Hohenheim University
Department of Plant Production and Agroecology in the Tropics and Subtropics
Section: Water Stress Management, Prof. Dr. Asch

Morphological traits and development of sorghum ideotypes for coping with climate variability in Mali

Alhassan Lansah Abdulai, Holger Brueck, Mamoutou Kouressy, Michel Vaksmann, Folkard Asch

Developing RIce and SOrghum Crop Adaptation Strategies for climate change in vulnerable environments in Africa.

gtz German Technical Cooperation

RISOCAS

Federal Ministry for Economic Cooperation and Development

- Sorghum contributes immensely to the economy of the arid and semi-arid tropics (ASAT)
- A major staple in most of the ASAT of Africa (24 M ha; mean yield of 0.8 t/ha; *Maredia et al., 2000)*
- Cultivation in Mali
  - Savannahs and Sahel
  - Rain-fed
  - Subsistence
  - Use of landraces (short day; low but stable yields plasticity)

- Climate change is predicted to increase variability of climate
- This and other factors will affect sorghum production.
- Tactical and strategic adaptation of agriculture to variable climate require:
  - Appropriate ideotypes (several traits)
  - Component technology (eg cropping calendar)
- Current gene pool of sorghum in West Africa is diverse

- Gene-pool might contribute to development of ideo-types
  - ‘Ready-for-use’ genotypes
  - Valuable traits
- Knowledge of relations of various traits with yield
- Why Morphological traits?
  - Measurement not as elaborate as other traits
  - Do not require specialized equipment

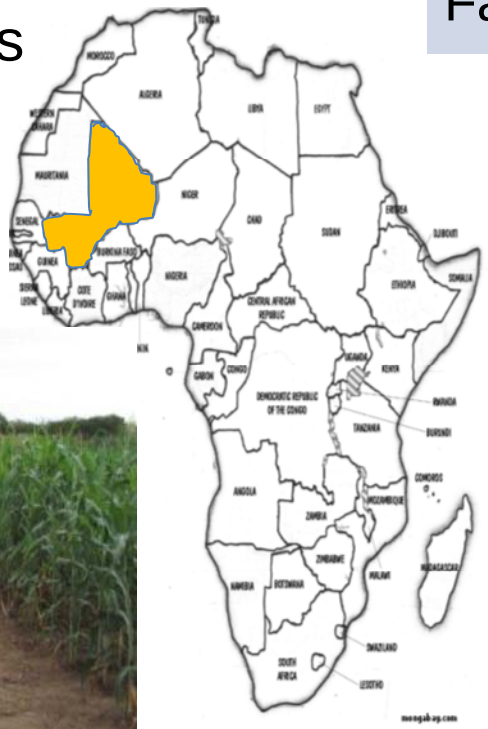
Objective

- To identify morphological traits with strong and stable relations with grain yield based on field data

3 sites on a N-S transect

- Latitudinal gradient
- Rainfall gradient
- Variable photoperiods

Site	Climate Features
Cinzana	Sahel
Sotuba	Sudan Savannah
Farako	Guinea Savannah



Staggered sowing dates

Diverse sorghum genotypes

- Split plot arrangement
- RCBD with 3 Reps
- Appropriate agronomic practices

Traits Measured

- Area of largest leaf
  - L X W X 0.7
- Length of largest leaf
- Width of largest leaf
- Rank of largest leaf

