



## Variability for root traits in early growth stages of pigeonpea [*Cajanus cajan* (L.) Millsp.]

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**Abstract :** Assessment of genotypic variation for root traits among 20 genotypes of pigeonpea chosen from core collection was done. Root traits were measured at 30 days after sowing. Analysis of variance for the 4 quantitative root traits studied revealed highly significant differences among the genotypes. UPAS-120 recorded highest root volume, number of lateral roots, root to shoot dry weight ratio and total dry matter indicating that it has desirable root traits to tolerate drought in later stages of growth. Very low difference between PCV and GCV values were observed for number of lateral roots indicating little influence of environment on the expression of these traits in this set of genotypes. Very high heritability estimates were observed for the characters like root volume, number of lateral roots, root to shoot dry weight ratio and total dry matter. This reveals considerable genotypic component of variability which might be of much value in the selection programme.

**Key Words :** *Cajanus cajan*, Root traits, Diversity, GCV, PCV

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### INTRODUCTION

Improvement of crop root systems has lagged behind that of above ground plant characteristics. This disparity may be attributed to the root system's concealment in the soil and its highly variable nature in relation to soil conditions, both of which enormously complicate observation and experimentation. Differences in rooting pattern can change the amount and duration of water availability to plants. Greater root depth and extent of soil water extraction could increase the amount of water available at critical growth stages. Deeper roots increased yield by 20 per cent (Jordan and Miller, 1980). Increased root depth, density, increased conductance and better root to shoot dry weight ratio would help the crop in sustaining its growth during moisture stress period (Sharp and Davies, 1989, Ingram *et al.*, 1994). An increase in the simulated root zone depth has been shown to increase leaf area growth, photosynthesis and transpiration and yield of crops under drought (Jones and Zur, 1984).

Pulses are basic ingredients in the diets of a vast majority of Indian population as they provide a perfect mix of high biological value when supplemented with cereals. Pigeonpea (*Cajanus cajan*) is one of the most important pulse crops of India, which accounts for 90 per cent of the world production, occupying an area of 3.47 m ha with a production of 2.7 m tons and the national average yield is 797 kg/ha. It is normally cultivated as a rainfed crop and is often subjected to water stress at one or several stages of crop growth and development, since it is a long duration crop.

The rooting system was investigated and studied in many crop species. A difference in rooting morphology among different varieties of soybean was observed (Raper and Barber, 1970). Similar genetic variability in root system was observed in sorghum and their implications for drought tolerance were reported. The adoptive mechanism of plant to water and high temperature stress was studied, but not inheritance of rooting traits (Jordan and Miller, 1980).

Narayanan and Sheldrake (1979) compared the late

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