

New Sources from Germplasm Mini Core Collection Enhance Genetic Gains for Oil Content in Peanut

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Peanut is an important oil crop cultivated in over 110 countries globally. In most cultivars oil content in seed is about 48% and protein about 25%. Genetic gain, the annual increase realized through crop breeding was $<1.0 \text{ year}^{-1}$ for yield in most crops. Germplasm collections are the source of variability for agronomic and nutritional traits. ICRISAT genebank at Patancheru, India has the largest collection of peanut germplasm, 15,444 accessions. The core (1704 accessions) and mini core (184 accessions) collections have been developed and sources for high oil content from mini core identified. Using 13 parents, including 10 from mini core, 19 recombinant inbred line (RIL) populations were developed to study genetics of oil content and identifying transgressive lines. Evaluation of these RILs in two seasons showed huge variation for oil contents in all the populations. Eighty-six exceptionally high oil containing breeding lines ($>60\%$) were selected for further evaluation along with parents and high oil control cultivars. Over three seasons, 42 breeding lines had on average 62.2-66.8% oil content. Most of these lines had low protein content, however, some lines had good combination of protein and exceptionally high oil contents (20.2 -22.2% protein, 65.4-66.4% oil). High genotype \times environment interaction was observed for oil and protein contents and further multiseason evaluation is in progress to identify stable lines. The exceptionally high oil lines originated from crosses involving normal oil (48%) \times high (53%) or high \times high parents from mini core collection, indicating exploitable epistatic effects. Occurrence of low oil containing lines also in the populations involving high \times high oil parents indicated different sets of loci in the high oil parents. Preliminary results indicated that at least four independent loci were involved in inheritance of oil content in the peanut. Mapping using molecular markers is in progress to confirm genetic basis of oil content.