Asian J. of Bio Sci. (2007) Vol. 2 No. 1 : (194-195)

Research Note :

Assessment of stability performance in pigeonpea

C. VANNIARAJAN
Department of Plant Breeding & Genetics, Cotton Research Station, T.N.A.U., SRIVILLIPUTTUR (T.N.) INDIA

(Accepted :February, 2007)

Exploitation of hybrid vigour is one of the potential avenues for quantum jump in the grain yield of crop plants. The identification of genetic male sterility and the presence of a considerable degree of natural outcrossing have made it possible to exploit non-additive genetic variation through economical production of heterotic hybrids in pigeonpea. It is commonly observed that the performance of different genotypes varies in different environments. The occurrence of genotype x environment interactions has provided a major challenge in obtaining a complete understanding of genetic control of variability. The study of genotype-environment interaction in biometrical aspects is thus important from the genetical and evolutionary point of view. In the present study, the phenotypic stability of 13 parents and 40 hybrids has been assessed and the stability performance of different characters in pigeonpea is computed.

The experimental material comprised of eight genetic made sterile lines viz. MSPrabhatDT, QMS1, QMS2, QMS9, IMS1, MSCO5, MST21 and MSPrabhatNDT and five testers viz. ICPL151, ICPL161, Vamban1, ICPL87 and ICPL84032 (totally 13 parents) and forty hybrids of pigeon pea generated by 13 parents were grown in a randomised block design with three replications during Rabi 1991 (E1) at Agricultural Research Station, Kovilpatti and during rabi, 1992 (E2) Summer 1993(E3) and Kharif 1993 (E4) at Agricultural College and Research Institute, Madurai. Each genotype was accomodated in a single row of 4.5 m length with a spacing of 60 x 30 cm. Recommended package of practices and plant protection measures were followed to raise a good crop. Date were recorded on five randomly selected plants from each genotype in each replication for days to 50% flowering, days to maturity, plant height, branches per plant, clusters per plant, pods per plant, pod length, seeds per pod, 100 seed weight and seed yield per plant. Since the female parents segregated for fertility / sterility, only the fertile lines within a row were selected at random for recording the observations. The data was subjected to stability analysis as per the procedure outlined by Eberhart and Russel (1966). The stable performance of different characters in pigeonpea is also worked out and presented.

The pooled analysis of variance over environments for different biometrical traits is presented in Table 1.

The analysis of variance revealed significant differences for all the ten characters studied due to genotypes and environments and due to genotype x environmental interactions.

In the present studies enough diversity exists among genotypes and among environments which was similar with earlier results (Ghodke *et al.,* 1992). The arithmetic translations of the mean squares for the pooled data over environments into the estimates attributable to genotypic component and genotype x environment interaction component revealed the increased share of genotypic component as compared to genotype x environment interaction component in determining the expression of all the characters studied except seeds per pod where both the genotypic component and genotype x environmental interactions were equal. The yield was expressed mainly through genotypic component than genotypic x environment interaction.

A stable genotype as one which showed a high mean yield, regression coefficient (bi) around unity and deviation from regression nearer to zero. Only those genotypes which showed high mean (overall mean +2SE) were considered. In this study, all the hybrids and parents were assessed for their stability performance based on regression coefficient and deviation from regression for each character and is presented in Table 2.

The line MSPrabhat DT was stable for most of the characters like branches per plant, pod length, seeds per pod, 100 seed weight and seed yield per plant. The line MSCO5 was not stable for anyone of the characters studied. Among the testers, Vamban1, IcPL87 was stable for three characters but not for seed yield per plant.

Among the hybrids, QMS1 x ICPL161 was stable for six characters including seed yield per plant with high mean. The hybrid IMS1 / ICPL84032 was stable for four characters including seed yield per plant but with low mean. The hybrid QMS1 x ICPL151 was not stable for any of the characters studied. Sunil Holkar *et al*. (1991)

Table 1 : Pooled analysis of variance over environments.

