



## Genetic Variability in Pigeonpea [*Cajanus cajan* (L.) Millsp.] for Grain Yield and Its Contributing Traits

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### ABSTRACT

Forty one pigeonpea genotypes were studied to know their performance, genetic variability, heritability and genetic advance as per cent of mean for yield and yield contributing characters. Significant variations were observed for all the characters in all the genotypes used in the experiment. High PCV coupled with high GCV was observed for number of primary branches per plant, number of secondary branches per plant, number of pods per plant and seed yield per plant. High heritability coupled with high genetic advance as per cent of mean was observed for number of primary branches per plant, number of secondary branches per plant, number of pods per plant, seed yield per plant and grain protein content.

**Key words :** Coefficient of variation, Genetic advance, Heritability, Pigeonpea, Variability.

Pigeonpea [*Cajanus cajan* (L.) Millsp.] is one of the major grain legumes grown in the tropics and sub-tropics. It is most versatile food legume with diversified uses as food, feed, fodder and fuel. It has been recognized as a valuable source of protein particularly in the developing countries where the majority of the population depends on low priced vegetarian food for meeting their dietary requirements. Its production potential is low, as only the local collections are being grown. To initiate the improvement process, the present investigation was carried out to study the genetic variability in the available germplasm.

### MATERIAL AND METHODS

The experiment material comprised of forty one medium and late duration genotypes of pigeonpea (Table 1), was evaluated in randomized block design with three replications at the Regional Agricultural Research Station, Lam, Guntur, during *khari*, 2010-11. Each genotype was represented by six rows of four meter length in each replication with a spacing of 90 cm between rows and 20 cm within row. Recommended package of practices were followed for growing the crop.

The observations were recorded on 10 randomly selected plants of each genotype in each replication for plant height (cm), days to 50%

flowering, days to maturity, number of primary branches per plant, number of secondary branches per plant, number of pods per plant, pod length (cm), number of seeds per pod, shelling percentage (%), 100 seed weight (g), seed yield per plant (g), grain protein content (%) and harvest index.

Genetic parameters of variability viz., phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV) and genetic advance as per cent of mean were estimated according to Johnson *et al.* (1955). Heritability in broad sense was estimated according to method proposed by Hanson *et al.* (1956).

### RESULTS AND DISCUSSION

The extent of variability present in pigeonpea germplasm was studied in terms of range, mean, phenotypic and genotypic coefficient of variation (Table 2). The genotypes showed a wide range of variability with maximum in case of number of pods per plant (108.13-387.47) followed by plant height (196.67- 283.73) and seed yield per plant (35.00-96.67). However, the lowest range was observed for seeds per pod (3.43-4.10) and pod length (3.87-4.81). Maximum range in respect of number of pods per plant, plant height and seed yield per plant was also reported by Aher *et al.* (1996), Gohil (2006) and Kalaimagal *et al.* (2008). The genotypic coefficients

Table 1. Source of the genotypes of pigeonpea under study.

S.no	Genotypes	Source	S.no	Genotypes	Source
1	BSMR 737	Maharastra	21	SM 114	ICRISAT, Hyderabad
2	BWR 376	Maharastra	22	SM 118	ICRISAT, Hyderabad
3	CHILAKA 1	Local collection from AP	23	SM 12	ICRISAT, Hyderabad
4	CORG 9701	Coimbatore, TN	24	SM 13	ICRISAT, Hyderabad
5	GM 1	Gulbarga, Karnataka	25	SM 146	ICRISAT, Hyderabad
6	ICPL 13082	ICRISAT, Hyderabad	26	SM 20	ICRISAT, Hyderabad
7	ICPL 96058	ICRISAT, Hyderabad	27	SM 30	ICRISAT, Hyderabad
8	JKM 144	Khargone, Madhya Pradesh	28	SM 5	ICRISAT, Hyderabad
9	JSA 72-3	Sehore, Madhya Pradesh	29	SM 54	ICRISAT, Hyderabad
10	JSMP 8	Madhya Pradesh	30	SM 67	ICRISAT, Hyderabad
11	LOCAL 2003-1	Local collection from AP	31	SM 7	ICRISAT, Hyderabad
12	LOCAL 2002-3	Local collection from AP	32	SM 8	ICRISAT, Hyderabad
13	LRG 30	RARS, Lam, AP	33	SM 8-1	ICRISAT, Hyderabad
14	LRG 38	RARS, Lam, AP	34	SM 97	ICRISAT, Hyderabad
15	MAC 19	Bihar	35	TAT 96-29	Akola, Maharastra
16	MAHANANDI 2	Mahanandi, AP	36	TT 02	BARC, Mumbai
17	MRG 66	ARS Madhira AP	37	WRG 150	RARS, Warangal, AP
18	PERENNIAL 1	Coimbatore, TN	38	WRG 17	RARS, Warangal, AP
19	SM 1	ICRISAT, Hyderabad	39	WRG 47	RARS, Warangal, AP
20	SM 108	ICRISAT, Hyderabad	40	WRG 53	RARS, Warangal, AP
			41	WRP1-2	Gulbarga, Karnataka

