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Studies on Yield and Yield Attributes of Pigeonpea Genotypes Growing on Rice Bunds

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Abstract: *A field experiment consisted fifteen pigeonpea genotypes laid out in randomized block design with three replications. The high yield of genotype V1 (AKTE-11-1) was mainly due to production of higher number of pods per plant (214.33), mean 100 seed weight (9.83 g) and mean seed yield per plant (51.61 g) while reverse case was recorded in low yielding genotype V15 (ICPL-87). The genotype V1 (AKTE-11-1) recorded the highest harvest index (22.75) among all genotypes while low yielding genotype V15 (ICPL-87) recorded lowest harvest index (18.49). Among the different pigeonpea genotype the genotype V1 (AKTE-11-1) produced highest seed yield per plant (51.61 g) while the genotype V15 (ICPL-87) produced lowest yield per plant (33.38 g).*

Keywords: *Pigeonpea, yield, yield attributes, harvest index*

INTRODUCTION

Pigeonpea (*Cajanus cajan* (L.) Millsp) is one the most important grain legume crop species of tropics and sub-tropics of the world. It is second most important pulse crop only after chickpea. It is called by different names viz. Congo pea, Tur, Toovar, Gandul, Gungo pea and Red gram. Broad maturity classification of pigeonpea genotypes adopted as early (< 150 days), medium (151 to 180 days) and late (> 180 days) by Reddy (1990). Pigeon pea or red gram also is an important crop in India belongs to the family fabaceae. In India major pigeonpea growing states are Maharashtra, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Orissa, Jharkhand, Bihar and Tamilnadu. Among these Maharashtra is largest producer of pigeonpea which contributes 39.24% and remaining states contributes 60.76% of total output in the country. In Maharashtra pigeonpea is grown over an area of about 1.17 million hacters (Anonymous, 2011).

It is a versatile crop and ideally suited for drought-prone areas. It is a fast growing crop with extensive root system. Its tap root system allows optimum utilization of soil moisture and soil nutrients. It is endowed with diverse useful characteristics and is a multipurpose crop. It is used as food, feed and fuel. It is grown across slopes to reduce soil erosion; with its high protein content. Its area and production, however, are highly fluctuating year after year on account of erratic, scanty and uneven rainfall; high infestation of pests and diseases and highly varying market prices. In *konkan* region of Maharashtra pigeon pea is grown mainly on rice bunds. This crop is sown during *kharif* in month of June-July after transplanting of rice. This crop matures in the month of November-December. This crop is also grown in rice fallows after harvest of rice on residual moisture during the month of October and matures in the month of February-March. The farmers are using the seed material of any pigeon pea variety and therefore yield is less. It is necessary to identify the pigeon pea variety for growing on rice bunds. In *konkan* region of Maharashtra rice is grown on about 4.2 lakh hectare area. The rice bunds have more residual moisture

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than the field, the growing of pigeon pea on rice bund increase the total cropped area and this crop grows very well and produces a good yield. Pulses including pigeonpea has lowest harvest index, improved varieties of pigeonpea have high yield potential but farmers are not able to realize the potential due to various constraints hence, to overcome this and identify the pigeonpea genotype for growing on rice bunds, the present study was carried out to study the yield and yield attributes of pigeon pea genotypes by growing on rice bunds.

MATERIAL AND METHODS

The experiment was conducted at the experimental field of Department of Agricultural Botany and Agronomy, College of Agriculture, Dapoli, Dist: Ratnagiri (M.S.) during Kharif 2013. The selection of the site was considered on the basis of availability of the bunds for cultivation of pigeonpea. The experimental material consisted of fifteen different promising genotypes of pigeonpea as V1 (AKTE-11-1), V2 (BSMR-853), V3 (VIPULA-1), V4 (T-VISHAKHA), V5 (BDN-711), V6 (PHULE RAJESHWARI), V7 (PKV-TARA), V8 (ICPL-87119), V9 (AKT-8811), V10 (UPAS-120), V11 (TAT-10), V12 (BDN-708), V13 (BSMR-736), V14 (KONKAN TUR-1), V15 (ICPL-87) with three replications. Sowing of seeds was done in June, 2013 in plastic bags. About 2 seeds were dibbled at each bag. To retain only one healthy seedling per hill, thinning was done ten days after sowing. Fourteen day's old seedlings were transplanted on bund of rice field at 30cm distance. Total 33 plants of each genotype were planted on 10m bund length. After transplanting on bunds two weeding's were done at 20 days interval. At the time of transplanting FYM was incorporated in soil and fertilizer dose of 25:50:00 N:P:K (kg/ha) was given as per recommendations. The recommended practices followed as and when required.

