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Stability Analysis for Yield and its Components in Pigeonpea [*Cajanus cajan* (L.) Mill sp.] Under Rainfed Conditions

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A B S T R A C T

An Investigation was carried out to examine the stability analysis of the twenty genotypes of pigeonpea including check BSMR-736, during *kharif*-2012, 2013 and 2014 under rainfed condition at the Agricultural Research Station, Kalaburagi, Karnataka, India. Highly significant differences among varieties were observed for all the characters except pod bearing length (cm), number of pods per plant and seed yield kg/ha. The variance due to Genotype x Environmental (GxE) interaction found significant for the characters like number of seeds per pod and pod length. All the traits under the study except for 100 seed weight showed significant differences in different environment. The variance due to pooled deviation was highly significant for all the traits except primary branches, number of seeds per pod and pod length under study which reflect considerable variability in the material. Out of 20 genotypes the genotype ICP-13270 were found to be a stable for pod length and ICP 9691 and ICP 12654 are on par with check for seed yield kg/ha across the environments for rainfed conditions.

Introduction

Pigeonpea [*Cajanus cajan* (L.) Millsp.] is commonly known in India, as redgram or arhar or tur or thogari. It is a short-lived perennial shrub in which plants may grow for about five years and turn into small trees. India is considered as the native of pigeonpea (Vander and Messen, 1980) because of its natural genetic variability available in the local germplasm and the presence of its wild relatives in the country.

It is an important grain legume that originated in the Indian sub-continent. It is now grown in many parts of the world including Southern Africa particularly the region encompassing Kenya, Mozambique, Malawi and Southern Tanzania (Hogh Jensen *et al.*, 2007).

This region is considered as a secondary centre of diversity for pigeonpea, it is a short lived perennial shrub in which plants may grow for about five years and turn into small trees. It is an often cross pollinated crop (20–70 %) with diploid (2n=2x) chromosome number of 22 and the estimated size of pigeonpea genome packed in 11 chromosomes is 858 Mbp (Greilhuber and Obermayer, 1998).

Pigeonpea is the important grain legume which occupies a major place in dietary requirement. It is cultivated in varied agro climatic conditions ranging from moisture stress and input starved conditions to irrigated conditions. Pigeonpea breeders look forward

for widely adapted genotypes responsive to input intensive as well as input deficient agriculture in order to enhance production and productivity of the crop. Selection and yield testing are the two major phases of varietal development and the later one is highly influenced by the locations and years of testing. The magnitude of G x E interaction and its components has a direct bearing on the environmental domain of the varieties to be recommended for commercial cultivation. With this back ground the present study was undertaken under rainfed situation in three locations to identify stable genotypes of Pigeonpea for seed yield and its component traits.

Materials and Methods

The present experiment material comprised of 20 genotypes of pigeonpea including check BSMR-736 received from Indian Institute of Pulse Research Kanpur. The trials were conducted in a randomized block design with two replications in three season *viz*., *kharif*-2012, 2013 and 2014 grown under rainfed condition. The plot size of two rows each with 4m length was followed with spacing of 75 cm between rows and 25 cm between the plants observations were recorded on five randomly selected plants in each replication in each environment in respect of 12 different metric characters *viz.*, days to 50 per cent flowering, days to maturity, plant height (cm), number of primary branches per plant, number of secondary branches per plant, pod bearing length, number of seeds per pod, pod length (cm), number of pods per plant, seed yield per plant, 100- seed weight (g)and seed yield kg/ha. Stability analysis was carried out by using the stability model proposed by Eberhart and Russell (1966).

