

Exploring drought tolerance variation in Ugandan *Coffea canephora*

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Introduction

- ❖ Uganda, largest producer and exporter of *Coffea canephora* in Africa [1].
- ❖ Erratic climate, frequent and severe drought periods.
- ❖ Intra-specific variation in drought tolerance
- ❖ Support breeding for drought tolerance.

Materials/Methods

- ❖ 148 genotypes (90 wild, 11 feral and 47 domesticated)
- ❖ Experimental treatments: ample or restricted water supply
- ❖ Sub-set of 15 genotypes
- ❖ Drought responses and tolerance

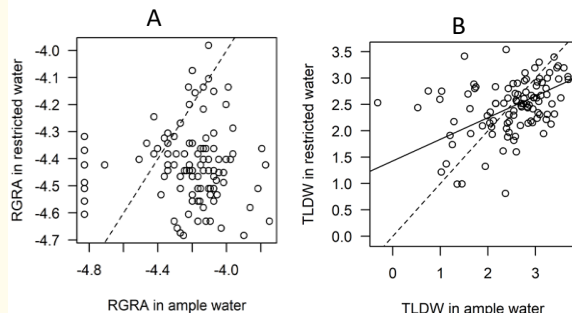


Fig. 1: Link between growth traits in ample water versus restricted water; Relative growth rate in leaf area (RGRRA) Panel A, and Total leaf dry weight (TLDRW) Panel B. The relationships were fitted with type II regression, relationship significantly different from zero is plotted as the solid black lines, and reference line, 1:1; dotted line.



Plate 1.
 genotypes 'to drought

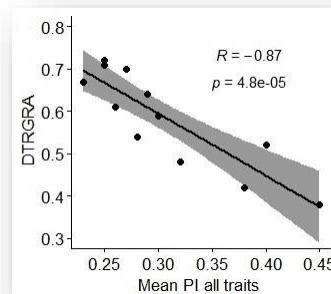


Fig. 2: Link between drought tolerance in RGRRA (DTRGRA) and mean plasticity (Mean PI) for all studied traits

Results/Discussion

- ❖ Leaf traits; number of leaves, leaf area, leaf dry weight and specific leaf area reduced from 12 to 38 % relative to ample water [2; Plate 1].

- ❖ Growth-tolerance trade-off; genotypes with best scores under ample-water conditions suffered most from drought (Fig. 1) [2].
- ❖ Negative link between drought tolerance and trait plasticity (Fig. 2); genotypes with high plasticity were least able to maintain growth under drought conditions [2].

Conclusion/Perspectives

- ❖ Breeding climate-resilient material should attempt to weaken the trade-off between drought tolerance and performance under well-watered conditions.
- ❖ Plasticity in drought related traits may not necessarily confer drought tolerance.
- ❖ Need to link the our phenotyping data to genetic data, e.g. through genome-wide association studies (GWAS).

References:

1. ICO. 2019. Country Coffee Profile: Uganda. International Coffee Organization
2. Kiwuka C., (2020). Genetic diversity and phenotypic variation of wild, feral and cultivated *Coffea canephora* in relation to drought stress. PhD. Thesis. Wageningen University, ISBN: 978-94-6395-537-9