



Research Note

Genetic divergence in chilli accessions

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Abstract:

A study of genetic diversity in 25 chilli genotypes for various characters revealed substantial differences for all the traits. Based on D^2 values, the genotypes were clustered into eight constellations. Cluster I contained nine genotypes followed by cluster-II (four) cluster IV and V (two each). The maximum inter cluster distance ($D=12.75$) was observed between cluster VI and cluster VIII. The cluster IV recorded maximum intracluster distance ($D=5.91$). Interbreeding among the genotypes belonging to cluster III, IV and I was suggested to develop high yielding varieties with other desirable characters or may be used as potential donors for future hybridization programme to develop better chilli variety with good fruit yield

Key words:

Capsicum annum, Genetic divergence, yield

Chilli (*Capsicum annum* L.) is being cultivated in an area of 0.96 m.ha with an annual production of 0.95 mt in India (Peter, 1999). It is an important commercial crop of India and grown for its green fruits as vegetable and in ripe dried fruits as spice. Its cultivation is mostly concentrated in the southern states viz., Andhra Pradesh, Karnataka, Maharashtra, Orissa and Tamil Nadu, occupying nearly 75% of the total area under chilli. Chilli is one of the dryland crops of the Eastern Dry zone of Karnataka. Genetic divergent parents may result transgressive and productive recombinants. More diverse the parents within a reasonable range, better are the chances of improving economic characters under consideration in the offspring. Mahalanobis' D^2 statistic of multivariate analysis is recognized as a powerful tool in quantifying the degree of genetic divergence among the populations. Therefore, the present study was undertaken to assess the genetic diversity in 25 genotypes of chilli and to identify suitable donors for a successful crop improvement programme. Similar

studies have also been conducted in chilli by Varalakshmi and Haribabu (1991).

Twenty five chilli genotypes collected from UAS, Bangalore, Karnataka were evaluated in a randomized block design with three replications at Zonal Agricultural Research Station, Mudigere, during summer 2005. Forty five days old seedlings were transplanted to the main field with 60 cm x 45 cm spacing. All other cultural practices were followed as per the recommended package. Five plants were selected randomly for recording the observations on days to flowering plant height (cm), number of branches/plant, pod length (cm) and Green fruit yield (Kg/plot). Mahalanobis's generalized distance (D^2) was used to determine the degree of divergence and the group constellations were arrived by Tocher's methods described by Rao (1952).

The 25 chilli genotypes were grouped into eight clusters based on the D^2 values (Table-1). Cluster I was the largest and comprised nine genotypes, followed by cluster II (Four genotypes), cluster IV and V (Three genotypes each), cluster III and VI (Two genotypes each), while cluster VII and VIII were solitary clusters indicating wide diversity from

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one another and also from the rest. A similar observation was made by Dutonde *et al.* (2008).

The Intra and intercluster distance values are presented in Table 2. Maximum intracluster distance (D=5.91) was observed in cluster IV followed by cluster I (5.82) and cluster II (4.92), which suggested appreciable genetic diversity within particular clusters. The minimum intercluster divergence (D=4.22) was noticed between cluster IV and VII and they seemed to be closely related as compared to other pairs of clusters. The maximum inter cluster distance (D=12.75) was observed between cluster VI and VII followed by cluster IV and VI (D=11.75) and cluster III and VII (D=10.46) The distance between the cluster I and VII, cluster III and IV, cluster I and IV, cluster VII and VIII, cluster V and VII and Cluster IV and VIII was moderate. These results are in agreement with those reported by Sundaram *et al.* (1980).

The selection and choice of parents mainly depend upon contribution of characters towards divergence. In the present study (Table-3), the green fruit yield (36.33%) followed by pod length (28%) and plant height (27%) had maximum contribution towards divergence. So, this needs more attention to get high green fruit yield with better pod length of chilli genotypes.