Results and Discussion

Pooled ANOVA for stability of different characters (Eberhart and Russell, 1966) are given in table 1. Genotypic differences pooled over environments were significant for the nine characters except pod bearing length (cm), number of pods per plant and seed yield kg/ha. Variance due to environments was significant for all the characters except 100 seed weight. Variance due to G × E was significant for three characters *viz.*, number of seeds /pod and pod length (cm).However, further partitioning of genotype x environmental interaction as per Eberhart and Russell's (1966) model indicated that, Environmental + (Genotype x Environment) interaction was significant for plant height, primary branches, number of seeds per pod, pod length, seed yield per plant and seed yield kg/ha. Environment linear component was significant for all the traits except 100 seed weight. Whereas, G × E (linear) interaction was non-significant for most of the characters except number of seeds per pod and pod length (cm), which indicated differential response of genotypes to the environments. As regard to pooled deviation (nonlinear portion of variance), which is unpredictable portion of G × E interaction was significant for all the characters except primary branches, number of seeds per pod and pod length (cm) under study. This demonstrated that genotypes respond differently to variation in environmental condition. The results are in accordance with Shoran *et al*., (1981), Balakrishna and Natarajratnam (1989) and Sawargaokar *et al.*, (2011). In contrast, significant GxE (linear) for number of seeds per pod and 100 seed weight was observed by Muthiah and Kalaimagal (2005). Ghodke (1992) obtained non significant G x E for majority of the traits.

The genotype ICP 16309 showed minimum number of days to 50% flowering (91.33 days) while, Bahar required maximum number of days to 50% flowering (139.66 days) and population mean over three environments was 117.65 days. All the genotypes showed non-significant value for

regression coefficient and deviation from regression. The genotypes *viz.,* ICP 16309, ICP 14832, TJT 501, BSMR 736 (check), ICP 12654, ICP 6971, ICP 6049, TTB 7, RVK 284 and ICP 9691 were found to have lesser mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. ICP 16309 was the earliest to days to 50% flowering. The genotypes which require minimum number of days to 50% flowering are more desirable. So, ICP 16309, ICP 14832, TJT 501, BSMR 736 (check) and RVK 284 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* ICP 12654, ICP 6971, ICP 6049, TTB 7 and ICP 9691 had the regression value less than unity, it indicates suitable for poor environments. These findings are in accordance with Patel *et al.,* (2009), Vannirajan (2007) who identified genotypes with average responsiveness and also genotypes with higher environmental sensitivity.

The genotype ICP 16309 showed minimum number of days to maturity (144.66 days) while, Bahar required maximum number of days to maturity (194.83 days) and population mean over three environments was 173.13 days. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* ICP 16309, TJT 501,ICP 14832, ICP 6971, BSMR 736 (check), TTB 7, ICP 13270, ICP 12654,ICP 13304, RVK 284 and ICP 6049 were found to have lesser mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. ICP 16309 was the minimum number of days to maturity. The genotypes which are early are more desirable. So, ICP 16309, TJT 501, ICP 14832 and ICP 13270 had the regression value more than unity, it indicates specifically adapted to favourable environments. The genotypes *viz.,* ICP 6971, BSMR 736 (check), TTB 7, ICP 12654, ICP 13304, RVK 284 and ICP 6049 had the regression value less than unity, it indicates specifically adapted to unfavourable environments. The results are in accordance with Singh (1984) and Thanki *et al.,* (2010) identified genotypes having average and above average stability for this trait. Sreelakshmi *et al.,* (2010) obtained three stable genotypes (ICPL 98008, ICPHL 4979-2 and ICP 77303) for maturity.

The genotype ICP 8700 showed maximum plant height (163.00 cm) while, ICP 16309 minimum plant height (113.33 cm) and population mean over three environments was 143.43 cm. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* ICP 8700, NDA 1,TTB 7,ICP 13673, Bahar, ICP 3451, ICP 9691, ICP 6668, ICP 13304,ICP 13270and RVK 284 were found to have higher mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. ICP 8700 was the highest plant height. The genotypes which are tall plant height are more desirable. So, ICP 8700, TTB 7, ICP 13673, Bahar and ICP 3451 had the regression value more than unity, it indicates specifically adapted to favourable environments. The genotypes *viz.,* NDA 1, ICP 9691, ICP 6668, ICP 13304, ICP 13270and RVK 284 had the regression value less than unity, it indicates specifically adapted to unfavourable environments. Similar results were obtained by Sawargaokar *et al.,* (2011), identified stable genotypes for this trait. In contrast Ghodke (1992) obtained non singnificant G x E for this trait.

