Indian Journal of Agricultural Sciences **82** (8): 721–3, August 2012

Assessment of genotypes of pigeonpea (*Cajanus cajan*) for higher productivity in semi-arid Vertisols*

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Received: 15 April 2011; Revised accepted: 7 April 2012

Key words: Correlation, Heritability, Genetic advance, Phenotypic and genotypic variation

Pigeonpea (*Cajanus cajan* (L.) Millsp.) is an important pulse crop grown in rainfed condition in Maharashtra. It is grown mainly as intercrop with sorghum, cotton and soybean. Among different crops grown in rainy (*kharif*) season, pigeonpea would normally perform better under drought prone condition (Choulwar *et al.* 2010). However, there is a large variability in the performance of pigeonpea genotypes for grain yield under rainfed condition. Breeding of genotypes thus would require identification of specific attributes that may be transferred to high-yielding cultivars. The present study was undertaken to assess genetic variation of genotypes and identify genotypes for rainfed condition in a semi-arid Vertisol. Twenty three pigeonpea genotypes were tested for yield contributing traits during *kharif* 2007, 2008 and 2009 under rainfed condition in a semi-arid Vertisol at Marathwada Agricultural University, Parbhani in Maharashtra. Parbhani is located at a latitude of 19^0 16', longitude of 76^0 47' and altitude of 409 m above mean sea level. The trials were conducted in a randomized block design with three replications.

The genotypes were sown with row × plant spacing of 60 x 30 cm in net plot size of 3.6 x 4.8 m with seed rate of 15 kg/ha. They were sown on 30.6.2007 and harvested on 16.1.2008 in first year; sown on 30.6.2008 and harvested on 02.02.2009 in second year; sown on 11.7.2009 and harvested on 28.1.2010 in third year. Recommended fertilizer (30:60:30 NPK kg/ha) was applied as basal dose. Observations were recorded on five plants of each genotype for drought tolerance and yield contributing traits. Different traits measured are days to 50% flowering, days to maturity, plant height (cm), number of primary branches/plant, number of pods/plant, dry matter (g/plant), leaf water potential (-bar), relative water content (RWC, %) and rain water-use efficiency (RWUE, kg/ha/mm).

Genotypic (GCV) and phenotypic coefficient of variation (PCV) were derived as

$$PCV = (\sqrt{\sigma^2 p}/\text{Mean of trait}) \times 100 \quad \ldots\ldots (1)$$

$$GCV = (\sqrt{\sigma^2 g}/\text{Mean of trait}) \times 100 \quad \ldots\ldots (2)$$

where $\sigma^2 p$ is phenotypic variance; $\sigma^2 g$ is genotypic variance.

The broad sense 'heritability' was estimated as

$$\text{Heritability } (h^2) = (\sigma^2 g/\sigma^2 p) \times 100 \quad \ldots\ldots (3)$$

The genetic advance was measured as

$$\text{Genetic advance (GA)} = h^2 \times \sigma p \times K$$

$$\text{Genetic advance (\%)} = (\text{GA/Mean}) \times 100 \quad \ldots\ldots (4)$$

where K = Selection differential at 5% level = 2.06.

Genotypic correlation coefficient (rgxy) can be given as

$$rgxy = (\text{cov } (gx, gy))/(\sqrt{(\sigma^2 gx)\,(\sigma^2 gy)}) \quad \ldots\ldots (5)$$

where cov (gx, gy) = genotypic covariance between traits x and y; σ^2 gx and σ^2 gy are genotypic variances of traits x and y.

The phenotypic correlation coefficient (rpxy) can be given as

$$rpxy = (\text{cov } (px, py))/(\sqrt{(\sigma^2 px)\,(\sigma^2 py)}) \quad \ldots\ldots (6)$$

where cov (px, py) = phenotypic covariance between x and y; σ^2 px and σ^2 py are phenotypic variances of x and y.

The relative leaf water content (RWC) in a leaf is measured as

RWC = (Fresh weight – Dry weight)/(Turgid weight – Dry weight) × 100 ..... (7)

The data was analyzed based on analysis of variance (ANOVA). Differences between genotypes are examined based on Least Significant Difference (LSD) at $P < 0.05$ level and inferences are drawn (Gomez and Gomez 1984). There was a rainfall of 838 mm in 2007, 636 mm in 2008 and 654 in 2009. Based on ANOVA, differences between genotypes were significant for all traits. BDN 2009 attained significantly higher yield of 1496 kg/ha, followed by K2 (1 406 kg/ha). RWUE of genotypes was derived as ratio of yield (kg/ha) and rainfall (mm) received in each year. BDN 2009 gave significantly higher RWUE of 3.39 kg/ha/mm.

*Short note

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