The use of regression to relate each of the traits to yield

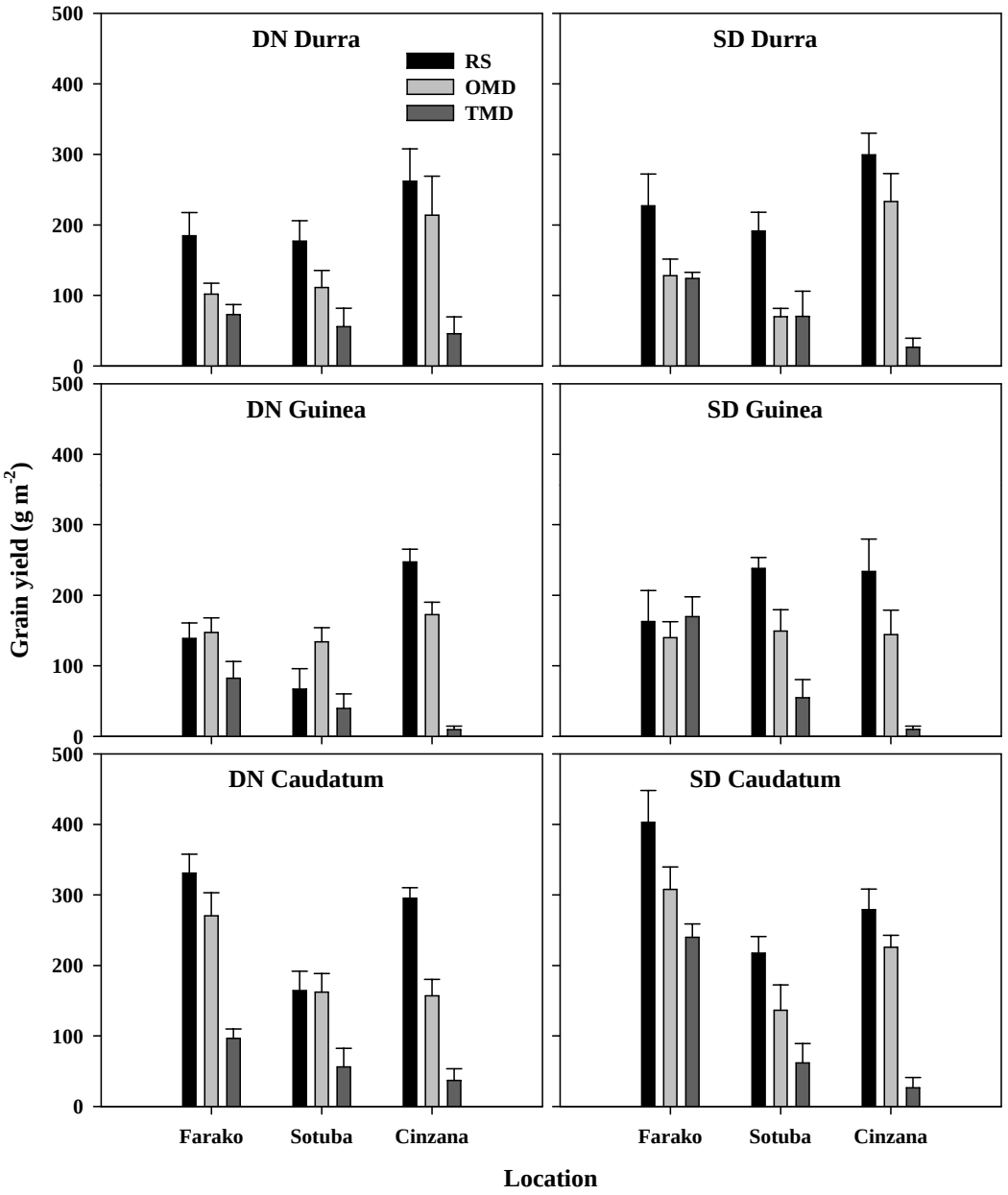
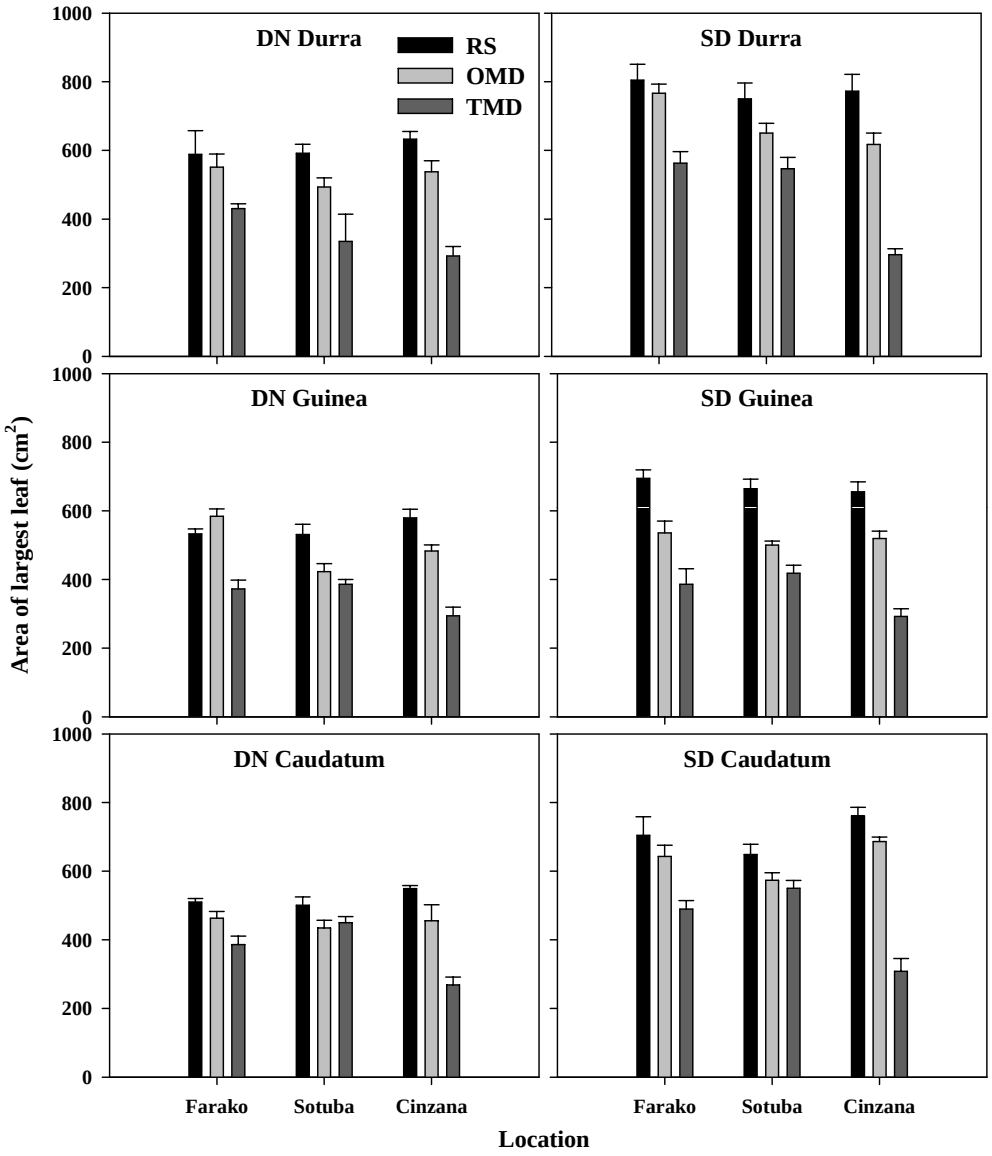