The genotype ICP 3451 showed maximum number of primary branches (13.94) while, ICP 16309 minimum numbers of primary branches (8.88) and population mean over three environments was 11.47. All the genotypes showed non-significant value for regression coefficient and deviation from

regression. The genotypes *viz.,* ICP 3451, ICP 12654, ICP 9691,NDA 1, MAL 13, ICP 8700, ICP 13673, ICP 6049, ICP 6668 were found to have higher mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. ICP 3451 was the higher number of primary branches. The genotypes *viz.,* ICP 12654, ICP 9691, ICP 8700, ICP 6049, ICP 6668 and BSMR 736 (check) had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* ICP 3451, NDA 1, MAL 13 and ICP 13673 had the regression value less than unity, it indicates suitable for poor environments.

The genotype ICP 6668 showed maximum number of secondary branches (11.44) while, ICP 13270 minimum numbers of secondary branches (3.16) and population mean over three environments was 6.52. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* ICP 6668, ICP 6971, ICP 9691, ICP 12654, ICP 13673, ICP 3451, NDA 1, BSMR 736 (check) and ICP 13304 were found to have higher mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance.

ICP 6668 found higher number of secondary branches. The genotypes *viz.,* ICP 6668, ICP 9691, ICP 12654, ICP 13673, BSMR 736 (check) and ICP 13304 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* ICP 6971, ICP 3451 and NDA 1 had the regression value less than unity, it indicates suitable for poor environments.

The genotype TJT 501 showed higher pod bearing length (40.22) while, ICP 12654 lesser pod bearing length (24.83) and population mean over three environments was 31.13. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* TJT 501, RVK 284, ICP 8700, ICP 6049,ICP 14832, BSMR 736 (check), TTB 7, ICP 16309 and ICP 3451 were found to have higher mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. TJT 501 found higher pod bearing length. The genotypes *viz.,* TJT 501, ICP 8700, ICP 6049 and ICP 3451 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* RVK 284, ICP 14832, BSMR 736 (check), TTB 7 and ICP 16309 had the regression value less than unity, it indicates suitable for poor environments. These findings are in accordance with Niranjan Kumar (2013).

The genotype ICP 13270 showed higher number of seeds per pod (4.80) while, ICP 8700 lesser number of seeds /pod (3.66) and population mean over three environments was 4.05. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* ICP 13270, ICP 13304, VKS 11/24-2, NDA 1, RVK 284, MAL 13, BSMR 736 (check), TJT 501, Bahar and ICP 6668 were found to have higher mean value than population mean with non significant bi and S^2d_i values. The stability parameters for number of seeds per pod exhibited the genotypes RVK 284 and MAL 13 are stable across the environments, statistically regression (b_i) value is equal to unity and S^2d_i approaches to zero and ICP 13270 found higher number of seeds per pod. The genotypes *viz.,* ICP 13304, VKS 11/24-2, NDA 1, BSMR 736 (check), TJT 501 and Bahar had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* ICP 13270 and ICP 6668 had the regression value less than unity, it indicates suitable for poor environments.

The genotype ICP 13270 showed highest pod length (4.90) while, ICP 9691 less pod length (3.82) and population mean over three environments was 4.31. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* ICP 13270, RVK 284, MAL 13, BSMR 736 (check), TTB 7, VKS 11/24-2, NDA 1, ICP 14832, ICP 12654 and TJT 501 were found to have higher mean value than population mean with non significant bi and S^2d_i values. The stability parameters for pod length exhibited the genotype ICP 13270 as stable across the environments, statistically regression (b_i) value is equal to unity and S^2d_i approaches to zero. and ICP 13270 found maximum pod length. The genotypes *viz.,* RVK 284, MAL 13, TTB 7, VKS 11/24-2 and TJT 501 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* BSMR 736 (check), NDA 1, ICP 14832 and ICP 12654 had the regression value less than unity, it indicates suitable for poor environments.