The observations were recorded of five randomly selected plants from each variety in each replication which harvested separately, when plants reached to physiological maturity. The mean value of five plants for each observation as number of seeds/pod, number of pods/plant counted and recorded. Also, pod length (cm) and mean biomass yield per plant recorded. After counting the number of pods/plant from five sampled plants, the pods were threshed separately. The seed yield thus obtained was weighed and mean was calculated to obtain mean seed yield/plant and expressed in grams. A random sample was drawn from seeds of each variety, 100 seeds were counted and accurately weighted and expressed in grams. Harvest index of variety was calculated by the formula given by Donald (1962) and expressed in percentage.

Statistical analysis of the data obtained during the course of investigation was carried out by using statistical analysis methods of analysis of variance as described by Panse and Sukhatme (1985). The standard error of mean (S.E±) was worked out and the critical difference at 5 per cent level of significance was calculated wherever the results were found significant.

RESULTS AND DISCUSSION

In pigeonpea, yield per unit area is determined largely by the various components, namely number of branches and pods per plant, seeds per pod, 100 seed weight and harvest index.

The data on mean number of seeds per pod, mean number of pods per plant, mean pod length, mean pod dry weight (g), 100 seed weight (g), mean seed yield per plant (g), biomass yield per plant and harvest index (%) are represented in given Table. The data revealed that genotypic differences were significant for all yield and yield contributing parameters.

The mean number of seeds per pod was 3.67. The genotypic differences were statistically significant for mean number of seeds per pod. The genotype V5 (BDN-711) recorded highest (4.40) seeds per pod which was at par with genotypes V4, V10, V15, V14, V2 and V8 over other genotypes while the genotype V9 (AKT-8811) had recorded lowest (3.07) seeds per pod. Similar findings were reported by Upadhyaya and Saharia (1980) and Sindhu *et al.* (1982) reported that the number of seeds per pod and 1000 grain weight were apparently the main contributing traits in pigeonpea crop yield.

The data on mean number of pods/plant revealed that the genotypic differences were

Table 1
Mean yield and yield attributes and harvest index of different pigeonpea genotypes

Genotypes	Number of Seeds per pod	Mean number of pods per plant	Mean pod length (cm)	Test wt. (100 seeds) (g)	Mean biological yield per plant (g)	Mean seed yield per plant (g)	Harvest index (%)
V1 (AKTE-11-1)	3.13	214.33	5.20	9.83	226.96	51.61	22.75
V2 (BSMR-853)	3.80	204.33	5.60	9.50	220.15	46.10	20.94
V3 (VIPULA-1)	3.27	212.67	5.10	9.83	206.07	45.75	22.20
V4 (T-VISHAKHA)	4.00	197.33	5.67	8.83	184.18	36.94	20.06
V5(BDN-711)	4.40	206.00	6.07	9.50	196.49	38.50	19.59
V6(P.RAJESHWARI)	3.40	175.67	5.53	9.50	208.82	45.12	21.60
V7(PKV-TARA)	3.27	174.00	5.70	9.00	201.25	42.35	21.06
V8 (ICPL-87119)	3.80	196.67	5.53	9.50	211.77	45.71	21.59
V9 (AKT-8811)	3.07	217.33	5.03	9.50	218.69	48.74	22.29
V10 (UPAS-120)	4.00	230.33	4.80	9.17	187.33	38.09	20.34
V11 (TAT-10)	3.60	213.00	5.23	8.83	187.23	36.94	19.73
V12 (BDN-708)	3.40	206.67	5.53	8.50	199.16	44.29	22.24
V13(BSMR-736)	4.00	195.00	5.67	9.50	208.75	44.45	21.30
V14 (KONKAN TUR)	3.87	221.67	5.87	9.67	226.97	50.64	22.31
V15 (ICPL-87)	4.00	162.67	5.73	8.33	180.47	33.38	18.49
MEAN	3.67	201.84	5.48	9.27	204.29	43.24	21.10
SE ±	0.27	6.81	0.20	0.30	1.98	0.76	0.42
CD at 5%	0.79	19.74	0.58	0.86	5.74	2.21	1.22