Fig.1: Grain yield response of sorghum to date of sowing and genotype interaction at Farako, Sotuba and Cinzana



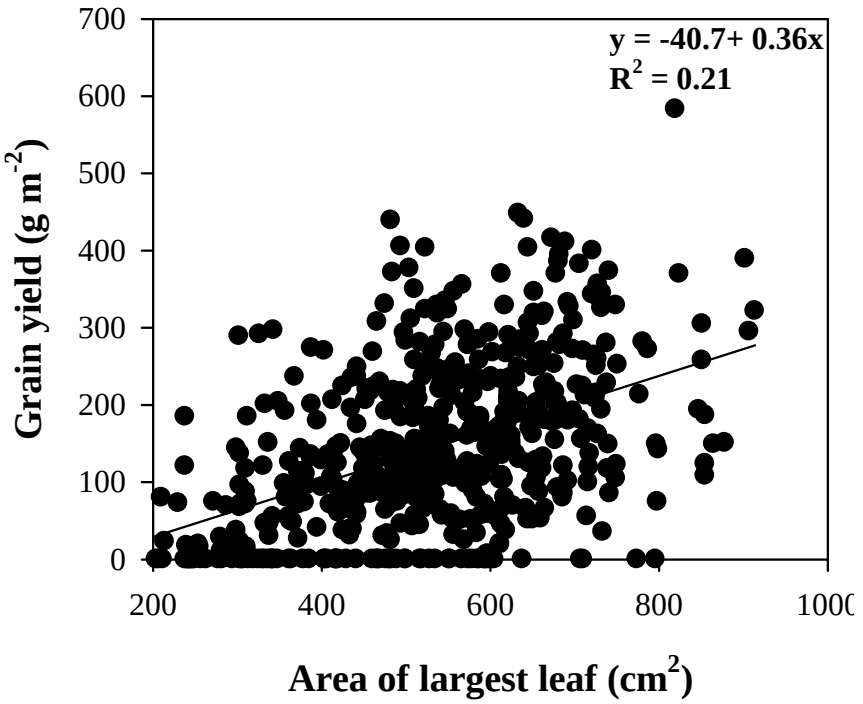
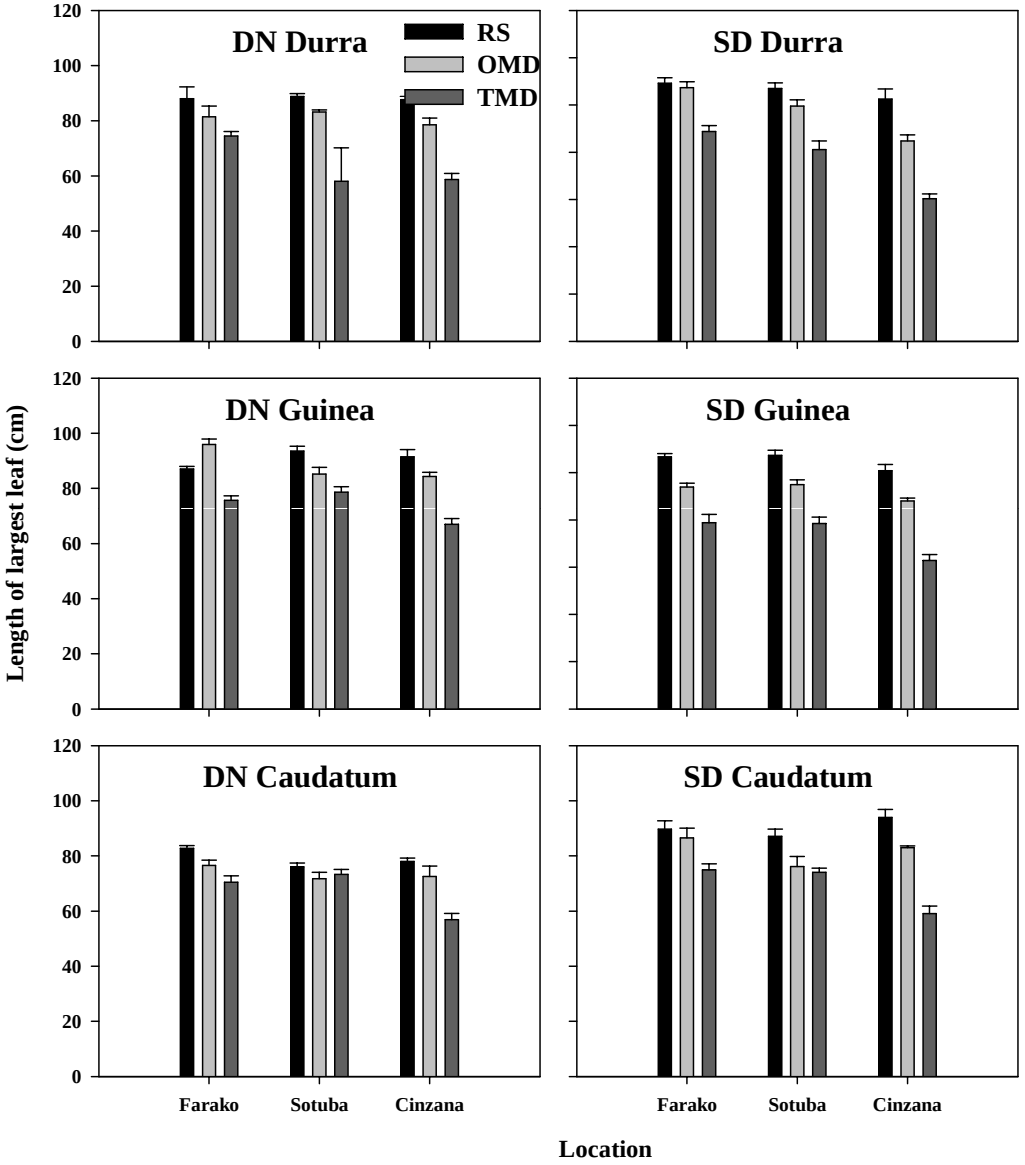


Fig. 2: Area of largest leaf of sorghum and its relation to yield as influenced by date of sowing and genotype interaction at Farako, Sotuba and Cinzana