The genotype ICP 6668 showed higher number of pods per plant (168.99) while, ICP 8700 lesser number of pods/plant (103.33) and population mean over three environments was 135.03. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* ICP 6668, ICP 9691, VKS 11/24-2, BSMR 736 (check),ICP 13304, ICP 6049, ICP 3451, TJT 501, ICP 12654 and TTB 7 were found to have higher mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. ICP 6668 found higher number of pods per plant. The genotypes *viz.,* ICP 6668, ICP 9691, ICP 13304, ICP 6049 and ICP 3451 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* VKS 11/24-2, BSMR 736 (check), TJT 501, ICP 12654 and TTB 7 had the regression value less than unity, it indicates suitable for poor environments. These findings are in accordance with Shoran *et al.,* (1981); Muthiah and Kalaimagal (2005); Vannirajan *et al.,* (2007); Patel *et al.,* (2009); Sreelakshmi *et al.,* (2010); Thanki *et al.,* (2010); Sawargaonkar *et al*., (2011) and Niranjan Kumar (2013)

The genotype ICP 6668 showed highest seed yield per plant (40.31) while, ICP 14832 less seed yield per plant (17.17) and population mean over three environments was 29.20. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.,* ICP 6668, BSMR 736 (check), ICP 6971, VKS 11/24-2, ICP 13304, ICP 13673, ICP 3451, ICP 9691 and NDA 1 were found to have higher mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. ICP 6668 found highest seed yield per plant. The genotypes *viz.,* ICP 6668, BSMR 736 (check), ICP 6971, ICP 13304, ICP 13673, ICP 3451 and ICP 9691 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.,* VKS 11/24-2 and NDA 1 had the regression value less than unity, it indicates suitable for poor environments. These findings are in accordance with Shoran *et al.,* (1981); Muthiah and Kalaimagal (2005); Vannirajan *et al.,* (2007); Patel *et al.,* (2009); Sreelakshmi *et al.,* (2010); Thanki *et al.,* (2010); Sawargaonkar *et al*., (2011) and Niranjan Kumar (2013).

The genotype TJT 501 showed highest 100 seed weight (10.60) while, ICP 13304 less 100 seed weight (7.46) and population mean over three environments was 9.10.

Table.1 Pooled MSS values for different quantitative traits over three environments

Source of Variation	DF	DFF	DM	PHT	PB	SB	PBL	NSPP	PL	NPPP	YLDPPT	100SW	kg/ha
Rep within Env.	3	7.37	13.46	63.27	0.26	0.2	25.37	0.11 *	0.36 **	15.58	15.78	0.37	97103.81
Varieties	19	543.19 **	623.596 **	415.77 *	4.62 *	13.70 *	46.37	0.24 **	0.34 **	873.9	84.71 *	3.76 *	193454.3
Env.+ (Var.* Env.)	40	135.01	148.3	1602.90 **	4.77 **	10.48	127.1	0.37 **	0.62 **	1983.71	82.48 *	1.6	402206.60 *
Environments	2	723.45 **	605.706 *	27528.24 **	49.22**	66.27 **	1024.57 **	5.06 **	10.0 **	11589.02 **	780.14 **	1.15	5159995.00 **
Var.* Env.	38	104.04	124.22	238.4	2.43	7.5	79.84	0.12 **	0.12 *	1478.17	45.76	1.62	151796.7
Environments (Lin.)	1	1446.91 **	1211.41 *	55056.45 **	98.44**	132.45 **	2049.1 **	10.1 **	20.1 **	23178.04**	1560.2 **	2.3	0319990.0 **
Var.* Env.(Lin.)	19	120.76	87.04	295.96	3.02	8.82	53.8	0.21 **	0.19**	1858.58	58.71	1.79	110851.6
Pooled Deviation	20	82.95 **	153.32 **	171.80 **	1.75	5.88 **	100.59 **	0.03	0.06	1042.86 **	31.17 **	1.38 **	83104.70 **
Pooled Error	57	2.38	2.96	16.64	1.35	1.03	9.23	0.06	0.06	27.06	5.39	0.08	15435.68
Total	59	266.44	301.35	1220.6	4.72	11.49	101.09	0.33	0.53	1626.31	83.2	2.29	334981.3

* & ** significant at 5% and 1% level respectively

DFF : Days to 50 per cent flowering
DM : Days to maturity
PHT : Plant height (cm)
PB : Number of primary branches per plant
SB : Number of secondary branches per plant
PBL : Pod bearing length
NSPP : Number of seeds per pod
PL : Pod length (cm)
NPPP : Number of pods per plant
YLDPPT : Seed yield per plant
100SW : 100- seed weight (g)
kg/ha : seed yield kg/ha

