.326**	0.193	0.333**
Stem girth		0.506**	0.057	0.165	0.001	0.231*	0.401**	0.179	0.186	0.293**
Number of branches per plant			0.113	0.462**	0.135	0.282**	0.641**	0.130	0.298**	0.143
Days to first flowering				-0.230*	-0.091	-0.196*	-0.159	-0.134	-0.347**	-0.365**
Flower diameter					0.368**	0.142	0.688**	0.471**	0.690**	0.361**
Flower size						-0.235*	0.349**	-0.041	0.432**	0.506**
Flower stalk length							0.299**	0.156	0.085	0.018
Flower weight								0.139	0.469**	0.370**
Number of flowers per plant									0.611**	0.283**
Flower yield per plant										0.613**

*,** Significant at 5 and 1 % level respectively



Table 2. Path co-efficient analysis depicting the direct (bold) and indirect effects on yield, yield attributes and xanthophylls content in African marigold (*Tagetes erecta* L.)

Characters	Plant height	Stem girth	Number of branches per plant	Days to first flowering	Flower diameter	Flower size	Flower stalk length	Flower weight	Number of flowers per plant	Xanthophylls content	Correlation with Flower yield per plant
Plant height	-0.1501	0.0229	0.0670	-0.0201	0.0465	-0.0089	-0.0010	-0.0036	0.1369	0.1035	0.193
Stem girth	-0.1117	0.0308	0.0666	-0.0048	0.0446	0.0002	-0.0009	-0.0050	0.0752	0.0911	0.186
Number of branches per plant	-0.0764	0.0156	0.1317	-0.0095	0.1248	0.0219	-0.0011	-0.0080	0.0546	0.0444	0.298**
Days to first flowering	-0.0360	0.0018	0.0149	-0.0838	-0.0621	-0.0148	0.0008	0.0020	-0.0563	-0.1134	-0.347**
Flower diameter	-0.0258	0.0051	0.0608	0.0193	0.2701	0.0597	-0.0006	-0.0086	0.1978	0.1122	0.690**
Flower size	0.0083	0.0000	0.0178	0.0076	0.0994	0.1623	0.0009	-0.0044	-0.0172	0.1573	0.432**
Flower stalk length	-0.0393	0.0071	0.0371	0.0164	0.0384	-0.0382	-0.0039	-0.0037	0.0655	0.0056	0.085
Flower weight	-0.0432	0.0124	0.0844	0.0133	0.1858	0.0567	-0.0012	-0.0125	0.0584	0.1150	0.469**
Number of flowers per plant	-0.0489	0.0055	0.0171	0.0112	0.1272	-0.0067	-0.0006	-0.0017	0.4199	0.0880	0.611**
Xanthophylls content	-0.0500	0.0090	0.0188	0.0306	0.0975	0.0821	-0.0001	-0.0046	0.1188	0.3108	0.613

Residual= 0.59