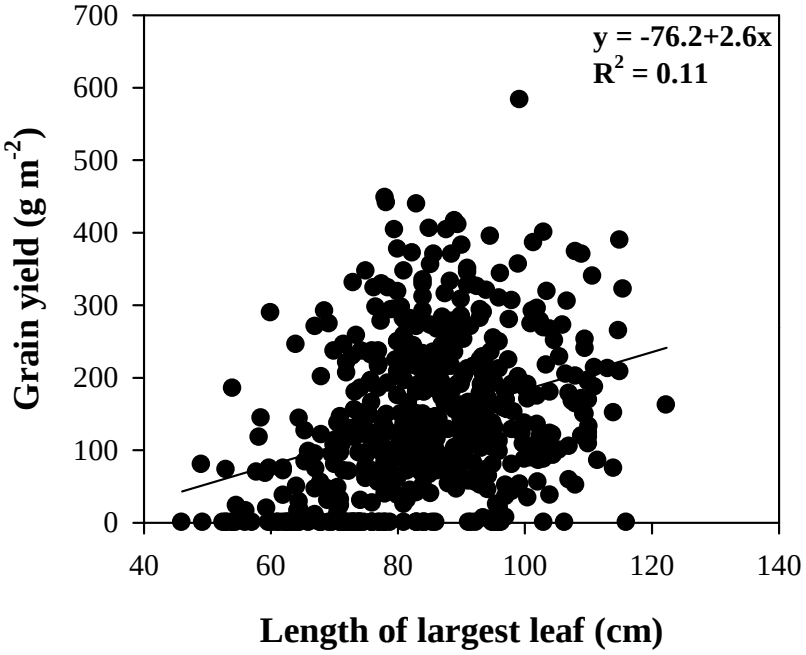


Fig. 3: Length of largest leaf of sorghum as influenced by date of sowing and genotype interaction at Farako, Sotuba and Cinzana