A P : Andhra Pradesh      TN: Tamilnadu

of variation for all the characters studied were lesser than the phenotypic coefficients of variation indicating the effect of the environment. The characters with wider range had comparatively higher estimates of variability indicating thereby that there is sufficient scope for bringing out improvement in such traits.

The estimates of heritability and genetic advance as per cent of mean were high for number of pods per plant (99.13 and 52.99) followed by seed yield per plant (95.77 and 46.97) number of secondary branches per plant (85.87 and 37.32), number of primary branches per plant (86.57 and 36.78) and grain protein content (95.75 and 23.39) suggesting presence of additive gene action in the inheritance of these traits and improvement in these characters is possible through simple selection. Similar results have also been obtained by Bhadru (2010), Linge *et al.* (2010). The higher estimates of heritability and lower estimates of genetic advance as per cent of mean for days to 50% flowering (87.09 and 7.31) and days to maturity (62.43 and 1.78)

may be attributed to non additive gene effects and further improvement of these character would be possible through heterosis breeding. Aher *et al.* (1996) also found high heritability and lower genetic advance as per cent of mean for days to 50% flowering, while Bhadru (2010) observed for days to maturity. However, moderate heritability and low genetic advance as per cent of mean was observed for shelling percentage (31.19 and 2.75) and pod length (53.28 and 8.17) suggested that these were under the control of epistatic interaction and offers the best possibility of improvement through progeny selection or any modified selection procedures aiming to exploit the additive gene effects.

The estimates of heritability and genetic advance as per cent of mean were low for number of seeds per pod (27.04 and 2.83) indicating the presence of non-additive gene action in the inheritance and further selection for its improvement is ineffective. On the bases of genetic parameters estimated, it can be concluded that selection would be worthwhile for grain yield and associated traits to bring out improvement in pigeonpea.

Table 2. Mean, genetic variability, heritability (broad sense) and genetic advance as per cent of mean for seed yield and yield components in pigeonpea [*Cajanus cajan* (L.) Millsp.]

S.No	Character	Mean	Range		Coefficient of variation		Heritability (%) (broad sense)	Genetic advance as per cent of mean
			Minimum	Maximum	PCV (%)	GCV (%)		
1	Days to 50% flowering	143.95	130.33	156.33	4.07	3.80	87.09	7.31
2	Days to maturity	189.15	183.33	193.33	1.38	1.09	62.43	1.78
3	Plant height (cm)	232.17	196.67	283.73	9.06	8.74	93.13	17.39
4	Primary branches plant <sup>-1</sup>	15.00	9.10	20.30	20.62	19.18	86.57	36.78
5	Secondary branches plant <sup>-1</sup>	16.45	11.37	24.27	21.09	19.55	85.87	37.32
6	Pods plant <sup>-1</sup>	231.32	108.13	387.47	25.94	25.83	99.13	52.99
7	Pod length (cm)	4.38	3.87	4.81	7.44	5.43	53.28	8.17
8	Number of Seeds pod <sup>-1</sup>	3.76	3.43	4.10	5.07	2.63	27.04	2.83
9	Shelling percentage	67.08	61.60	71.02	4.28	2.39	31.19	2.75
10	100 seed weight (g)	9.85	7.97	12.80	11.78	9.53	65.48	15.90
11	Harvest index	25.03	19.57	32.79	11.55	9.79	71.85	17.10
12	Grain protein content (%)	22.06	17.71	26.63	11.85	11.60	95.75	23.39
13	Seed yield per plant (g)	62.90	35.00	96.67	23.80	23.29	95.77	46.97

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