Seventh framework programme
Food, Agriculture and Fisheries, and Biotechnology

Specific International Co-operation Actions
Small or medium scale focused research project

Sweet Fuel

Sweet Sorghum an alternative energy Crop

Grant Agreement n° 227422

WP3
Deliverable 3.3:

Fifteen varieties evaluated for response to P stress

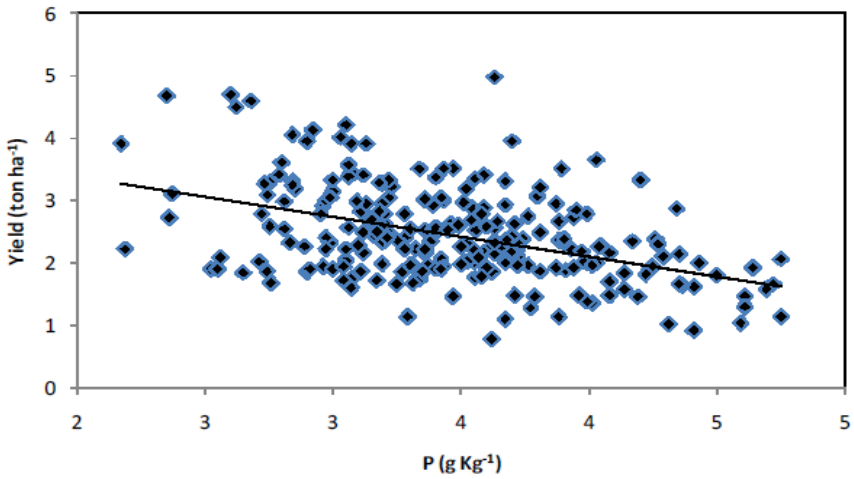
Composition of the consortium

CIRAD
ICRISAT
EMBRAPA
KWS
IFEU
UniBO
UCSC
ARC-GCI
UANL
WIP

The basic objective of this activity is to develop sweet sorghum cultivars with improved phosphorus (P) acquisition efficiency. We believe that progress can best be achieved by identifying QTLs in sorghum that are associated with more efficient P acquisition efficiency. Consequently we have modified this activity to first identify QTLs or genes associated with more efficient P acquisition using an elite sorghum association panel and then incorporate this QTLs/genes in improved sweet sorghum cultivars. We believe that QTLs and genes associated with improved P acquisition efficiency can be more easily identified in short statured three dwarf genotypes as opposed to tall one or two dwarf sweet sorghum cultivars. Consequently we are proceeding to phenotype 243 uniform height three dwarf sorghum lines from the IGD Sorghum Association Panel at two levels of P.

In 2010 and 2011, 243 uniform height three dwarf sorghum lines from the IGD (Institute for Genomic Diversity) Sorghum Association Panel, were phenotyped in a Phosphorus (P) Phenotyping Site developed at Embrapa Maize and Sorghum with two levels of P, low and high. The panel has been genotyped by GBS (Genotyping by Sequencing) in collaboration with IGD/Cornell University. This Phenotyping activity is part of a PhD thesis that is expected to be finished during the first semester of 2012. In future activities of this project, genes/QTLs identified for improved P acquisition efficiency will be selected in sweet sorghum germplasm by marker assisted selection (MAS).). In general, heritability exceeded 0.8 for all traits in 2010 and 2011. Yield reduction due to P stress was near 20 – 25% relative to high P conditions.

The Figure below shows that grain yield and grain P concentration were negatively correlated in members of the association panel. Thus, low grain P concentration in sorghum can be used to identify genes related to high P internal utilization efficiency. Previous research in maize at Embrapa showed a high correlation between grain yield under low P and P acquisition efficiency, thereby suggesting that grain yield under low P can be used to select for high P acquisition efficiency.



Negative correlation between grain yield and grain P concentration
in the sorghum association panel in 2010.