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Correlation Between Yield and its Attributing Traits in Crossandra

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ABSTRACT: A study was undertaken to determine association between different quantitative and qualitative traits of 10 genotypes of crossandra collected from various sources. The correlation analysis revealed that, all vegetative parameters (plant height, plant spread, number of branches, leaf area) and flowering parameters (number of flowers per spike, number of spikes per plant and spike length) showed significant and positive correlation with flower yield per plant. However, the number of days for spike initiation and number of days for first harvest showed significant negative correlation with flower yield per plant.

All the quality attributes like flower diameter, corolla length, weight of 100 flowers and shelf life showed a significant and positive correlation with each other except corolla length with shelf life, which showed a non-significant correlation coefficient. These traits may serve as effective selection parameters for breeding in Crossandra for improvement of the yield.

Keywords: Crossandra, vegetative & flowering parameters, positive correlation, negative correlation.

INTRODUCTION

Crossandra [*Crossandra infundibuliformis* (L.) Nees] is commonly known as firecracker flower in English, Kanaka-ambaram in Tamil, Malayalam and Telugu, Aboli in Marathi, Kanakambarain Kannada, belongs to the family Acanthaceae.

It is an important loose flower in South India and commercially grown in Karnataka, Tamil Nadu and Andhra Pradesh (Bhattacharjee, 2006). In India, crossandra is cultivated in an area of 3,003 ha with a production of 1,65,300T (NHB, 2022). In Andhra Pradesh, it is mostly cultivated in Chittoor, Ananthapur, Kurnool and East Godavari districts. Its flowers are very popular due to their attractive bright colour and light weight. It has a very high market demand, fetching a high price in the Indian flower market. This flower is also a valuable or namental pot flower in Sweden, Denmark and Hungary.

Many public/private varieties have been released for commercial cultivation, however their performance is not assessed for their suitability in this region, hence an investigation on evaluation of crossandra genotypes to assess their performance with respect to growth, flowering was carried out.

MATERIAL AND METHODS

The present experiment was carried out at Dr. YSRHU-College of Horticulture, Anantharajupeta, Annamayya district, Andhra Pradesh during the year 2022-2023. The experiment was laid out in Randomized Block Design (RBD) with ten genotypes as treatments and three replications. The treatments include *viz.*, Arka Ambara, Arka Shreeya, Arka Shravya, Arka Chenna, Arka Kanaka, Lakshmi, Pallur Local, Mydukur Local, Piler Local and Chitvel Local cultivar. The plants were spaced at 45 × 45 cm and all the standard agricultural practices were followed for general cultivation and maintenance.

The quantitative characters such as plant height, days to flower bud appearance, days to flower bud opening, number of primary branches, number of secondary branches, number of flowers per plant, flower size, number of petals per flower, single flower weight, stem girth, total crop duration and flower yield per plant were studied. The observed data were subjected to statistical analysis. Correlation coefficients between flower yield and its attributing traits, were worked out by using the formula suggested by Karl Pearson (1948).

RESULTS AND DISCUSSION

The results of correlation coefficients between yield and its attributes in crossandra cultivars are discussed Table 1.

Yield per plant. The results obtained through the correlation coefficients indicate a strong association between plant morphological characters with yield. A

positive correlation between desirable characters is favorable to the plant breeder which helps in simultaneous improvement of both the characters.

There existed a positive and significant correlation between yield per plant with number of spikes per plant (0.95**), plant spread (0.92**), plant height (0.87**), leaf area (0.94**), spike length (0.70**), number of flowers per spike (0.57**), number of branches (0.51**) and corolla length (0.50**). Significant and positive correlation was estimated with weight of 100 flowers (0.37*). Whereas, a highly negative and significant correlation was observed between yield per plant and number of days for spike initiation (-0.71**) and number of days for first harvest (-0.68**) was also observed.

Similar results were also reported by Aditya *et al.* (2020) in china aster, Arulmani *et al.* (2016) in gaillardia, Karuppaiah and Kumar (2010) in marigold.

