

seeded soybean varieties of Indian provenance have been repatriated from USDA, USA. The introductions particularly for specific genes of interest have helped in bringing about a renaissance of this ancient crop of northern India into a commercial crop of the country.

Opportunities exist to further have directed-introduction for several traits and genes of interest which were hitherto unimportant but are presently assuming significance such as those for food and nutritional quality, lack of anti-nutritional factors etc.

Introduction and Management of Groundnut Germplasm in India

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Groundnut (*Arachis hypogaea* L.), which is a premier oilseed crop is cultivated in more than 100 countries, spread across 40°N and 40°S latitudes. The crop is grown in about 24 m ha with a total production of 31 m tones and productivity of 1304 kg ha⁻¹. Groundnut occupies about 35 % of the area and 40 % of the production among the oilseed crops, and is being cultivated in 7.6 m ha producing about 7.8 m tonnes (nuts in shell) with productivity of about 1000 kg/ha.

The genus *Arachis* L. includes both diploid and tetraploid taxa confined to South American countries viz., Argentina, Bolivia, Brazil, Paraguay and Uruguay. The cultivated groundnut is believed to be originated in northern Argentina and southern Bolivia. Prior to early 1500, groundnut was not known outside the Americas and worldwide distribution of two seeded and three seeded forms took place soon after the discovery of New World. The groundnut moved up the west coast from Peru to Mexico and then across the pacific to Philippines. The introduction of groundnut to African agriculture is accredited to Portuguese. The earliest form successfully introduced into southeastern United States was probably from Africa. Groundnut was introduced to India in the east coast of the erstwhile Madras Province in the middle of 19th century and assumed agricultural importance in the late 19th and early 20th centuries. It was surmised that groundnut was introduced to India from Manila (Philippines). Presently about 90 per cent of the total production of India is shared by Andhra Pradesh (27 percent), Tamil Nadu (23.4 percent), Gujarat (17.2 percent), Karnataka (13.8 percent) and Maharashtra (8.3 percent).

Arachis hypogaea is placed under the family Fabaceae, tribe Aeschynomeneae and subtribe Stylosanthinae. The

genus is divided into nine sections (Krapovickas and Gregory 1994) viz., *Arachis*, *Caulorhizae*, *Erectoides*, *Extranervosae*, *Heteranthae*, *Procumbentes*, *Rhizomatosae*, *Trirectoides* and *Triseminatae*. The section *Arachis* comprises the cultivated groundnut, tetraploid species *A. monticola* and a number of diploid wild species. Among the cultivated forms, subspecies *fastigiata* has been divided into four botanical varieties, *fastigiata*, *peruviana* Krapov and WC Gregory, *aequatoriana* Krapov. and WC Gregory and *vulgaris* C. Harz. The sub species *hypogaea* comprises two botanical varieties, *hypogaea* and *hirsuta* Kohler (Table 1).

As per the revised classification (Singh & Simpson 1994), the primary gene pool comprises *A. hypogaea* and a tetraploid *A. monticola* which is freely cross-compatible. The cross-compatible diploid species of section *Arachis* forms the secondary gene pool. The tertiary gene pool comprises the members of the section *Procumbentes* that probably co-evolved the species of series *Perennes* of the section *Arachis* and are weakly cross compatible with section *Arachis*.

The National Research Centre for Groundnut (NRCG) was established in 1979 by the ICAR with a mandate to conduct, coordinate and steer research programme on groundnut based production systems. One of the major objectives of NRCG is to collect, characterize, evaluate, conserve and document groundnut genetic resources. The centre is identified as National Active Germplasm Sites under the Indian Plant Genetic Resources System (IPGRS) the activities of which are monitored by NBPGR, New Delhi. The All India Co-ordinated Research Project on Oilseeds was shouldering the responsibility of collection of groundnut germplasm at national level prior to the establishment of the Centre.