statistically significant for mean number of pods per plant. The mean number of pods per plant was 200.51. The genotype V14 (Konkan Tur-1) had recorded highest (221.67) which was at par with V9, V1, V11, V3, V10, V12, V5 and V2 over other genotypes while the genotype V15 (ICPL-87) recorded lowest number of pods per plant (162.67). Similar results were reported by Dumbre and Deshmukh (1983), Sheldrake and Narayanan (1979). Angadi *et al*. (1988), Bhute *et al*. (1988), Sharan *et al*. (1988) also reported a positive correlation between mean number of pods per plant and seed yield per plant.

The data on mean pod length revealed that there was significant differences in all the genotypes for mean pod length. The mean pod length per plant was 5.48 cm. The genotype V5 (BDN-711) had recorded highest (6.07cm) mean pod length which was at par with genotypes V14, V5, V7, V4, V3, V2, V11, V8 and V6, while the genotype V10 (UPAS-120) recorded the lowest (4.80cm) mean pod length. Similar findings were reported by Ramadevi *et al*. (2012).

The data on mean 100 seed weight showed significant differences in all the genotypes. The mean hundred seed weight (g) was 9.27. The genotype V1 (AKTE-11-1) and V3 (Vipula-1) recorded highest (9.83 g) which was at par with genotypes V14, V13, V2, V5, V6, V8, V9, V10 and V7 over other genotypes, while the genotype V15 (ICPL-87) recorded the lowest mean 100 seed weight (8.33 g). Rangaswamy *et al*. (1975), Paul *et al*. (1996), Dubey and Upadhyaya (1991) and Singh and Srivastava (1977) reported positive significant association of grain yield with 100 seed weight in pigeonpea.

The differences in the mean seed yield per plant (g) due to different genotypes were significant. The mean seed yield per plant was 43.24 g. The data in respect to mean seed yield revealed that the genotype V1 (AKTE-11-1) had recorded highest (51.61 g) mean seed yield followed by genotypes

V14 (Konkan Tur-1) recorded (50.64 g) and genotype V9 (AKT-8811) recorded (48.74 g) seed yield per plant while the genotype V15 (ICPL-87) had recorded the lowest (33.38 g) seed yield per plant. Similar results were reported by Roysharma *et al*. (1981), Singh *et al*. (1980), Salith (1983) and Ghosh and Mathur (2000).

The mean biomass yield per plant was 204.29 g. The genotype V14 (Konkan Tur-1) recorded significantly highest mean biomass yield per plant (226.97 g) which was at par with genotype V1 (AKTE-11-1) over other genotypes. The genotype V15 (ICPL-87) recorded lowest mean biomass yield per plant (180.47 g). The results of Deotale *et al*. (1989) in pigeonpea and Sahane *et al*. (1995) in horsegram indicated that the dry matter production as well as translocation and accumulation were very efficient in highly efficient genotype.

The data on mean harvest index revealed that the genotypic differences were statistically significant for mean harvest index. The mean harvest index (HI) was 21.10 %. The genotype V1 (AKTE-11-1) had recorded the highest (22.75) mean harvest index which was at par with genotypes V14, V12, V9, V3, V6 and V8, while the genotype V15 (ICPL-87) recorded the lowest (18.49) mean harvest index. Similar findings were reported by Jain (1975), Bangal and Patil (1985), Nagarjun *et al*. (1989) and Bhute *et al*. (1988) showed positive relation between mean harvest index and seed yield (g) per plant.

CONCLUSION

It could be therefore concluded that the genotype V1 (AKTE-11-1) followed by the genotypes V14 (Konkan Tur-1) and V9 (AKT-8811) was found to be superior over other genotypes in general for yield and yield contributing characters. Thus, the various characters listed above seemed important for improving productivity in pigeonpea. Hence, would be useful for crop improvement programme in pigeonpea to increase the crop productivity of this important pulse crop.

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