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Root System Structure of Six Food Legume Species: Inter- and Intraspecific Variations

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Abstract:

Root characteristics of 114 genotypes of six food legume species, i.e., chickpea (*Cicer arietinum* L.), cowpea (*Vigna unguiculata* (L.) Walp.), grasspea (*Lathyrus sativus* L.), lentil (*Lens culinaris* Medik.), black gram (*Vigna mungo* (L.) Hepper) and mung bean (*Vigna radiata* (L.) Wilczek) were studied to evaluate the inter- and intraspecific variations in root system structure. Eleven root and shoot characteristics of 10-day-old seedlings, raised in growth pouches in a growth chamber, were subjected to principal component analysis. The results indicated that the root system structure is determined mainly by taproot and lateral root lengths and lateral root density, in which the species varied significantly. Chickpea produced long individual lateral roots and cowpea produced a great number of lateral roots, which resulted in relatively large root system formation. Grasspea also developed relatively long lateral roots. In contrast, the formation of smaller-sized root system was due to a smaller number of lateral roots produced for lentil and shorter lateral roots for black gram and mung bean. Large genotypic variations in root characteristics were found within each species, particularly in cowpea and chickpea. The high-yielding, drought-tolerant or deep-rooting genotypes reported earlier tended to produce large root system. Significant correlations of root growth parameters between plants grown in growth pouches and soil indicated that the growth pouch technique can be a useful tool for screening of root characteristics.

Keywords:

Cicer arietinum L., *Lathyrus sativus* L., *Lens culinaris* Medik., Principal component analysis, Root, *Vigna unguiculata* (L.) Hepper, *Vigna radiata* (L.) Wilczek, *Vigna unguiculata* (L.) Walp

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