Table.2 Mean and stability parameters in 20 genotypes of pigeon pea

Traits	Days to 50% flowering			Days to maturity			Plant height (cm)			Primary branches		
Genotypes	**Mean**	**bi**	**S2di**	**Mean**	**Bi**	**S2di**	**Mean**	**bi**	**S2di**	**Mean**	**bi**	**S2di**
ICP 16309	91.333	1.88	1.54	144.7	1.12	33.05	113.33	1.1	481.19	8.887	0.9	-1.15
VKS 11/24-2	117.833	-1.6	352.91	173.5	2.99	567.29	141.83	1.5	-15.94	10.5	1.31	-1.29
ICP 6049	115	-0.5	-2.41	170.2	-0.24	0.16	141.72	1.28	235.79	11.777	1.77	3.17
BAHAR	139.667	-0.39	163.57	194.8	0.9	347.66	151.44	1.15	-16.59	10.877	0.18	-1.13
ICP 14832	92.833	3.03	7.75	159.7	1.22	22.17	127.17	0.17	795.84	11	0.19	0.26
ICP 6668	120.333	2.1	222.61	180.3	1.99	5.19	147.5	0.91	-17.15	11.722	1.23	-1.24
ICP 6971	111	-0.04	306.78	161.7	-1.4	105.25	134.61	0.67	-18.95	11.388	1.19	-0.8
ICP 13673	131.833	1.1	138.03	192.7	0.9	107.68	153.22	0.76	-17.64	12.055	-0.36	3.43
MAL 13	131.667	1.15	89.95	189	1.61	273.63	143.11	0.87	-4.4	12.555	0.48	-1.26
NDA 1	126.5	1.98	8.12	185.3	2.92	-2.83	161.11	0.73	-10.16	12.888	0.9	2.79
ICP 12654	109.333	0.2	65.58	169.5	-0.22	13.04	129.95	0.81	59.43	13.165	2.26	0.68
ICP 13304	121.833	2.94	14.56	169.7	0.83	201.59	146.94	0.84	-14.14	10.888	1.72	0.01
ICP 3451	127.5	-0.2	12.88	187.8	1.89	452.94	150.28	1.16	606.39	13.943	0.35	-0.1
ICP 13270	126.833	1.56	83.96	169.2	1.89	52.52	144.93	0.68	314.91	10.557	-0.07	0.36
ICP 8700	134.667	0.13	8.88	193.8	-0.49	34.42	163	1.11	7.1	12.227	1.3	1.57
RVK 284	117.167	1.69	64.79	170	0.77	-1.41	144.17	0.96	301.66	10.33	1.44	1.27
TTB 7	115.833	0.78	69.65	165.7	0.19	92.48	154.5	1.55	18.45	10.375	2.17	2.86
ICP 9691	117.167	-0.3	-1.9	173.2	-0.03	-1.37	147.84	1.33	61.39	13.108	1.53	-1.17
TJT 501	95.833	2.69	-1.72	146.7	2.84	524.57	133.61	1.06	36.13	10.612	-0.17	-0.85
BSMR 736 (check)	109	1.79	0.93	165.3	0.32	168.83	138.45	1.35	253.18	10.612	1.69	1.74
Population Mean	**117.658**			**173.1**			**143.44**			**11.473**		