The centres located in the states of Tamil Nadu, Andhra Pradesh, Maharashtra, Karnataka and Gujarat collected land races from their respective regions. A total of 5066 accessions thus assembled were donated to International Crops Research Institute for Semi-arid Tropics (ICRISAT), Patancheru at the time of establishment of Genetic Resources Unit. Later ICRISAT conducted further collection expeditions in collaboration with Indian programme and National Bureau of Plant Genetic Resources (NBPGR), and collected 1042 accessions from 11 states of the country. Explorations were also undertaken in six states by the NRCG during 1981-1993 to enrich the working collection and thus 108 accessions were assembled. Under the All India Co-ordinated Research Project on Oilseeds-Groundnut system a total of 3399 accessions of cultivated groundnut and 38 wild *Arachis* accessions are being maintained at 7 centres. It is also felt that being a recently introduced crop to India, exploration undertaken earlier have captured most of the variability within the country.

Introduction of useful germplasm from exotic sources has been one of the major activities of NBPGR, New Delhi. The NBPGR is contributing by facilitating the assembly of germplasm at ICRISAT from various parts of the world. Until 1988, 5297 accessions from the Peoples Republic of China, Indonesia, Japan, Malawi, Nigeria, Senegal, South Africa, Tanzania, UK, USA, USSR, Zambia and Zimbabwe were assembled. The NBPGR has also introduced another 4985 accessions from 37 countries.

The NRCG has been approaching NBPGR, New Delhi from time to time for the procurement of elite exotic germplasm. A total of 111 germplasm lines were procured including both cultivated and wild *Arachis* species. Land races (170) collected by NBPGR, New Delhi within the country were also annexed to the working collection of the centre. Recently a few accessions of other three varieties *hirsuta*, *peruviana* and *aequatoriana* have been introduced to NRCG from USDA through NBPGR.

The characterization of new introductions has been done to identify accessions having specific traits, for identifying duplicates and gaps in the working collection. The working collection maintained at the Centre was characterized for various agronomic traits and about 15 evaluation catalogues have been brought out. A wide spectrum of variability has been identified over years of characterization and evaluation. Recently, elaborate

characterization for 20 qualitative traits and 32 quantitative traits was undertaken and promising accessions in the working collection were identified. The information generated has been brought out in the form of catalogues. Large number of accessions of cultivated groundnut identified for various abiotic and biotic stress factors have been compiled and brought out as a reference manual.

The working collection at NRCG is conserved in medium term module at a temperature of 4°C and 35-40 per cent RH. The repository holds 8934 accessions at present in the form of seeds. It also includes 3937 accessions procured over last three years from the ICRISAT under the repatriation programme. The collection represents 96 countries with major chunk is of Indian origin followed by USA. A duplicate set belonging to both wild and cultivated forms numbering 7397 is being maintained at the National Gene Bank at NBPGR for long-term conservation. A field gene bank comprising 96 accessions belonging to 5 sections of *Arachis* has been established for characterization and further utilization in crop improvement programmes. Accessions belonging to rest of four sections were assembled from the ICRISAT recently for enriching the collection of wild species. Emphasis has been given to conserve the genotypes which reached the final stage of testing under the multi-location trial system of the AICRP (Groundnut) to avoid the loss of these genotypes (finished product) even if they are rejected for promotion as a variety.

Under the Memorandum of Understanding signed between ICAR and ICRISAT, groundnut germplasm accessions donated by institutes or collected through exploration within the country by the ICRISAT will be deposited in National gene Bank NBPGR for long-term conservation. A total number of 6060 groundnut accessions have been identified for repatriation. The regeneration of accessions to enhance the seed quantity was undertaken since 2001 and with the present rate of multiplication the repatriation of accessions will be over by 2005.

For sustainable crop improvement, there is an urgent need for introduction of accessions with resistance to various biotic and abiotic stresses, particularly to diseases, such as bud necrosis, late leaf spot, and pests, such as leaf miner and armyworm (*Spodoptera*). In addition, to broaden the genetic base of groundnut cultivars and incorporation of stable resistance against diseases and pests, introduction of wild *Arachis* species is desired.