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Diversity Analysis in Celosia Genotypes



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ABSTRACT

Celosia is the most important loose and cut flower plants. Genetic diversity among 20 genotypes was analyzed. The results of correlation coefficient indicated a positive and significant correlation between numbers of flowers, days to first flowering, inflorescence length, and single flower weight. Results revealed that among the studied traits, single flower weight, number of flowers, flower diameter were the most important traits for discriminating among celosia genotypes. The results of this study indicate that these traits are useful for selecting and identify superior genotypes of celosia.



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INTRODUCTION

Celosias are versatile plants that have been used as herbal remedies, as ornamental annuals in the garden and as cut and dry flowers. Flower head are harvested for fresh sales or dried for sale as everlasting flowers or for use in potpourri. Celosia flowers and leaves are used as vegetables. The seeds of Celosia have been used in the treatment of eye ailments and blood diseases (Cornell, 2006; Barash, 2006; Foster and Chongxi, 1992). The present study was to evaluate the genetic divergence of various quantitative traits related to yield.

MATERIALS AND METHODS:

The present investigation was conducted at the Department of Floriculture and Landscaping, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore-3. The statistical design was Randomized Block Design. The experimental field was prepared and levelled. Plots of size 3.5 m x 3.5 m were prepared in the main field. 30 days old seedlings was transplanted at a spacing of 30 cm x 45 cm. 20 genotypes of Celosia was collected from different places of Tamil Nadu and diversity analysis studied to know desirable variations among the genotypes.

RESULTS AND DISCUSSION:

Genetic divergence using Mahalanobis D^2 analysis: Clustering pattern of 20 celosia genotypes collections

The genetic divergence in the genotypes was estimated by subjecting them to distance analysis, using Mahalanobis D^2 statistics. By using the cluster technique as suggested by Tocher (Rao, 1952), all the 20 *Celosia* genotypes collections were grouped into ten clusters. The distribution of 10 characters into ten different clusters is presented in Table 1. Among the ten clusters, Clusters I (Acc.1, Acc.2, Acc.3, Acc. 6, Acc.20) had five genotypes and it was the largest. Clusters II(Acc. 8, Acc.9), III(Acc.14, Acc.19), IV(Acc. 10, Acc.18), V(Acc.7, Acc.12), VI(Acc.13, Acc.17), VII(Acc.5, Acc.15) had two genotypes each and all other clusters had one genotype each.

Average inter and intra cluster distance

The inter and intra cluster distances (D and D^2 values) for the different clusters are furnished in Table 2. Among the ten different clusters, the maximum intra cluster distance (diagonal

values) was shown by cluster X (72.03), followed by the cluster VIII (44.43) and cluster IX (44.38). The lowest intra cluster distance was observed in cluster II (18.50). The maximum inter cluster distance (Off diagonal values) was observed between clusters VII and X (58.5), VIII and X (58.5) followed by clusters III and X (54.50). The lowest inter cluster distance (24.88) was observed between cluster II and IV.

Cluster mean performance for different quantitative characters

The mean values for different clusters were calculated for all the ten characters and are furnished in Table 3. Wide differences were observed between high and low mean values among the clusters for most of the characters studied.

Cluster IX recorded the highest mean values for plant height (90.55), days taken for first flowering (31.31), flower diameter (29.64) and number of flowers (76.64). Cluster I registered the highest mean values for flowering branches (22.94) and inflorescence length (16.44). Cluster VIII recorded highest mean values for single flower weight (103.92). Whereas, genotypes grouped in cluster VI recorded highest mean values for flower yield (141.66). In cluster X, test mean values were recorded for seed yield (543.11) and betalain content (44.31).

Rank method of D² analysis

The percentage contribution of different characters towards genetic divergence is presented in Table 4. Ranking character wise D² values and adding the ranks for each characters for all the entries identified the variables, which contributed towards the divergence expect plant height. Betalain content contributed high (30.52%) towards total divergence. This was followed by flower yield(18.94), seed yield (15.26), number of flowers (11.05), days taken for first flowering (6.84), flower diameter (5.78), number of flowering branches (4.73), inflorescence length (4.21) and single flower weight (2.631).

Table 1. Cluster composition of 20 genotypes based on morphological and yield characters.

