Definition of new sorghum ideotypes to meet the increasing demand of bioenergy

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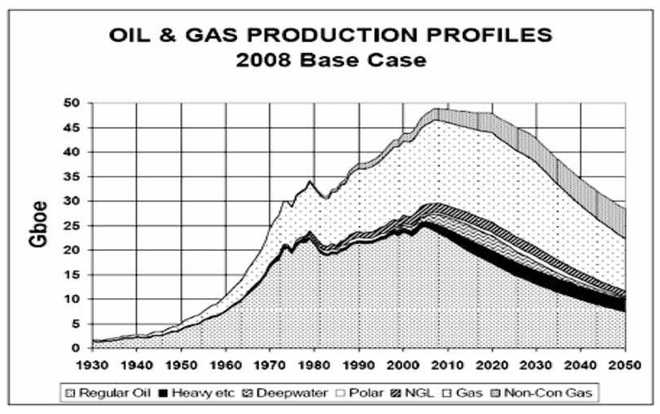
Global oil production is rapidly approaching its peak



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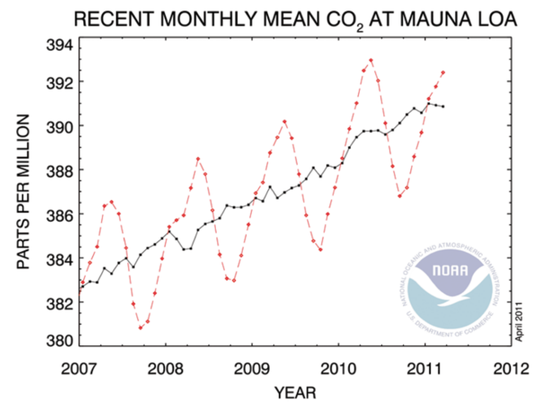
CO2 atmospheric concentration = 392.40 ppm



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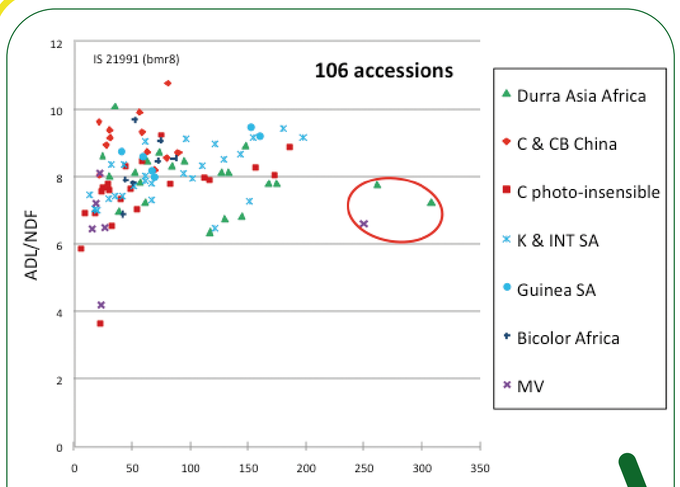
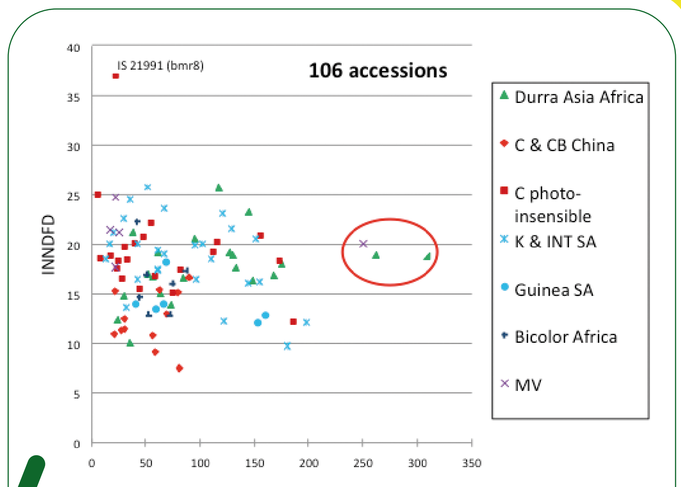
It is urgent to find alternative and sustainable energies !