Source	d	Days to 50% flowering	Days to maturity	Plant height	Branches / plant	Clusters / plant	Pods / plant	Pod length	Seeds / pod	100 seed weight	Seed yield / plant
Environment		93.84*	51.59*	6874.25*	27.06*	1313.82*	14860.24*	11.38*	7.40*	6.78*	3959.65*
Genotypes	5	278.93*	517.70*	3973.07*	8.97*	2002.58*	9163.55	0.32*	0.30*	3.75*	479.95*
Genotypes x environments	15	3.44	6.24*	152.18*	0.55*	60.35*	372.65*	0.06*	0.70*	0.11*	27.32*
Error	42	0.10	0.10	0.30	0.00	0.30	0.40	0.00	0.00	0.00	0.20
O^2g		22.90	42.60	318.40	0.70	161.80	732.50	0.00	0.00	0.30	37.70
O^2g1		1.00	2.00	50.60	0.10	20.00	124.00	0.00	0.00	0.00	9.00
$O^2g : O^2gl$		21.06	20.89	6.29	3.89	8.09	5.90	2.00	1.00	7.50	4.17

** Significant at 1 per cent level

Table 2 : Seed yield of pigeonpea genotypes and their stability for yield and its components characters

Genotypes	Seed yield per plant (g)	Days to 50% flowering	Days to maturity	Plant height	Branches / plant	Clugtery plant	Pods / plant	Pod length	Seeds / pod	100 seed weight	Seed yield / plant	Total stable characters
MSPrabhat DT	19.95	-		-	+	-	-	+	+	+	+	8
MS Co5	30.27	-	-	-	-	-	-	-	-	-	-	-
Vamban	21.55	-	-	-	-	-	-	+	+	+	-	3
ICPL 87	21.27	-	-	-	+	-	-	+	+	-	-	3
QMS 1 x ICPL 161	29.77	-	-	-	+	-	+	+	+	+	+	6
IMS1 x ICPL84032	5.88	-	-	-	+	-	-	+	+	-	+	4
QMS1 x ICP 151	21.59	-	-	-	-	-	-	-	-	-	-	-
MSPrabhat DT x Vamban	37.90	-	-	-	-	-	+	+	+	-	+	3
MST 21 x ICPL 161	43.70	-	-	-	-	-	+	+	+	-	+	3

stated that the magnitude of regression coefficient and deviation from regression varied from genotype to genotype indicating that they were responsive towards environmental variation.

As a whole, when considering all the parameters (i.e.) high mean, regression coefficient and deviation from regression, MSPrabhatDT recorded stable performance with high mean for branches per plant and seeds per pod. The tester ICPL151 for 100 seed weight, ICPL161 for pod length and Vamban1 and ICPL84032 for seeds per pod recorded stable performance with desirable mean.

In the present study, three hybrids viz.,MSPrabhatDT / Vamban1, QMS1 / ICPL161 and MST21 / ICPL161 were stable for seed yield per plant with high mean performance. Apart from this character, the hybrid MSPrabhatDT / Vamban1 possessed stability with desirable mean values for seeds per pod and QMS1 x ICPL161 for pods per plant and 100 seed weight. These stable hybrids can be further tested in different environments to test their yield potentiality.

The authors acknowledge Dr.R.P.Ariyanayagam and Dr.K.B.Saxena, Pigeonpea Breeders, ICRISAT, Patencheru for providing seed materials. C. Vanniarajan is grateful to CSIR, New Delhi for providing financial assistance.

REFERENCES

Eberhart, S.A. and Russel, W.A. (1966). Stability parameter for comparing varieties. *Crop Sci.*, **6 :** 36-40.

Ghodke, M.K., Nerkar, Y.S., Kharpre, P.R., Makne, V.G. and Jahagirdar, J.E. (1992). Estimates of genotypic coefficient of variation, heritability and genetic advance for yield and yield contributing characters of pigeonpea under three cropping systems. *Int. Pigeonpea Newsl*, **16 :** 7-9.

Sunil Holkar, V.K., Mishra, V.K. and Billore, S.D. (1991). Phenotypic stability of seed yield in pigeonpea under dryland conditions. *Crop res.*, **4 :** 247-252.