

Activity 3 - Each breeding location to make (1) at least 70 new crosses annually, 2) Advance populations (3) Conduct yield evaluation trials involving NARS partners and support release of new material by both private and public sectors. Key methodologies include (a) NIRS for oil content and fatty acid profile (b) Disease nursery for foliar fungal diseases (c) Empirical and trait-based phenotyping for drought tolerance (d) genomic tools for high oleic and resistance to rust and late leaf spot

Objective: To develop groundnut lines that combine several desirable traits into single genotype to meet the needs of the farmer, consumer and industry.

Materials and methods: Single-seed descent, pedigree, and backcross methods of breeding are used to improve the target traits. Selection in segregating populations are enabled by (a) markers for three traits, resistance to rust and late leaf spot and high oleic trait, and (b) phenotyping that uses a combination of empirical and trait-based approaches for drought, NIRS for quality parameters, and disease nursery and/or sick plots.

Results and interpretation: Eighty-eight new crosses were attempted to generate breeding populations, involving 68 unique parents of which 47 were elite lines. Both markers and NIRS phenotyping are used to breed high oleic groundnut varieties in the genetic background of drought tolerance and early maturity. Medium- to large-kernel size is preferred in food and confectionary industries and to meet this demand from the industries, the new high oleic lines identified in 2016 for trials had a 100-seed mass of up to 70 g. To meet the emerging challenges of rainfed ecologies, Spanish Bunch varieties with fresh seed dormancy (FSD) in the genetic background of drought tolerance are needed. From the crosses involving parent with FSD, 500 bulks were evaluated to select 46 lines for testing along with best check, and based on their performance, 22 lines were advanced to Elite trial (Fig. 2). Similarly, 42 red-seeded lines were identified for Preliminary Trials in 2016. Study conducted to estimate the genetic gain at ICRISAT-Patancheru for Spanish Bunch types, showed an annual pod yield increase of 17 Kg/ha equivalent to 0.76% increase (unpublished data). Absence of genetic gain for hundred seed weight and shelling outturn suggests the scope in the breeding program to further enhance genetic gain for pod yield.



*Fig. 2. Test for fresh seed dormancy in the lab shows absence of FSD in ICGV 00350, an drought tolerant and high yielding lines line released for cultivation in India. ICGV 97145 is used as FSD donor to develop new FSD line ICGV 15396 in the genetic background of drought tolerance.*

Next steps: To develop new lines for the key traits and their combinations, high oleic, red-seeded and fresh seed dormancy in the genetic background of high pod yield, seed size, and shelling outturn, and drought and disease tolerance.