GAU Res. J. 1996. 21 (2) : 107-109

D^2 Analysis in Soybean for Chlorophyl Under Rainfed Condition

Jay Lal Mahto and Z. A. Haider

Department of Plant Breeding and Genetics, Birsa Agricultural University, Kanke, Ranchi-834 006

In any breeding programme, inclusion of genetically diverse parents is essential in order to creat new reservoirs of genetic variability. The present investigation has assessed genetic diversity in a set of 40 soybean genotypes through multivariate analysis on the basis of chlorophyll and carotene.

Forty genotypes pertaining to different agroclimatic regions were grown in a randomised block design with 3 replications at Ranchi during *kharif* 1986. Each genotype was sown in 3 rows of 3 m long at a distance of 45 cm between rows. Chlorophyll and carotene were estimated as per Arnon (1949), Withan *et al.,*. (1971), Starness and Hadiey (1965) and Mukherji and Biswas (1979). Sample of leaves were taken from flower initiation (FIN) and other nodes (ON). The genetic divergence

TABLE 1

Distribution of 40 genotypes in clusters for chlorophyll in soybean.

Cluster	*No. of genotypes*	*Genotypes*
I	26	BR 16, BR 17, Bragg, DS 2, DS 9, DS 10, Himso 1520, Himso 1533, J 323, JS 71-5, JS 81-503, JS 81-607, Js 81-714, KD 2, MACS 13, PK 416, PK 472, PK 879, PK 884, PK 885, SH 84-85, SL-141, SL 142, VLS 7, VLS 8
II	5	Himso 1532, KB 34, KB 38, MACS 153, MACS 189
III	1	J 140
IV	1	J 75-27-51
V	2	PK 838, PK 863
VI	1	LS 140
VII	1	MACS 141
VIII	2	KD 1, DS 2
IX	1	UGM 21

TABLE 2

Mean intra - and inter - cluster distance (D^2) values in soybean for chlorophyll

Clusters	I	II	III	IV	V	VI	VII	VIII	IX
I	11.976	23.944	17.438	20.690	35.369	18.174	21.635	40.148	60.307
II		10.549	21.310	26.932	55.848	30.638	26.918	40.245	58.387
III			0.0	7.976	44.919	15.785	25.744	41.428	23.692
IV				0.0	44.857	19.515	32.484	48.597	15.353
V					9.583	34.840	40.958	55.297	40.932
VI						0.0	21.476	35.774	25.387
VII							0.0	20.642	15.657
VIII								15.429	16.928
IX									0.0

analysis was carried out using Mahalanobis' D^2 statistics. The genotypes were grouped into clusters by the Toucher's methods as described by Rao (1952) and Mahalanobis (1986).

The wilks test revealed highly significant differences for all the characters (Table 3). 40 genotypes were grouped into the nine clusters (Table 1). The constellations obtained by D^2 analysis were also confirmed by canonical analysis (Table 3). The first three canonical vectors accounted for 95.9% of total genetic divergence. Maximum intra-cluster distance is in cluster VIII and minimum is in cluster V. The highest inter-cluster distance between cluster I and IX (60.303) and the lowest between III and IV (7.976) Table 2.

TABLE 3

Canonical vectors and contribution of quantitative characters in soybean for chlorophyll.

Characters	*Canonical vectors*			*Contribution % of diversity (D^2)*
	Z_1	Z_2	Z_3	
Chlorophyll 'a' (FIN)	0.0647	-0.1983	0.1016	8.05
Chlorophyll 'a' (ON)	-0.0116	0.0359	-0.0074	0.0
Chlorophyll 'b' (FIN)	0.0080	-0.0220	-0.0037	0.0
Chlorophyll 'b' (ON)	0.0193	-0.0223	-0.0431	0.0
Carotene (FIN)	-0.0219	0.0278	-0.0117	0.0
Carotene (ON)	0.2554	-0.9876	-0.1375	23.45
Total Chlorophyll (FIN)	1.0712	0.2588	-0.1213	46.90
Total Chlorophyll (ON)	-0.1409	0.0751	-1.1281	21.60
Variability % accounted for	51.8858	32.9266	11.0902	
Total variability		(95.903)		

FIN - Flower initiation nodes, ON - Other nodes.

The analysis for estimating the contribution of various characters towards the expere-ssion of genetic divergence (Table 3) indicate that chlorophyll 'a' (FIN), carotene (ON), total chlorophyll (FIN), total chlorophyll (ON) are the basic physiological attributes of plant, which need greater attention for selection criteria.

(Received on 7th Dec., 1994)

REFERENCES

Arnon, D. I. (1949). Copper enzymes in isolated chloroplast. *Plant Physiol.*, **24** : 1-15.

Mahalanobis, P. C. (1936). On the generalised distance in statistics. *Proc. Nat. Inc. Sci. India.*, **2** : 49-55.

Mukherji, S. and Biswas, A. K. (1979). Modulation of chlorophyll, carotene and xanthophyll formation by penicilin, benzyl-adenine and embryonic axis in mungbean cotyledons. *Ana. Bot.*, **43** : 225-229.

Rao, C. R. (1952). *Advanced statistical Methods in Biometeric Research*. John Weley & Sons, New York.

Starnes, W. J. and Hadley, K. H. (1965). Chlorophyll content of various strains of sybean (*Glycine max.*) *Crop Sci.*, **5** : 9-11.

Withan, F. H.; Maydes, D. F. and Devalin, R. M. (1971). Chlorophyll absorption spectrum and quantitative determinations. '*Experiments in plant physiology*' Pub. Van Nestrand Rein.