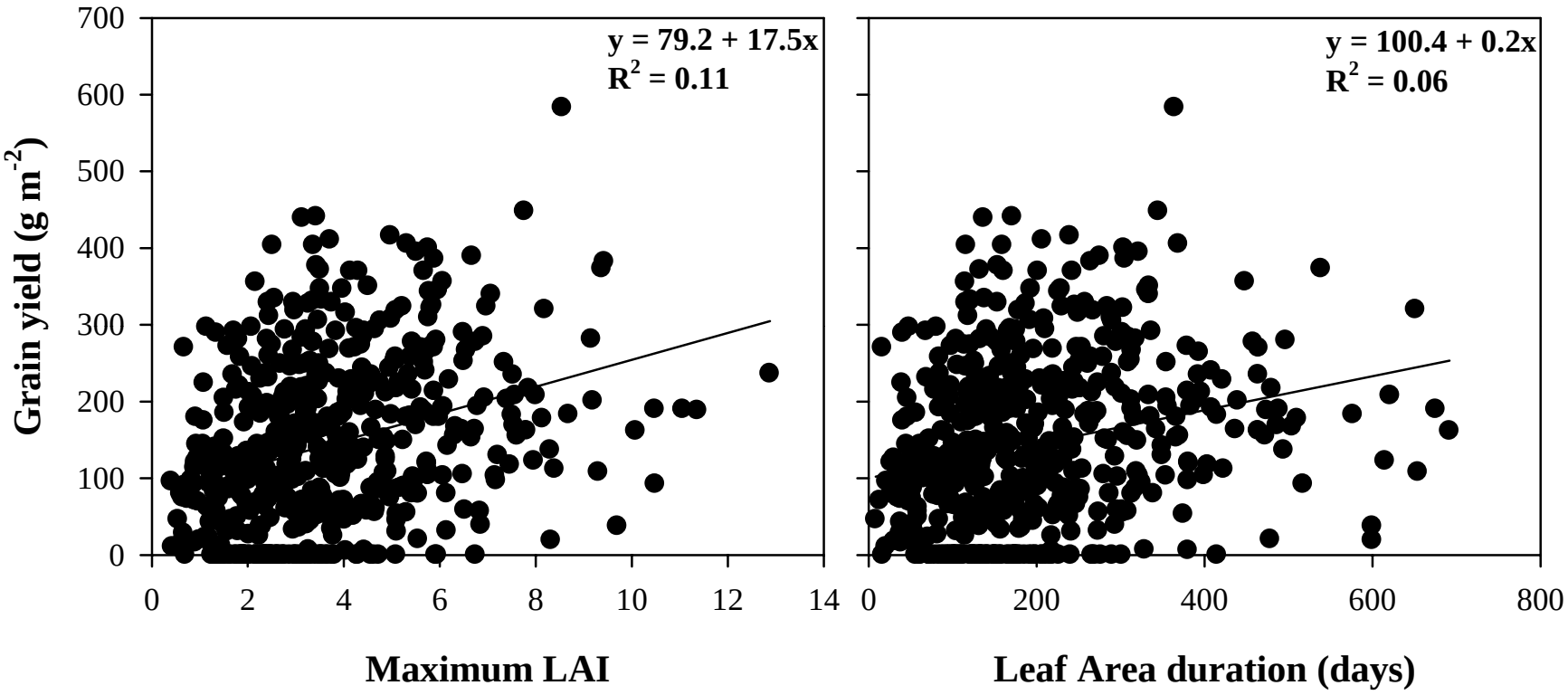


Fig 4: Relations of maximum LAI and Leaf area duration to grain yield

