Overcoming Abiotic and Biotic Constraints to Yield, and Production of High-Quality Peanuts in West Africa and Texas.


Texas A&M AgriLife Research, Texas A&M System, Lubbock, TX 79403 USA; 2 Department of Plant and Soil Science, Texas Tech University, Lubbock, TX 79409 USA; 3 Texas A&M AgriLife Research, Texas A&M System, Shreveport, TX 71118 USA; 4 Institut Sénégalais de Recherches Agronomiques, Centre National de Recherches Agronomiques, Saint-Louis, Sénégal; 5 Savannah Agriculture Research Institute, Tama, Northern Region, Ghana; 6 Laboratoire de Physiologie, Université de Ouagaouzou, Ouagadougou, Burkina Faso.

IMPROVED EDIBLE SEED QUALITY

**Needs:**
- 1. Fresh seed dormancy (SSD) – to prevent crop loss from early germination in the field if the harvest is delayed due to rain.
- 2. Early maturity (T) – to prevent off-favours due to immaturity of peanuts in West Texas.
- 3. High oleic oil content (T) – to reduce rancidity in storage and promote better canary health.
- 4. Combine large seed sizes with high oil content (SN).

**Results:**
- 1. Identification of two breeding lines to release as varieties (SSD), reducing early germination by 50%.

DROUGHT TOLERANCE

**Needs:**
- 1. Identify drought-tolerant genotypes that can be used as parents for developing new varieties with improved drought tolerance and other traits.
- 2. Make crosses to develop new populations to increase lines that can be developed into new varieties.

**Results:**
- 1. Identified genotypes in the US peanut mini-core collection with superior yield and adaptive traits under water deficit stress.
- 2. Began screening CRESAT lines for yield at the Sahel Pobo station in Burkina Faso.
- 3. Began making crosses to develop new populations to screen.

BIOTECHNOLOGY

**Needs:**
- 1. Development of QNAs-based markers to use for breeding for tolerance to drought and leafrust.

**Results:**
- 1. Identification of markers in the mini-core collection for drought response by association mapping.
- 2. Development of SSR-based maps for introgression populations to use in identifying markers for leafrust resistance.

SEED MULTIPLICATION

**Needs:**
- 1. Multiply seeds of new varieties to provide farmers with high-quality seed for planting.
- 2. Train personnel in methods of seed multiplication and quality assurance.

**Results:**
- 1. Multiplication of breeders seed by the ISN breeding program; and transfer to farmers in collaboration with the NGO ADEMEAC, funded by the private Sunner Corporation.
- 2. Release of new, early-maturing varieties by TADA.

HIGH OIL PEANUT

**Needs:**
- 1. High-oil varieties for production of more oil for cooking on the same acreage.
- 2. Identification of high-yield peanut genotypes to use as parents to develop high-oil varieties.

**Results:**
- 1. Identification of peanut species with 60–65% seed oil content.
- 2. Successful crosses between wild species and a bridge line to bring genes into section Arachis.
- 3. Identification of other materials with ca. 50% seed oil content to use as parents in crosses to develop high-oil cultivars.

RESISTANCE TO LEAFSPOT

**Needs:**
- 1. Leafspot resistant varieties to reduce yield losses.
- 2. Testing of rustpores and herbicides to assess control in control of disease and weeds.
- 3. Identification of indigenous plant extracts capable of serving as insecticide fungicides.

**Results:**
- 1. Developing leaf spot resistant variety (Burkina Faso).
- 2. Testing of chrysanthemum (in collaboration with UG)/GF and verifying its effectiveness in disease control.

OUTREACH

**Needs:**
- 1. Dissemination of field results to local farmers.
- 2. Laminating needs of farmers.

**Results:**
- 1. Field days attended by local farmers in Burkina Faso and Tossale.
- 2. Farmers’ Association visiting Peanut CRSP trial at Farakoba, Burkina Faso.

FUTURE NEEDS

- 1. Leafspot resistance – improved yield in resistant varieties (Spanish for Africa, runner and Spanish for US).
- 2. Screening of new populations and release of drought-tolerant varieties, and testing for reduced mycotoxin contamination.
- 3. Edible seed quality – combine seed dormancy, high oleic, and larger seed size traits. Add wider salt resistance.
- 4. High oil peanut - crossing high oil trait into the cultivated species, and development of high oil varieties.

- 5. Saed multiplication – improved system of seed multiplication and provision of high-quality seed to farmers.
- 6. Biotechnology – further development of markers for drought tolerance and leaf spot resistance and integration into the breeding programs.
- 7. Capacity building – beginning training in breeding, seed multiplication and development of sustainable harvesting equipment, and marker analysis, construction of a greenhouse for the Ghana program.
- 8. Expand regional testing – include Senegal, Burkina Faso, Ghana, and perhaps Mali, continued collaboration with UPL and ICRI programs.

CAPACITY BUILDING

**Needs:**
- 1. Training of a peanut breeders group in Ghana, graduate students in plant pathology in Burkina Faso, and personnel in seed multiplication.
- 2. Provision of equipment and facilities for the program in Burkina Faso.

**Results:**
- 1. Graduation of Nicholas Derwa from the PhD program at Texas Tech, and return to SARD to assume the position of peanut breeder.
- 2. Construction of a greenhouse and purchase of a truck for research in Burkina Faso.