Table.3 Mean and stability parameters in 20 genotypes of pigeon pea

Traits	Secondary Branches			Pod bearing length (cm)			Number of seeds /pod			Pod length (cm)		
Genotypes	**Mean**	**bi**	**S2di**	**Mean**	**Bi**	**S2di**	**Mean**	**bi**	**S2di**	**Mean**	**bi**	**S2di**
ICP 16309	5.872	1.01	-0.95	31.89	0.55	131.83	3.807	-0.1	-0.07	4.002	1.21	0
VKS 11/24-2	6.365	1.97	-0.74	28.223	1.8	30.54	4.333	1.44	-0.06	4.55	1.48	-0.07
ICP 6049	5.222	1.77	-0.98	35.333	1.18	1.03	3.835	0.25	-0.04	3.933	0.93	-0.03
BAHAR	4.637	-0.54	0.1	30	1.27	-7.87	4.11	1.13	0.18	4.28	1.16	-0.07
ICP 14832	4	0.31	-0.75	33.472	-0.2	78.72	3.972	0.53	-0.04	4.402	0.7	-0.07
ICP 6668	11.443	2.05	7.26	26.428	1.27	9.49	4.083	0.28	-0.07	4.117	1.37	-0.07
ICP 6971	10.005	-1.59	-0.95	26.39	-0.34	-9.46	3.748	1.16	-0.07	3.945	0.95	-0.08
ICP 13673	7.72	1.92	0.58	26.61	1.16	106.48	4.002	0.57	-0.06	4.305	1.4	-0.06
MAL 13	5.855	1.8	-0.19	28.665	2.28	62.78	4.223	1.07	-0.07	4.692	1.25	-0.07
NDA 1	7.397	0.26	-0.77	30.888	0.8	6.48	4.277	1.56	-0.06	4.54	0.67	0.01
ICP 12654	8.222	2.37	36.19	24.833	0.85	132.65	3.75	1.22	-0.02	4.365	0.45	-0.08
ICP 13304	7.253	2.19	23.15	30.498	0.3	179.69	4.36	2.92	0.07	4.295	-0.2	-0.05
ICP 3451	7.555	-0.36	3.57	31.798	1.28	170.93	3.723	1.07	-0.07	3.917	0.92	-0.08
ICP 13270	3.168	-0.31	1.05	28.61	1.15	194.13	4.805	0.27	0.04	4.907	1.1	-0.07
ICP 8700	5.198	0.64	3.6	36.055	2.53	34.42	3.667	0.57	-0.06	3.862	0.87	0.06
RVK 284	5.015	0.31	5.94	36.723	0.31	495.39	4.223	1.07	-0.07	4.867	1.45	0.02
TTB 7	4.298	0.91	0.07	32.5	0.81	33.01	4.055	1.12	-0.02	4.56	1.47	0.4
ICP 9691	9.222	2.4	-0.79	30.938	1.48	79.49	3.777	1.31	-0.03	3.827	0.62	0.02
TJT 501	4.763	0.65	23.44	40.222	1.1	90.5	4.193	1.28	-0.06	4.343	1.44	-0.08
BSMR 736 (check)	7.315	2.21	-0.97	32.588	0.45	-9.19	4.197	1.28	-0.06	4.677	0.83	-0.07
Population Mean	**6.526**			**31.133**			**4.057**			**4.319**		