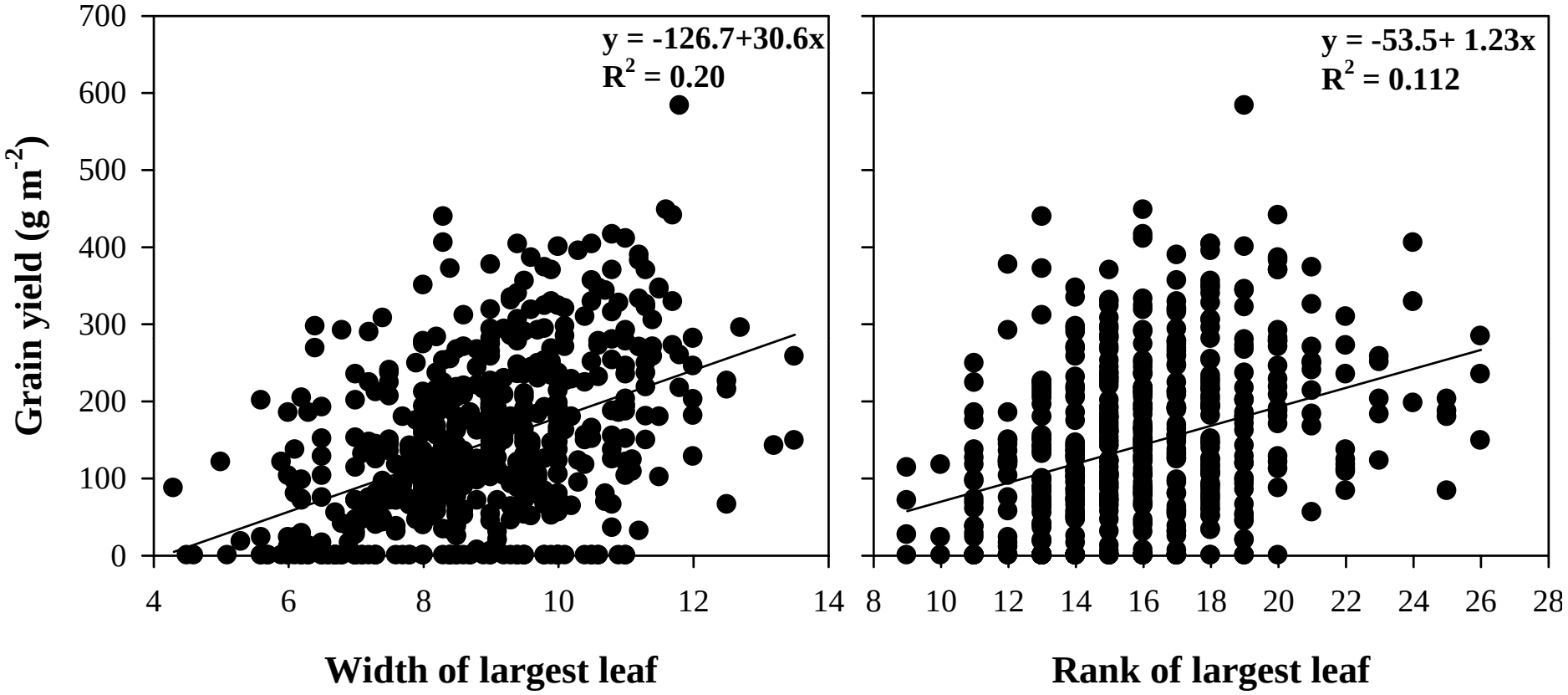


Fig 5: Relations of the width and rank of the largest