Plant height. Plant height (cm) was found to exhibit highly significant and positive correlation with plant spread (0.79**), leaf area (0.79**), number of spikes per plant (0.77**), number of flowers per spike (0.70**), spike length (0.62**). The correlation of this trait with corolla length (0.40*) was found significant at 5%. However, highly significant and negative correlation was observed with respect to number of days for spike initiation (-0.60**) and number of days for first harvest (-0.57**).

These results are in accordance with the reports made by Tirakannanavar *et al.* (2015) in China aster, Kumar *et al.* (2012) in chrysanthemum and Shivakumar (2014) in marigold.

Plant spread. There existed a highly significant and positive correlation between the plant spread and leaf area (0.95**), number of spikes per plant (0.95**), number of branches (0.70**), corolla length (0.55**), weight of 100 flowers (0.52**). Significant and positive association was observed with spike length (0.61*), shelf life (0.45*), number of flowers per spike (0.39*) and flower diameter (0.37*), whereas, highly significant and negative correlation observed with number of days to spike initiation (-0.74**) and number of days for first harvest (-0.72**).These results were in agreement with the findings of Kumar *et al.* (2012); Poornima *et al.* (2007).

Number of branches. The correlation between the number of branches and variables like shelf life (0.73**), number of spikes per plant (0.65**), weight of 100 flowers (0.63**), leaf area (0.60**), flower diameter (0.56**) and yield per plant (0.51**) was highly positive and significant. There was significant and highly negative correlation with duration of flowering (-0.53**), days for first harvest (-0.50**) and days for spike initiation (-0.46**).

Leaf area. It is evident from the data in Table 1, that there was significant and highly positive correlation of leaf area with number of spikes per plant (0.92**), spike length (0.61**), number of branches (0.60**), corolla length (0.54**) and weight of 100 flowers (0.48**). Significant and positive correlation was noticed with number of flowers per spike (0.44*) and shelf life (0.38*). There was significant and highly negative association with days for spike initiation (-0.69**) and days for first harvest (-0.67**).

These results were in agreement with the findings of Aditya *et al.* (2020) in China aster, Ranchana *et al.* (2013) in tuberose and Bharathi *et al.* (2014) in marigold.

Number of days for spike initiation. The data pertaining to correlation analysis showed that, the number of days for spike initiation had highly significant and positive correlation with number of days for first harvest (0.98**). Whereas, it had highly negative and significant correlation with the traits *viz.*, number of spikes per plant (-0.79**), leaf area (-0.69**), spike length (-0.65**) and shelf life (-0.61**). Significant and negative association was noticed between number of days for spike initiation and corolla length (-0.41*).Similar results were also found by Tejaswi *et al.* (2020).

Number of days for first harvest. The number days for first harvest recorded highly significant and negative correlation with number of spikes per plant (-0.76**), spike length (-0.62**), shelf life (-0.60**) and number of branches (-0.50**).

Duration of flowering. In the present study, duration of flowering was observed to show highly significant positive association with number of flowers per spike (0.82**) and spike length (0.68**). Significant and negative correlation was observed with shelf life (-0.52*) and corolla length (-0.49*). These results are similar to the findings of Tejaswi *et al.* (2020); Das (2017) in crossandra.

Number of flowers per spike. The highly positive and significant correlation was observed by number of flowers per spike with spike length (0.83**) and corolla length (0.42*). Whereas, significant and negative correlation was observed with flower diameter (-0.37*) and shelf life (-0.38*).

Number of spikes per plant. The correlation between number of spikes per plant with parameters like spike length (0.60**), shelf life (0.55**) and weight of 100 flowers (0.47**) was found significant and highly positive. The trait's association with corolla length (0.46*), number of flowers per spike (0.38*) and flower diameter (0.37*) was found significant and positive.

These results are in agreement with earlier findings by Rajiv *et al.* (2014); Negi *et al.* (1983) in China aster, Karuppaiah and Kumar (2010) in chrysanthemum, Singh and Kumar (2008) in marigold, Singh (2003); Suman *et al.* (1980) in dahlia.