Biofuels or agrofuels, defined as solid, liquid or gas fuels derived from biomass, are today particularly in the transport sectorthe only direct subsitute for oil on a significant scale

Sorghum is a an interesting alternative energy crop



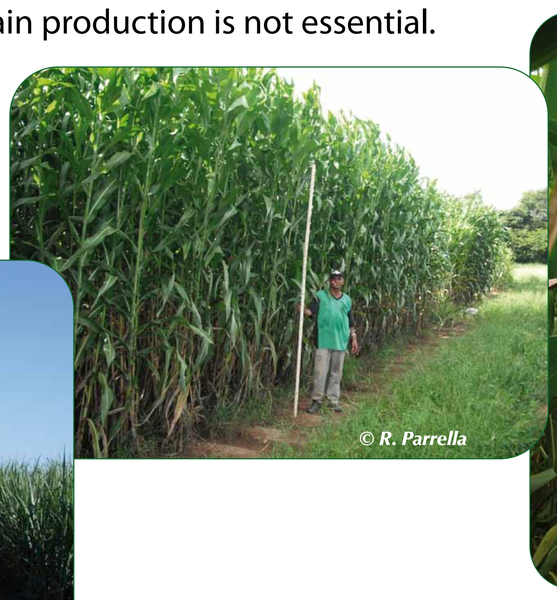


Possible combination:
high biomass stalks + low lignin content + good digestibility of fibers

EtOH 2e generation or methanization

The target is a "biomass " sorghum with the following traits

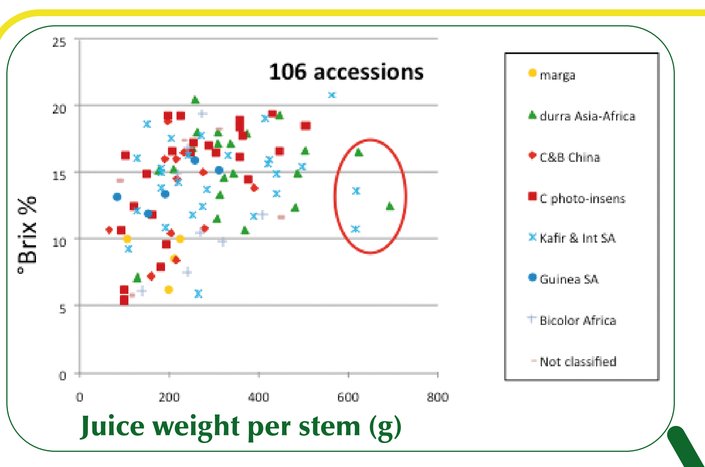
- High biomass (30-40 t ms/ha) with plant height > 3.5-4 m
- Good quality of the raw material (low lignin content = *bmr* trait) to increase digestibility of the tissues
- Good homogeneity of the raw material for industrial processing
- Good resistance to lodging
- Adaptation to low temperature at the beginning of the cycle
- Drought tolerance / high water use efficiency
- Grain production is not essential.



