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Genetic Variability Studies for Yield and Yield Components in Urdbean (*Vigna mungo* (L.) Hepper)

Key words : Genetic advance, Heritability, Urdbean, Variability.

Among pulses, urdbean plays an important role in Indian agriculture because of its amenability to various cropping systems, fixation of atmospheric nitrogen by enriching the soil fertility, high nutritive value and feed for livestock. The success of any crop improvement programme essentially depends upon the nature and magnitude of genetic variability present in the crop. The knowledge of nature and magnitude of genetic variability in the population is of immense value for planning efficient breeding programme to improve the yield potential of the genotypes. GCV along with heritable estimates would provide a better picture of the amount of genetic advance to be expected by phenotypic selection. Similarly, the estimates of heritability alone will not be of much value for selection on phenotypic performance hence, genetic gain should be considered in conjunction with heritability (Johnson *et al*., 1955). Therefore, the present study was conducted to assess the extent of variability, heritability and genetic advance for seed yield and its components in urdbean.

The material comprised eight parental genotypes and their 28 F_1 combinations of urdbean excluding reciprocals. These were grown in a randomized block design which was replicated thrice. Each entry was grown in three rows of 2m length with a spacing of 30 x 10 cm during *rabi*, 2010-2011. Observations on twelve quantitative characters *viz.*, plant height (cm), days to 50% flowering, days to maturity, number of primary branches per plant, number of clusters per plant, number of pods per cluster, number of pods per plant, pod length (cm), number of seeds per pod, 100-seed weight (g), seed yield per plant (g) and harvest index (%) were recorded on five randomly chosen plants in each entry. The genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were calculated as per the formula suggested by Burton (1952), whereas heritability, genetic advance and genetic advance as percent of mean were worked out as per the formulae suggested by Johnson *et al*., (1955) and Allard (1960).

The Analysis of variance revealed highly significant differences among the genotypes for all the traits under study (Table 1). The range of variation for different characters indicated wide diversity among the varieties (Table 2). Genotypic coefficient of variation is considered to be more useful for assessing variability than phenotypic coefficient of variation, since it depends on the heritable portion of variability. In the present study, the PCV and GCV values for all the characters showed same pattern of variability with the former values being little higher. The PCV and GCV values were high for harvest index, seed yield per plant and plant height which were in confirmity with the results of Anuradha and Murthy (1993) for harvest index, Gopi Krishnan *et al.,* (2002) for seed yield per plant and Konda *et al.* (2009) for plant height. Moderate values were observed for pods per plant, clusters per plant and primary branches per plant which were in accordance with the results of Ramesh Babu (1998) and low values for pods per cluster , pod length, hundred seed weight, seeds per pod, days to flowering and and days to maturity. These high, moderate and low PCV and GCV values indicate the potentiality of variation of each character. High difference between PCV and GCV values in respect of clusters per plant, pods per cluster, pods per plant and primary branches per plant indicated that these traits were highly influenced by environmental factors.

High estimate of heritability was recorded for all the twelve characters under study (Table 2). Johnson *et al.,* (1955) reported that high heritability with high genetic advance (as percentage of mean) will be more useful for selection than the former alone. Harvest index, seed yield per plant, plant height, pods per plant, clusters per plant and primary branches per plant had high heritability coupled with high genetic advance indicating that additive genes were involved in the genetic control of these traits.

Table 1. Analysis of variance for yield and yield components in a 8 x 8 half diallel in urdbean.

S.No.	Character	Mean sum of squares		
		Replications (df=2)	Treatments (df=35)	Error (df=70)
1.	Plant height(cm)	14.9	107.4**	0.70
2.	Days to 50% flowering	5.12	7.617**	1.25
3.	Days to maturity	0.84	13.59**	1.01
4.	No. of primary branches per plant	0.38	3.040**	0.18
5.	No. of clusters per plant	17.5	12.10**	1.11
6.	No. of pods per cluster	0.00	0.120**	0.01
7.	No. of pods per plant	15.9	84.12**	3.84
8.	Pod length(cm)	0.06	0.380**	0.01
9.	No. of seeds per pod	0.02	0.530**	0.00[a]
10.	100 seed weight(g)	0.01	0.360**	0.00[a]
11.	Seed yield per plant(g)	0.03	12.68**	0.20
12.	Harvest index(%)	1.18	321.2**	3.07

** Significant at 1 per cent level; a: Low estimate of error mean square.

The traits pods per cluster, pod length, hundred seed weight and seeds per pod which had high heritability with moderate genetic advance were controlled by additive and non additive gene effects whereas high heritability with low genetic advance was expressed by the traits days to flowering and days to maturity indicating the influence of non additive gene effects (dominance) in the inheritance of these traits. Hence, simple selection alone may not be effective. Similar kind of high heritability and low genetic advance was revealed for days to 50% flowering by Ramana and Singh (1987).

It is to conclude that the traits seeds per pod, hundred seed weight and pod length which showed negligible difference between PCV and GCV were least influenced by environment and hence selection of these traits is more effective. Based on the estimates of genetic parameters, the traits harvest index, seed yield per plant, plant height, pods per plant, clusters per plant and primary branches per plant which exhibited high heritability and high genetic advance can be further improved through simple selection.

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Table 2. Estimates of variability and genetic parameters for seed yield and its components in urdbean

S. No.	Character	Mean	Range	Variance		Coefficient of variation (%)		Heritability in broad sense (h^2_b)(%)	Genetic advance (GA)(%)	Genetic advance as per cent of mean (GAM)
				Genotypic (s^2_g)	Phenotypic (s^2_p)	Genotypic (GCV)	Phenotypic (PCV)			
1.	Plant height(cm)	27.9	15.00 – 37.00	35.5	35.8	21.3	21.4	99.3	12.2	43.8
2.	Days to 50% flowering	41.3	37.6 – 44.33	2.12	2.53	3.52	3.85	83.5	2.74	6.63
3.	Days to maturity	77.3	74.66 – 82.66	4.19	4.53	2.65	2.75	92.5	4.05	5.25
4.	No. of primary branches per plant	7.20	5.06 – 9.4	0.95	1.01	13.5	13.9	94.1	1.95	27.0
5.	No. of clusters per plant	11.0	7.33 – 15.06	3.66	4.03	17.3	18.1	90.8	3.75	34.0
6.	No. of pods per cluster	2.55	2.13 – 3.00	0.03	0.04	7.52	7.97	89.0	0.37	14.6
7.	No. of pods per plant	29.0	17.6 – 41.26	26.7	28.0	17.8	18.2	95.4	10.4	35.8
8.	Pod length(cm)	5.32	4.24 – 5.88	0.12	0.13	6.63	6.72	97.5	0.72	13.5
9.	No. of seeds per pod	7.20	6.03 – 7.68	0.17	0.18	5.86	5.89	99.0	0.86	12.0
10.	100 seed weight(g)	5.52	4.65 – 6.25	0.12	0.12	6.24	6.28	98.6	0.70	12.7
11.	Seed yield per plant(g)	8.67	5.33 – 15.8	4.16	4.22	23.5	23.7	98.4	4.17	48.0
12.	Harvest Index(%)	34.4	18.44 – 56.13	106	107	29.8	30.0	99.0	21.1	61.2

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Department of Genetics and Plant Breeding,
S V Agricultural College,
Tirupati 517 502, Andhra Pradesh, India.

S Isha Parveen
M Reddi Sekhar
D Mohan Reddy
P Sudhakar

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