Since crosses among divergent parents are likely to yield desirable recombinants, a breeding programme may be initiated between the selected genotypes belonging to different cluster considering their cluster means (Table-4 and Fig.1). The days to 50 per cent was observed for cluster VI (72.83), while it was minimum for cluster VIII (63.67). The cluster VI (73.72 cm) exhibited maximum plant height followed by cluster III (69.70cm). The cluster III (7.32) recorded maximum number of branches per plant followed by cluster IV (7.31). The cluster III (11.17) exhibited the highest mean pod length followed by cluster IV (10.00) and cluster I (9.88). The cluster III (4.13 Kg) recorded the highest green fruit yield followed by cluster I (4.08 Kg) and cluster-IV (3.93Kg).

In general, the cluster III, IV and I were found superior for one or the other characters. Therefore, it is proposed to arrange a multiple crossing programme involving genotypes from those three clusters to isolate superior segregants in advanced generations with high yield potential and its components in chilli.

Similar findings were reported by Varalakshmi and Haribabu (1991).

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Table 1. Clustering pattern of 25 chilli genotypes

Cluster No.	No. of Genotypes	Name of Genotypes
Cluster I	9	Arkavathi, A R-75, Annadiri, C P B , Cylon, CP-4-7-98, C x Rh RC, Byadgi Kaddi and K C P-1
Cluster II	4	Byadagi Dabbi, G-4, PMR-57 and PBC-460
Cluster III	2	HMT-1 and HMT-11
Cluster IV	3	GPC-82, PBC-613 and C-7/4/9636
Cluster V	3	HBKS-1, PusaJawla and PBC-474
Cluster VI	2	C-6/1/9626 and VN-2
Cluster VII	1	PP:9908-2
Cluster VIII	1	Kumta-L

Table 2. Average intra (bold) and inter cluster distances (D) values

	I	II	III	IV	V	VI	VII	VIII
I	5.82	6.19	5.83	9.34	5.27	6.34	9.99	6.08
II		4.92	5.84	6.89	4.58	7.78	7.17	6.68
III			2.44	9.51	4.44	7.44	10.46	7.20
IV				5.91	8.59	11.75	4.22	9.01
V					4.26	6.26	9.18	6.47
VI						3.62	12.75	6.56
VII							0.00	9.21
VIII								0.00

Table.3 Relative contribution of different characters to genetic divergence

Character	Percentage of total D ² values
Days to Flowering	2.67
Plant height(cm)	27.00
Branches No. /Plant	6.00
Pod length (cm)	28.00
Green Pod yield (kg /plot)	36.33
Total	100

Table 4. Cluster means of different characters in Chilli genotypes

	Days to Flowering	Plant height (cm)	Number of branches /Plant	Pod length (cm)	Green Pod yield (kg /plot)
Cluster I	67.93	67.83	6.43	8.88	4.08
Cluster II	70.92	61.63	6.70	9.76	3.65
Cluster III	68.33	69.70	6.32	11.17	4.13
Cluster IV	65.56	53.23	7.31	10.00	3.93
Cluster V	72.00	66.19	6.43	9.70	3.76
Cluster VI	72.83	73.72	7.67	8.00	3.68
Cluster VII	65.33	49.37	6.57	9.53	3.55
Cluster VIII	63.67	67.17	6.50	8.16	3.07

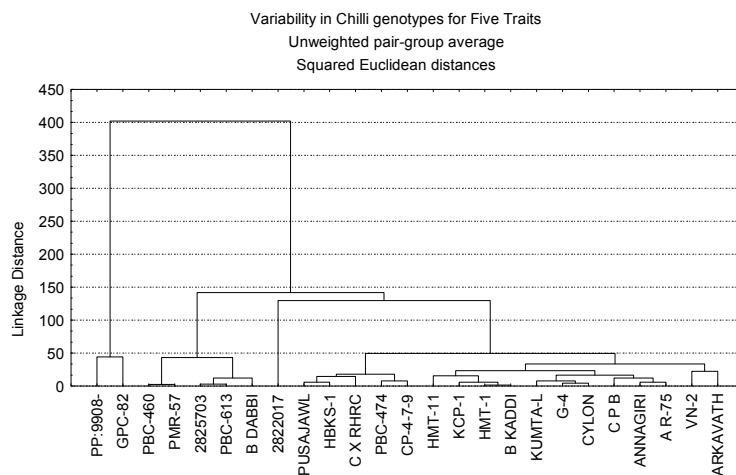


Fig.1 : Diagrammatic representation of Cluster means of different characters in Chilli genotypes