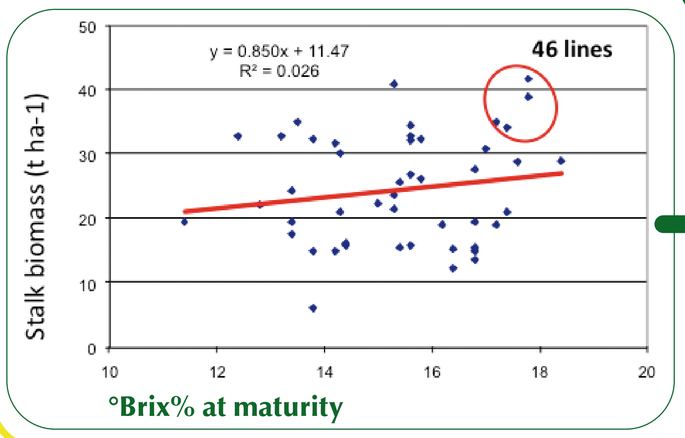
EtOH 1st generation + cogeneration

EtOH 1st generation + cogeneration

- High biomass (30-40 t ms/ha) with plant height > 3.5-4 m
- High accumulation of soluble sugars in stalks, °Brix% at maturity: 15 to 20 with 80% of saccharose
- Juicy stalks
- High energetic value of the bagasse for cogeneration (= more fibers with lignin)
- Good adaptation to marginal soils (acidity , Al toxicity, P deficiency)
- Good adaptation of crop cycles (complementarity with sugar cane in the case of Brazil)
- Grain production is not wishable (as it decreases yeast efficiency).



Identification of the gene for tolerance to Al toxicity: AltSB

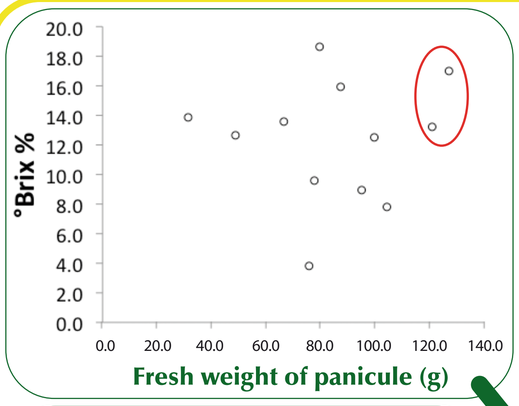


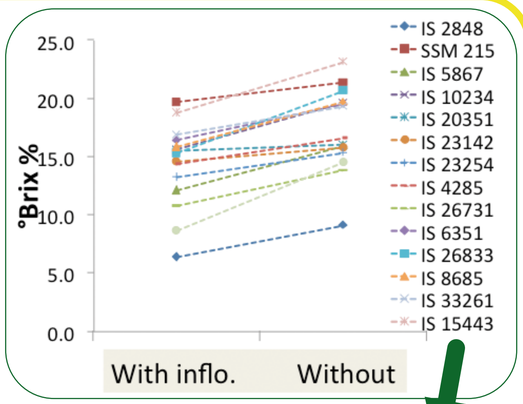
Possible combination:
°Brix% with juice
°Brix% with stalk biomass
+ tolerance to Al toxicity

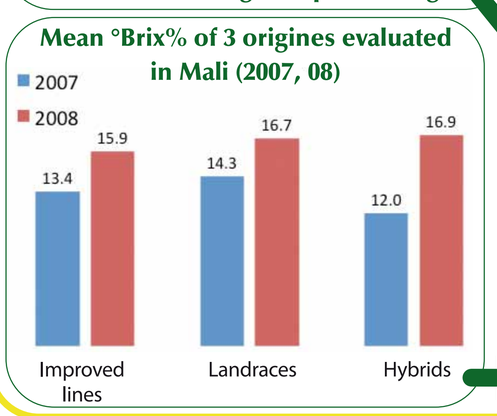
EtOH 1st generation + grain + fodder

The target is a sweet sorghum with the following traits

- High biomass (20-30 t ms/ha) with plant height ± 3m
- Mean production of grain (1.5 to 3 t/ha)
- High accumulation of soluble sugars in stalks, °Brix% at maturity: 15 to 20 with 80% of saccharose
- Juicy stalks
- High value of the bagasse as fodder (= *bmr* trait = low lignin content)
- Adaptation to marginal soils and rainfall distribution (stay green, sensitivity to photoperiod).







There is a competition grain/°Brix%, but there is also a great diversity we have to exploite without forgetting landraces !

Most of this work was funded by the E C through the FP7 project SWEETFUEL (GA 227422)

SEVENTH FRAMEWORK PROGRAMME

cirad LA RECHERCHE AGRONOMIQUE POUR LE DÉVELOPPEMENT