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# Genetic resources and genomics for enhancing the efficiency of crop improvement in grain legumes

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## Abstract

Grain legumes have great potential in alleviating protein hunger and malnutrition among poor people in developing countries, being the primary source of dietary protein. Besides their importance for human and animal nutrition, legumes fix nitrogen and are important components in the cropping systems for improving and sustaining soil fertility. Globally, ~1.1 million grain legume accessions are conserved in different genebanks, of which ICRISAT genebank holds ~50,000 accessions of cultivated and wild relatives of chickpea, pigeonpea, and groundnut from 133 countries. These genetic resources are reservoirs of many useful genes for the present and future crop improvement programs globally. ICRISAT's strategic research on core (10% of entire collection) and mini core (10% of core or 1% of entire collection) collection approach has provided an entry point for crop scientists to utilize these resources in crop improvement. Evaluation of mini core collections of chickpea, pigeonpea and groundnut have resulted in identification of trait-specific germplasm for important agronomic traits (early maturity, large-seed, and high yield) as well as resistant/tolerance sources for various biotic (diseases and insect pests) and abiotic (drought, water-logging, heat, low temperature, and salinity) stresses and nutrition-related traits (oil, protein, O/L ratio) for use in breeding programs. In addition, vast genomic resources such as *BAC libraries, ESTs, SSRs, DArT clones,* and *SNPs* have been developed in chickpea, pigeonpea, and groundnut which will accelerate the molecular characterization of germplasm accessions and help in identification of genetically diverse trait-specific germplasm accessions to develop new cultivars with a broad genetic base. Based on these resources, dense genetic maps of these legume species have been developed and molecular markers linked with several traits of interest have been identified. Marker-assisted breeding approaches have already been initiated for some traits in chickpea and groundnut, and would lead to enhanced efficiency and efficacy of crop improvement.