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Genetic Diversity Analysis Of Inter sub-specific And Intra-specific Derivatives Of Lentil (Lens culinaris Medik.) To Understand Their Potential To Widen The Genetic Base Of Cultivated Lentils Based On Morpho-physiological And PCR Based Molecular Markers

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Abstract

Changing climatic conditions have challenged lentil breeding program to enhance its productivity to meet the dietary requirements of growing human population. Worldwide, narrow genetic base of cultivated lentils limit the efforts to increase its productivity by genetic manipulations. Superior inter and intra-specific derivatives have potential to create favourable gene combinations to widen the genetic base of cultivated lentils. 76 inter sub-specific and 20 intra-specific advanced derivatives along with 4 checks were evaluated using 17 morpho-physiological traits and 50 PCR based markers to determine the nature and magnitude of their genetic divergence. Mahalanobis D² analysis based upon morpho-physiological traits grouped 100 genotypes into two clusters. They exhibited 21 per cent genetic similarity. Cluster I was the largest with 94 genotypes (74 inter sub-specific, 18 intra-specific and two checks). Cluster II mostly had orange cotyledon coloured bold seeded genotypes. The inter-cluster distance between two clusters was 14.91. Highest intra cluster distance was observed in cluster II. The biological yield/plant followed by

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seeds/pod and pods/plant contributed maximum towards the genetic diversity. Of 50 PCR based markers (25 RAPDs and 25 EST-SSR/SSRs), 7 RAPDs and one EST-SSR/SSR primer generated 51 bands, of which 30 were polymorphic. Two RAPD primers (S-221 and S-223) exhibited maximum polymorphism. Jacquard’s similarity coefficient was used to understanding the genetic relationships among the genotypes and UPGMA clustering algorithm grouped genotypes into two main clusters. Cluster A had maximum of 99 genotypes. $D^2$-statistic and molecular analysis suggested cluster I being the largest and 78 genotypes were found to be common. Both methods revealed sufficient genetic diversity in lentil. Six genotypes, HPLL-32, L-354, L-541 HPLL-2, L-437-1 L-437-2 were identified as superior for seed yield and other related traits. Based upon morph-physiological traits and PCR based marker analysis, these genotypes have potential for their inclusion for future lentil breeding program.

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References