to grain yield

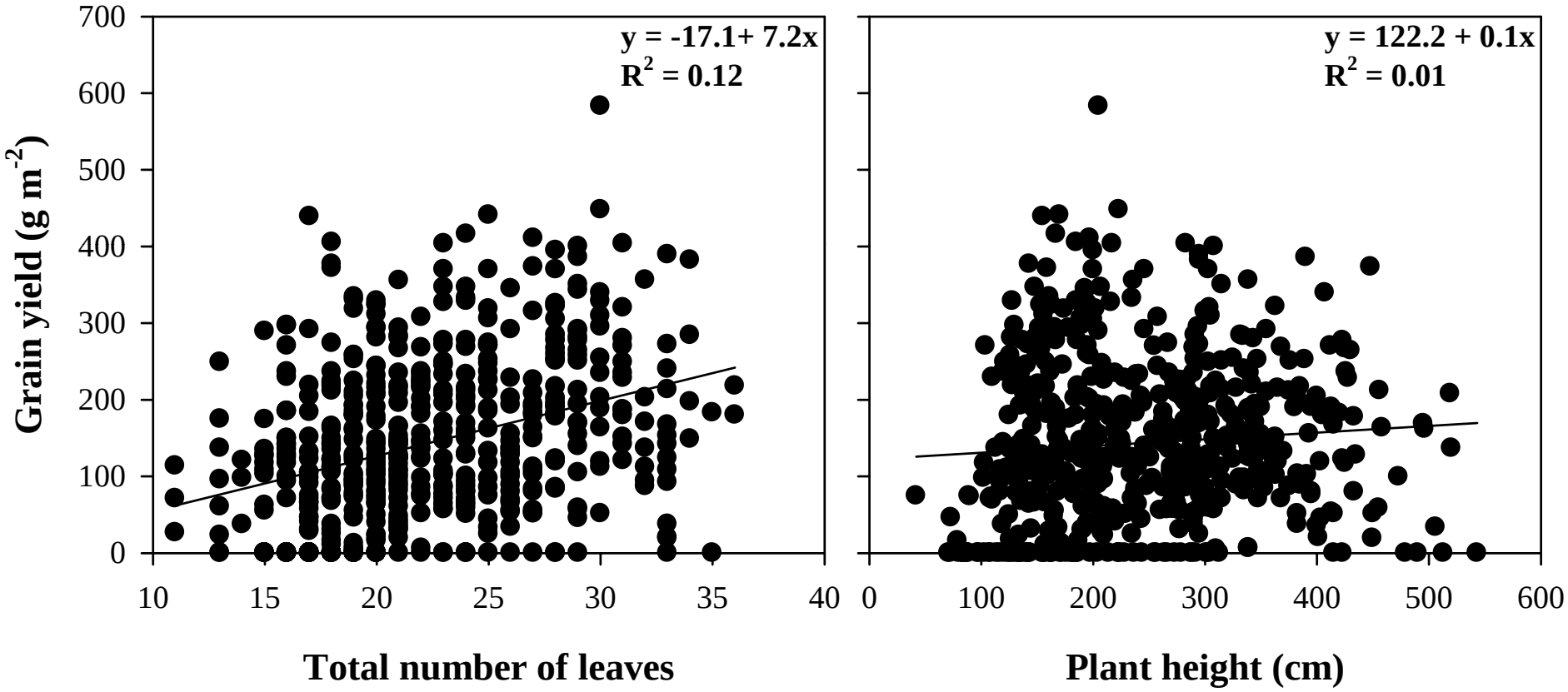
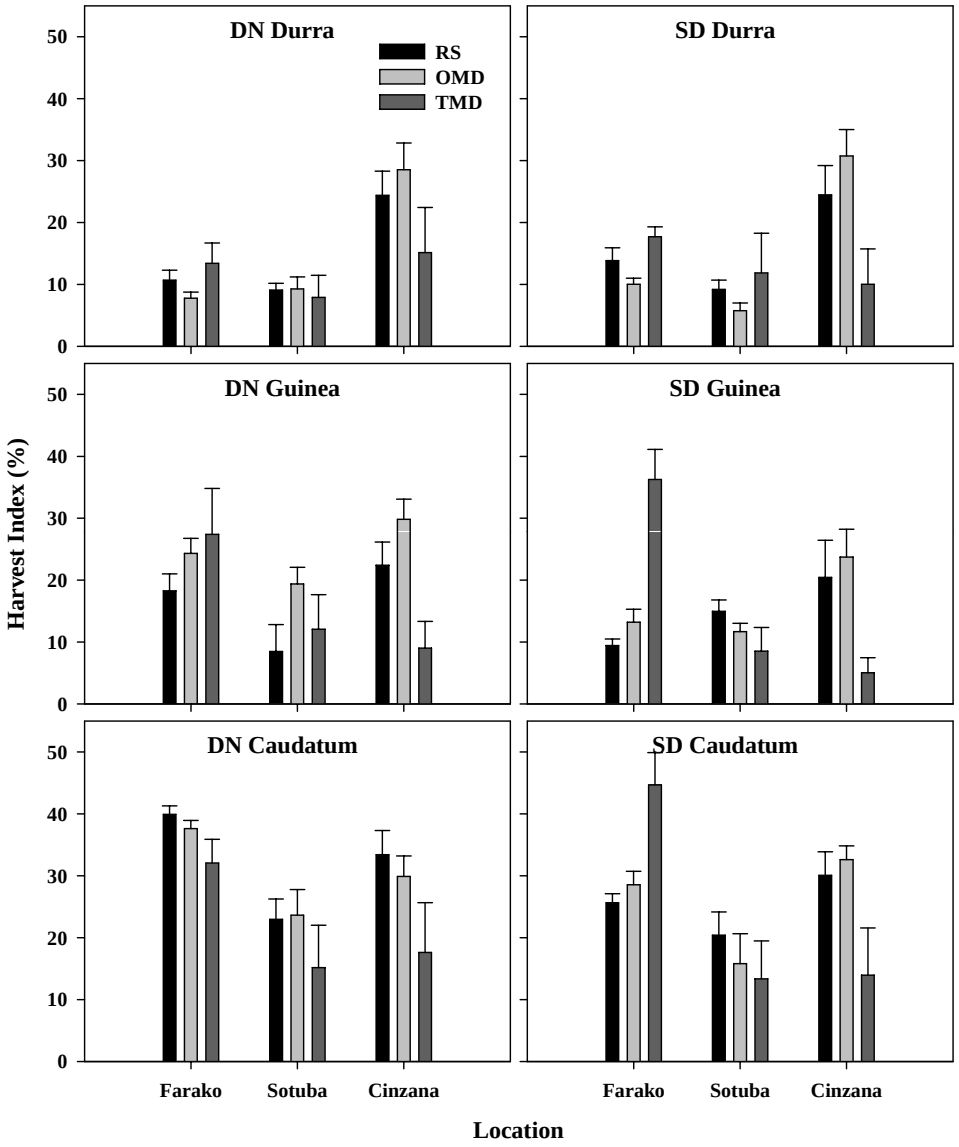