Table.4 Mean and stability parameters in 20 genotypes of pigeon pea

Traits	Number of pods/plant			Seed yield per plant(g)			100 seed weight (g)			KG/HA		
Genotypes	**Mean**	**bi**	**S2di**	**Mean**	**bi**	**S2di**	**Mean**	**bi**	**S2di**	**Mean**	**Bi**	**S2di**
ICP 16309	125.667	1.03	128.56	27.427	1.42	-2.45	8.617	6.06	-0.09	846.108	0.5	-219104
VKS 11/24-2	152.5	0.78	-10.51	35.265	1.06	9.55	10.54	-0.1	0.13	1347.218	1.59	625894
ICP 6049	145.682	1.03	215.18	24.247	1.34	-5.15	8.343	5.28	3.34	1122.218	0.9	-13418
BAHAR	110.112	-0.25	369.75	26.555	0.93	2.31	10.537	-4.54	3.23	1198.883	1.16	-9949
ICP 14832	124	-0.45	9.18	17.173	-0.25	2.77	8.012	5.38	0.4	1099.997	0.86	569829
ICP 6668	168.998	4.29	420.95	40.312	3.59	12.16	7.965	-2.59	0.1	1520.272	0.85	1361830
ICP 6971	134.722	1.46	278.01	35.75	1.21	65.26	8.333	1.61	0.2	1456.105	0.66	-11266
ICP 13673	120.61	1.98	-18.07	32.323	1.51	-2.58	10.342	-4.79	2.4	1198.327	1.08	-2276
MAL 13	115.525	1.81	1616.88	25.61	1.51	21.38	10.363	-5.43	6.19	1101.662	0.92	-17963
NDA 1	126.795	0.23	3391.06	29.742	0.03	-5.64	9.468	-2.28	0.8	1048.883	0.37	53628
ICP 12654	142.617	0.41	4055.86	28.082	0.41	0.33	8.697	7.15	0.13	1729.99	2.02	109163
ICP 13304	148.71	2.94	21.03	33.612	0.84	20.58	7.46	1.22	0.06	1151.103	0.78	43686
ICP 3451	143.183	1.28	81555.6	30.473	1.13	24.27	7.682	1.07	-0.04	1162.775	-0.1	309247
ICP 13270	129	0.59	93126.96	24.445	1.78	186.32	9.425	1.07	1.26	1502.773	1.03	43234
ICP 8700	103.333	1.95	203.99	25.167	-0.38	46.14	8.358	2.1	5.22	1325.55	1.52	114592
RVK 284	119.943	-0.62	78.36	28.223	0.18	4.78	10.08	6.02	-0.08	1495.548	0.96	-5536
TTB 7	136.182	0.71	74.57	28.615	0.93	6.06	9.99	-1.76	-0.05	1287.218	0.94	16185
ICP 9691	158.445	1.57	84.53	30.038	1.33	3.44	7.505	5.36	1.19	1756.103	1.3	88620
TJT 501	142.782	-1.23	34695.81	24.8	0.27	111.76	10.605	-2.2	1.15	1168.883	1	26497
BSMR 736 (check)	151.945	0.5	29.9	36.165	1.17	3.89	9.78	1.34	0.16	1771.66	1.59	-11179
Population Mean	**135.038**			**29.201**			**9.105**			**1314.564**		

All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.*, TJT 501, VKS 11/24-2, BAHAR, MAL 13, ICP 13673,RVK 284, TTB 7, BSMR 736 (check), NDA 1 and ICP 13270 were found to have higher mean value than population mean with non significant bi and S^2d_i values. None of the genotypes had stable performance. TJT 501 found highest 100 seed weight. The genotypes *viz.*, RVK 284, BSMR 736 (check) and ICP 13270 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.*, TJT 501, VKS 11/24-2, BAHAR, MAL 13, ICP 13673,TTB 7 and NDA 1 had the regression value less than unity, it indicates suitable for poor environments.

The genotype BSMR 736 (check) showed highest seed yield kg/ha (1771.66 kg) while, ICP 16309 less seed yield kg/ha (846.10) and population mean over three environments was 1314.56 kg. All the genotypes showed non-significant value for regression coefficient and deviation from regression. The genotypes *viz.*, BSMR 736 (check), ICP 9691, ICP 12654, ICP 6668, ICP 13270, RVK 284, ICP 6971, VKS 11/24-2 and ICP 8700 were found to have higher mean value than population mean with non significant bi and S^2d_i values. The genotype ICP 13270 Well adapted to all the environments and none of the genotypes had stable performance. BSMR 736 (check) found highest seed yield kg/ha. The genotypes *viz.*, BSMR 736 (check), ICP 9691, ICP 12654, VKS 11/24-2 and ICP 8700 had the regression value more than unity, indicating its suitability to favourable environments. The genotypes *viz.*, ICP 6668, RVK 284 and ICP 6971 had the regression value less than unity, it indicates suitable for poor environments. These findings are in accordance with Shoran *et al.*, (1981); Muthiah and Kalaimagal (2005); Vannirajan *et al.*, (2007); Patel *et al.*, (2009); Sreelakshmi *et al.*, (2010); Thanki *et al.*, (2010); Sawargaonkar *et al*., (2011) and Niranjan Kumar (2013).

In conclusion, from the present study it can be concluded that the genotype ICP-13270 were found to be a stable for pod length, ICP 9691 and ICP 12654 are on par with check for seed yield kg/ha across the environments for rainfed conditions and these genotypes can also be used as a donor parent for generating new breeding material for development of variety (Tables 1-4). However, this needs to be verified by testing the breeding lines over the season and over the locations for one more year under rain fed condition.

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