



Diversity analysis of the sorghum global composite collection and reference set



Project Team:

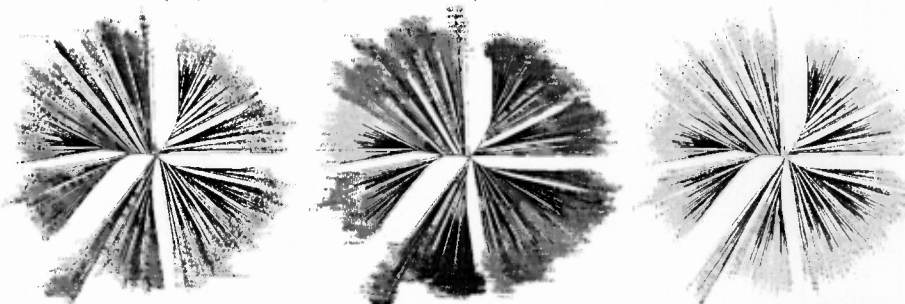
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Generation Challenge Programme (GCP) SP1 Genetic Diversity of Global Genetic Resources

Sorghum bicolor (L.) Moench, 2n=2x=20; 750 Mb

Sorghum Composite Collection

- 3372 wild and cultivated sorghum accessions of the GCP Global Composite Germplasm Collection were genotyped with 41 SSR markers
- Data was analyzed using DARwin software
- Accessions were grouped primarily according to race within geographic origin
- Guinea race sub-group margaritifera (Gma) was clustered closely with wild accessions suggesting its independent domestication
- Kafir race from southern Africa was distinct
- Bicolor race was scattered across all clusters
- A Reference Set of 384 accessions represents this race-within-geographic origin population structure of the Composite Germplasm Collection



Race

Geographic distribution

Reference Set

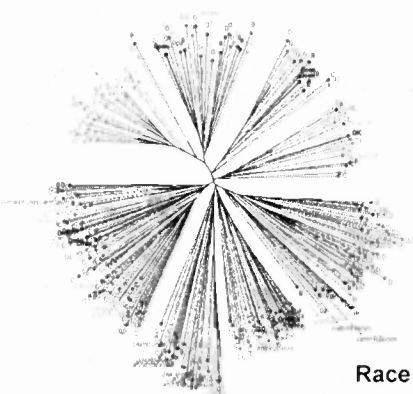
Reference Set of Sorghum

The sorghum reference set represents the diversity of wild and cultivated sorghum germplasm available to breeding programs globally. Population structure of this reference germplasm set was largely validated when independently assessed using a set of 40 EST-SSR primer pairs developed at ICRISAT from public EST sequence information. Cultivated accessions are grouped primarily by race within geographic origin. EST-SSR marker analysis also suggests that the margaritifera group within the guinea race results from an independent domestication event as it clusters with wild accessions, and confirms race kafir (largely from Southern Africa) is homogeneous. Durra, caudatum and guinea race accessions form distinct geographic subgroups. However, race bicolor exhibits some structure with two clusters of East African origin, one grouping with bicolor accessions having passport data indicating a North American origin (this suggests the latter are originally from East Africa). Combined analysis (SSRs and EST-SSRs) generally strengthened clustering patterns of race and within geographic distribution. Kafir and guinea margaritifera groups continued to show their distinctness. More structure was evident within race bicolor, and the guinea race accessions from Southern Africa and India grouped more closely. The GCP sorghum reference germplasm set is sufficiently diverse to serve as a panel for linkage disequilibrium mapping, and/or as an entry to global sorghum germplasm collections when seeking variation in any trait of interest, provided that phenological diversity present is not so great that it interferes with phenotyping of other traits.

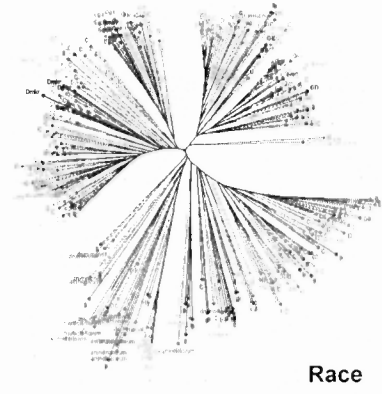
Genomic SSRs (41 markers)

EST-SSRs (40 markers)

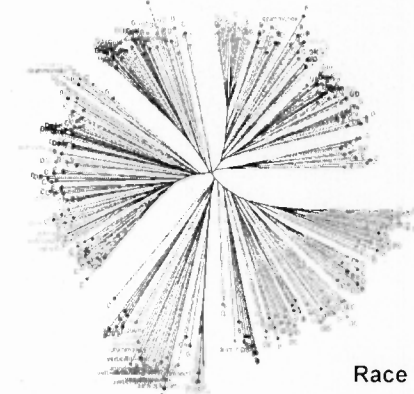
SSRs + EST-SSRs (81 markers)



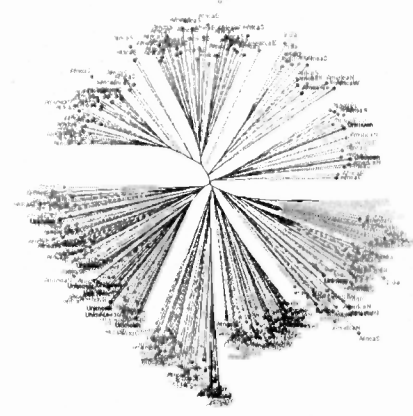
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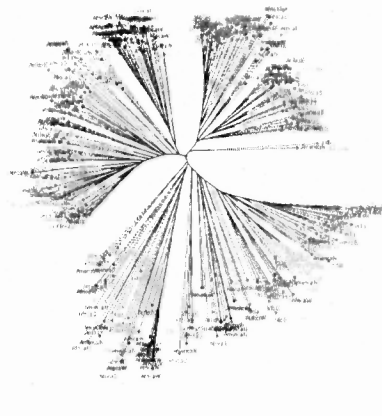
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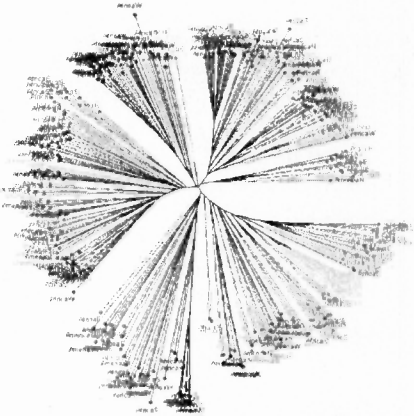
Race



Geographic distribution



Geographic distribution



Geographic distribution

Race: Bicolor, Caudatum, Durra, Guinea, Guinea margaritifera, Kafir, Wild,

Durra-bicolor, Durra-caudatum, Guinea-caudatum, Kafir-caudatum, Guinea-durra, Guinea-kafir, Kafir-bicolor, Kafir-durra

Geographic distribution: Eastern Africa, Central Africa, Southern Africa, Western Africa, North America, East Asia, India,

Middle East, Australia, South America