

DIVERSITY AMONG *GOSSYPIMUM HIRSUTUM* ACCESSIONS FROM AFRICA

Fatimata Bintou Hassedine Diouf
Senegalese Institute of Agricultural Research
Dakar, Senegal

James Frelichowski
Lori Hinze
USDA-ARS, Crop Germplasm Research Unit
College Station, TX

Abstract

The US National Cotton Germplasm Collection (NCGC) located in College Station, Texas, maintains approximately 45 species and 10,318 accessions. The NCGC recently acquired a donation of fifty-four (54) conventional upland cotton (*Gossypium hirsutum* L.) germplasm lines. These lines were selected for hairy leaves, fiber quality and improved performance in an African environment (Zimbabwe, South Africa). The main objective of this study was to determine the molecular-based genetic diversity of the newly acquired African lines and how they relate to African accessions currently in the NCGC. A related objective evaluated several methods to putatively improve germination among this varied set of germplasm.

Molecular diversity analysis

Fifty-one (51) of 54 breeding lines donated by Monsanto Company along with 43 African accessions (cultivars and landraces from the NCGC) were evaluated. The Monsanto Company breeding lines were developed from twelve segregating populations encompassing six Deltapine parent lines crossed with individual plant selections from two ALBAR lines from Zimbabwe. DNA extraction for all plants was from young unrolled leaves according to the E.Z.N.A Plant DNA Kit (OMEGA bio-tek). In this preliminary analysis, 12 SSR markers from a core set of 105 SSR markers were applied to analyze molecular relationships among the selected genotypes. NTSYS software was used to generate a Jaccard similarity matrix of genotypes which was then used to calculate eigenvectors for plotting principal coordinate analyses.

The SSR markers were polymorphic and showed differences among newer African breeding lines, African cultivated and landrace accessions at the targeted loci. Each germplasm group had specific alleles which differentiated it from the other two groups. African landrace accessions seemed to be most different with 11 specific alleles and several outlying individuals observed after multivariate analysis. The landraces appeared to have more affinity with the African cultivated accessions. Work will continue on this project to screen all genotypes with the remainder of the core set of 105 SSRs.

Seed germination analysis

In addition to the molecular diversity analysis, an unreplicated seed germination test was performed on a portion of the NCGC accessions to evaluate several techniques to improve germination. Seeds were initially treated with hot tap water (tap water, 1 min, 80°C) and dried 4 hours at 100°C. After this treatment, some accessions did not germinate; therefore, we tested different methods including 3% hydrogen peroxide (H₂O₂) to promote seed germination. Nine genotypes were tested using five seeds each and four treatments: (1) H₂O₂, 2 min, room temperature; (2) H₂O₂, 1 min, 80°C; (3) reverse osmosis purified water, 1 min, 80°C; and (4) no treatment. Seed germination was improved by using heated 3% hydrogen peroxide, but to confirm these results, it is necessary to replicate the experiment.