Weight of 100 flowers. The weight of 100 flowers was highly significant and positively correlated with flower diameter (0.91**) and corolla length (0.64**). Significant and positive correlation was exhibited with shelf life (0.40*). Similar results were reported by Tarannum and Naik (2014) in carnation.

Spike length. The data in Table 1 showed that the correlation of spike length was found to be highly significant and positive with corolla length (0.55**). Neeraj and Jha (2001) also reported significant positive correlation between plant height and spike length.

Flower diameter. This character exhibited highly significant and positive correlation with shelf life

(0.51**) and corolla length (0.50**). These results are in line with the findings of Tarannum and Naik (2014) in carnation.

Corolla length. A significant and positive correlation was observed in corolla length with yield per plant (0.50**).

Shelf life. Highly significant and positive correlation was observed by shelf life with number of branches (0.73**), number of spikes per plant (0.55**) and flower diameter (0.51**). The significant and positive correlation was observed plant spread (0.45*), weight of 100 flowers (0.40*) and leaf area (0.38*). Negative and highly significant association was observed with number of days for spike initiation (-0.61**), number of days for first harvest (-0.60**) and duration of flowering (-0.52**). Significant and negative correlation was noticed with number of flowers per spike (-0.38*).

These findings were indicative of potential direct and indirect influence on yield parameters. Similar findings were reported by Vishnupriya *et al*. (2015).

Table 1: Correlation coefficients between yield and its attributes in crossandra cultivars.

Variables	PH	PS	NB	LA	DSI	DFH	DF	NFS	NSP	WHF	SPL	FD	CL	SL	YPP
PH	1														
PS	0.79**	1													
NB	0.28	0.70**	1												
LA	0.79**	0.95**	0.60**	1											
DSI	-0.60**	-0.74**	-0.46**	-0.69**	1										
DFH	-0.57**	-0.72**	-0.50**	-0.67**	0.98**	1									
DF	0.28	0.07	-0.53**	0.15	-0.01	0.02	1								
NFS	0.70**	0.39*	-0.32	0.44*	-0.35	-0.3	0.82**	1							
NSP	0.77**	0.95**	0.65**	0.92**	-0.79**	-0.76**	0.04	0.38*	1						
WHF	0.17	0.52**	0.63**	0.48**	-0.23	-0.26	-0.16	-0.21	0.47**	1					
SPL	0.62**	0.61*	-0.01	0.61**	-0.65**	-0.62**	0.68**	0.83**	0.60**	-0.02	1				
FD	0.03	0.37*	0.56**	0.33	-0.28	-0.32	-0.31	-0.37*	0.37*	0.91**	-0.13	1			
CL	0.40*	0.55**	0.23	0.54**	-0.41*	-0.42*	-0.49**	0.42*	0.46*	0.64**	0.55**	0.50**	1		
SL	0.09	0.45*	0.73**	0.38*	-0.61**	-0.60**	-0.52**	-0.38*	0.55**	0.40*	0.03	0.51**	0.09	1	
YPP	0.87**	0.95**	0.51**	0.94**	-0.71**	-0.68**	0.22	0.57**	0.95**	0.37*	0.70**	0.22	0.50**	0.32	1

* Significant at 5% level of significance; ** significant at 1% level of significance

PH: Plant height PS: Plant spread NB: Number of branches
LA: Leaf area DSI: Days for spike initiation DFH: Days for 1st harvest DF: Duration of flowering
NFS: No. of flowers per spike NSP: No. of spikes per plant
WHF: Weight of 100 flowers SPL: Spike length FD: Flower diameter
CL: Corolla length SL: Shelf life YPP: Yield per plant

CONCLUSIONS

The correlation analysis revealed that, flower yield per plant showed significant and positive correlation with plant spread, number of spikes per plant, leaf area, plant height, spike length, number of flowers per spike, number of branches, corolla length, weight of 100 flowers. However, the number of days for spike initiation and number of days for first harvest showed significant negative correlation with flower yield per plant.

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