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Diversity Analysis Of The Generation Challenge Programme'S 3365-Entry Sorghum Composite Germplasm Set Based On Allelic Variation Detected By 41 SSR Primer Pairs

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The Generation Challenge Programme's Global Composite Germplasm Collection of 3372 wild and cultivated sorghums includes 280 elite breeding lines and improved cultivars, 250 Chinese germplasm lines to be provided by CAAS, 64 wild accessions, and >3000 landrace accessions selected from previously defined core collections, for resistance/tolerance to production constraints, and/or for variation in other traits. A set of 48 sorghum SSR primer pairs detecting loci distributed across all ten linkage groups was chosen following preliminary analysis of 48 diverse sorghum landrace accessions with 104 available SSRs complemented by additional SSRs from CIRAD and ICRISAT. Diversity analysis was performed on 3367 accessions genotyped with 41 SSR primer pairs by CIRAD and ICRISAT. Breeding lines and wild accessions clustered separately from landraces, which exhibited structure explainable by geographic origin. Landrace population substructure was further characterized within racial groups (five basic races and ten hybrid races). Race bicolor showed little evidence of population structure, congruent with it being the original domesticate. Race kafir (largely from Southern Africa) was distinct. Accessions of the durra, caudatum and guinea races each formed four distinct geographic subgroups. The guinea race margaritifera group formed its own cluster, which clustered with most of the wild accessions, suggesting its independent domestication. Intermediate races behaved similarly. A reference subset of 384 accessions was then defined for allele mining and more detailed characterization. Limited quantities of seed and DNA of this 384-entry sorghum reference germplasm set will be available for distribution from ICRISAT under the terms and conditions of the Standard Material Transfer Agreement of the International Treaty on Crop Genetic Resources.