Cluster number	No. of genotypes	Genotypes
I	5	1,2,3,6,20
II	2	8,9
III	2	14,19
IV	2	10,18
V	2	7,12
VI	2	13,17
VII	2	5,15
VIII	1	11
IX	1	16
X	1	4

Table 2. Intra and inter cluster average D² and D (with in parentheses) values of celosia genotypes.

	I	II	III	IV	V	VI	VII	VIII	IX	X
I	875.66 (29.59)	773.60 (27.81)	987.48 (31.42)	749.27 (27.37)	908.73 (30.15)	1082.34 (32.90)	1266.62 (35.59)	1829.23 (42.77)	1316.50 (36.28)	2563.55 (50.63)
II		342.38 (18.50)	931.22 (30.52)	618.75 (24.88)	914.92 (30.25)	1241.74 (35.24)	1084.33 (32.93)	1624.30 (40.30)	1479.89 (38.47)	2920.12 (54.04)
III			392.82 (19.82)	905.06 (30.08)	693.09 (26.33)	1156.60 (34.01)	1103.05 (33.21)	1650.61 (40.63)	1754.81 (41.89)	2969.79 (54.50)
IV				422.54 (20.56)	756.82 (27.51)	1043.25 (32.30)	798.93 (28.27)	1690.49 (41.12)	1598.59 (39.98)	2325.62 (48.23)
V					585.41 (24.20)	1272.67 (35.67)	1277.36 (35.74)	1602.31 (40.03)	1353.56 (36.79)	2836.74 (53.26)
VI						647.30 (25.44)	1342.44 (36.64)	1871.09 (43.26)	1452.28 (38.11)	2860.44 (53.48)
VII							1461.95 (38.24)	1974.84 (44.44)	2268.42 (47.63)	3422.24 (58.50)
VIII								1974.83 (44.43)	2268.41 (47.62)	3422.24 (58.5)
IX									1969.84 (44.38)	3287.46 (57.33)
X										5188.84 (72.03)

Table 3. Cluster means of characters for twenty celosia genotypes.

	PH	NFB	DFF	IL	FD	SFW	NF	SY	BE	FY
1	76.748	22.948	28.345	16.44	22.442	26.289	63.824	502.971	34.728	124.903
2	55.905	12.67	30.335	15.85	17.55	22.335	42.497	265.075	35.433	122.32
3	66.187	15.84	22.283	13.598	9.165	10.292	35.68	163.748	26.005	129.36
4	76.43	14.457	28.082	14.65	17.195	17.177	34.037	238.243	24.325	109.4
5	75.04	16.78	24.937	8.95	19.052	17.16	54.475	308.12	23.685	127.6
6	55.345	16.14	25.03	16.098	23.083	19.957	25.735	290.932	10.825	141.66
7	66.785	20.58	22.93	13.452	19.335	20.965	27.758	198.148	31.13	116.6
8	67.63	10.11	24.85	14.303	44.8	103.92	24.26	186.77	10.2	138.16
9	90.55	21.52	31.31	14.603	29.64	28.07	76.64	433.61	6.45	120.56
10	55.53	21.137	23.21	14.8	18.573	54.47	24.98	543.11	44.31	115.84

PH : Plant height

SFW : Single flower weight

NFB : Number of flowering branches

NF : Number of flowers

DFF : Days taken for first flowering

SY : Seed yield

IL : Inflorescence length

BE : Betalain

FD : Flower diameter

FY : Flower yield

Table 4. Contribution of characters to genetic divergence in celosia genotypes

Characters	% Contribution
Plant height	0
Number of flowering branches	4.736
Days taken to first flowering	6.842
Inflorescence length	4.21
Flower diameter	5.789
Single flower weight	2.631
Number of flowers/plant	11.052
Flower yield/plant	18.947
Seed yield/plant	15.263
Betalain content	30.526

CONCLUSION:

Based on Mahalanobis D^2 analysis, the accessions were grouped into ten clusters. Among the ten clusters, cluster I was the largest with five genotypes. The maximum inter cluster distance was observed between cluster IX and X (72.03) which showed maximum divergence between these two clusters. Relative contribution of characters ranged from 0 to 30.52 percent towards total genetic diversity. Flower yield contributed (30.52%) towards total divergence, followed by seed yield, betalain content, number of flowers per plant, days taken to first flowering, flower diameter, number of flowering branches, single flower weight.

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