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Creating Desired Traits for African Sorghum, Semi-Dwarf and Early Maturing, and Molecular Characterisation of their Genetic Architecture

Wad Ahmed is a Sorghum variety popular among farmers in Sudan, except that it matures slightly late and is (too) tall making it prone to yield losses caused by terminal drought and lodging. Mutagenesis and breeding work was undertaken to obtain early-maturing and semi-dwarf mutants and we are developing molecular markers to facilitate use of these new traits in breeding programs. Seed bags of Wad Ahmed were subjected to different doses of gamma radiation (200, 300, 400 Gy). M2 seeds were planted 'head-to-row', i.e., one row per M1-head. From 500 rows, six promising mutants (D1-D6) were picked and progressed to the M6 stage by single seed descent. For marker development we created segregating populations to genetically map the causal variant(s): M6-plants for each mutant were backcrossed to Wad Ahmed (M6BC1). The resulting F1 generations (M6BC1F1) were allowed to self-pollinate and thus F2 populations (M6BC1F2) were developed. Phenotyping of two of the F2 populations for flowering time and final plant height shows that the traits are segregating and accessible to genetic mapping. For genome wide identification of candidate loci we produced 2nd-generation DNA sequencing data (Illumina) for all six mutagenized lines (D1-D6, M6) and wild-type Wad Ahmed Sorghum plants. The sequencing reads were aligned to the available Sorghum reference genome and searched for distinct variants between the mutants and wild-type Wad Ahmed. Across the six mutants we called several thousand candidate variants (SNPs and small IN/DELS). They are scattered across the genome. We also identified regions of statistically significant differences in read coverage, indicative of large deletions. Genetic mapping with the segregating F2 populations will determine which of the candidate mutations are causal for the observed phenotypes. We will then convert those into PCR-based molecular markers to facilitate Marker Assisted Selection (MAS).

Country or International Organization

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