Fig 6: Total leaf number and plant height relations to grain yield sorghum in Mali



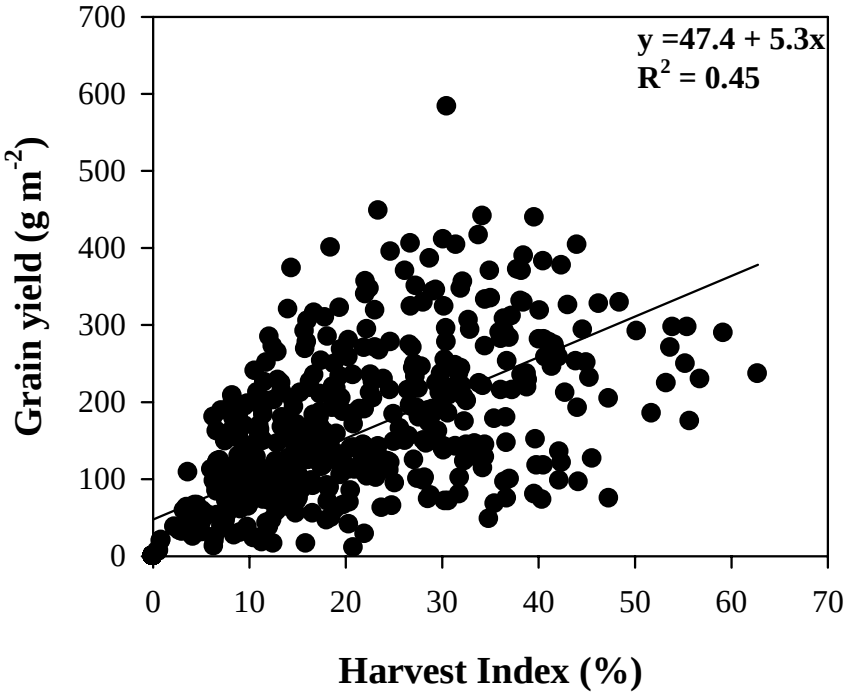


Fig. 7: Interactive effects of date of sowing and genotype on harvest index of sorghum and its relationship to grain yield at Farako, Sotuba and Cinzana

Current gene pool of sorghum could be exploited for ideo-types for coping with climate change

Morphological traits respond to G X E interactions but are weakly related to grain yield.

Other traits seem to mask or mediate the effects of morphological traits on grain yield.

Scout for other physiological traits that correlate well with both morphological traits and yield.

Thanks for your attention