

# Development and evaluation of drought-adapted sorghum germplasm for Africa and Australia

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**Aim: Improve drought adaptation and productivity in Malian & Australian sorghum**  
 Related GCP project–SP2 Commissioned G7009.04: *Development and evaluation of drought-adapted sorghum germplasm for Africa and Australia*



## Activities:

1. Evaluating the stay-green drought adaptation mechanism in plant architectures and genetic backgrounds appropriate to Mali.
2. Developing sorghum germplasm populations enriched for stay-green genes that also carry genes for adaptation to cropping environments in Mali.
3. Carrying out training activities for African sorghum researchers in drought physiology and selection for drought adaptation in sorghum.

## Preliminary results for Activity 1:

Stay-green enhances grain yield under post-anthesis drought in 3-dwarf sorghums used in Australia. An experiment was conducted in 2009 at a 'rain-out' shelter facility in Queensland, north-eastern Australia. This preliminary experiment with isogenic tall/short (2-dwarf versus 3-dwarf) pair comparisons in a stay-green and senescent background showed that the greater height of sorghums typically grown in Mali (1- or 2-dwarfs) does not counteract the beneficial effects of the stay-green trait.

## Evaluating stay-green in tall/short isogenic pairs:

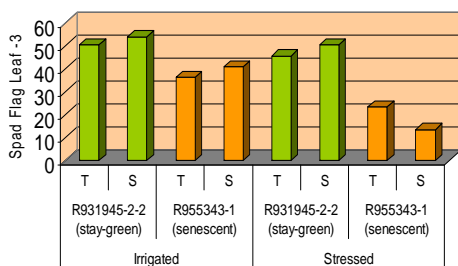


Fig 1a.

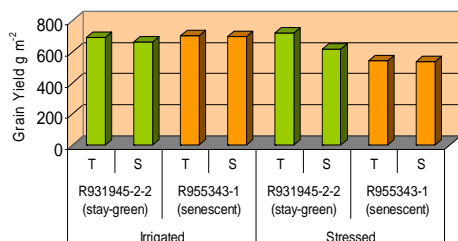


Fig 1b.

The stay-green pair retained greener leaves (SPAD) after grain ripening than the senescent pair in both an irrigated and a stressed treatment. There were no significant differences in leaf greenness between tall (T) and short (S) types of the stay-green pair (Fig 1a).

The stay-green pair maintained grain yields even under stressed conditions, while yield in the senescent pair was reduced under stress. Height did not counteract the benefits of stay-green. On the contrary, under stress the tall type of the stay-green pair yielded more than the short type (Fig 1b).



Senescent versus stay-green sorghum lines (2-dwarfs) at the rain-out shelter facility.

## Preliminary results for Activity 2:

a) *Transfer stay-green and high-yielding traits from Australian germplasm to photoperiod sensitive and tall sorghums adapted to Malian environments:*

F2 populations from a crosses between 4 Mali lines and an Australian high-yielding, stay-green line (R931945-2-2) were grown. Photoperiod sensitive plants carrying stay-green QTL were identified from each population and backcrossed to the respective Malian lines.

a) *Create photoperiod sensitive, tall mapping populations for stay-green and grain yield:* F2 populations from crosses between R931945-2-2 and nine unique Malian accessions were grown in the field. About 250 plants of similar height to the Malian parent from each population will be grown again and evaluated for photoperiod sensitivity in 2010.