

Evaluation of non-structural carbohydrate traits of Napier grass (*Cenchrus purpureus*) genotypes grown under field drought stress condition

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Introduction

Napier grass is a perennial forage grass primarily used as livestock feed in tropical and sub-tropical countries.

Drought stress changes in non-structural carbohydrates (NSC) levels of Napier grass affecting feed quality performance and tolerance to drought stress.

The present study was conducted to evaluate the accumulation of NSC in Napier grass genotypes grown at two different soil moisture stress conditions in Bishoftu, Ethiopia.



Figure 1. Napier grass feed



Figure 2. Napier grass growing under MWS (Left) and SWS (Right)

Conclusion

- The accumulation of NSC were dependent on the genotype.
- Genotypes under MWS had greater NSC levels than SWS.
- Two significant SNPs were identified that are linked with NSC trait.
- Future verification of these findings would be useful to develop resilient Napier cultivar/s via application of marker assisted selection.

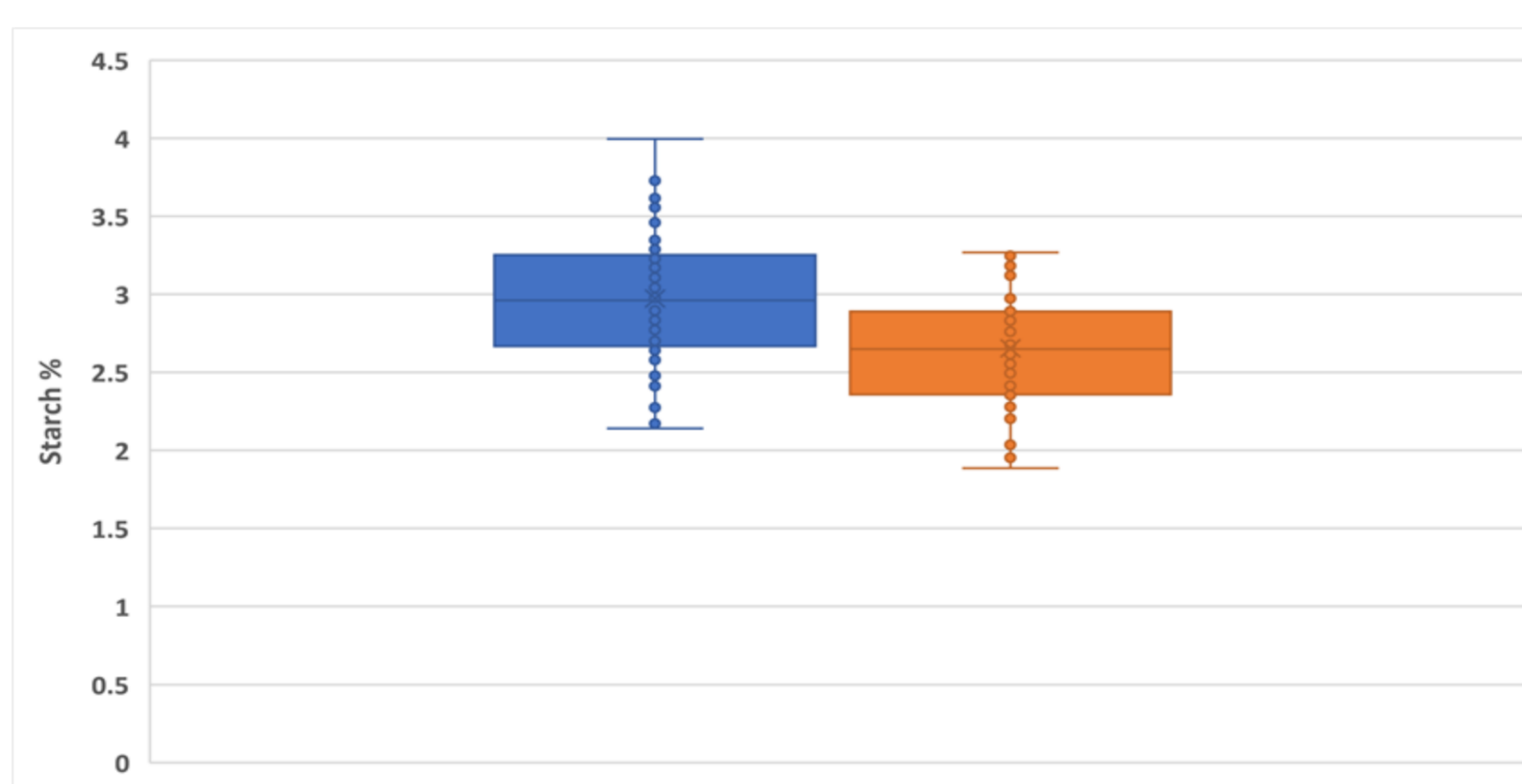
Results and Discussion

Table 1. Analysis of variance summary

Source of variation	WSC %	Starch %	NSC %
Treatments (T)	0.08ns	0.01**	0.04*
MWS/SWS			
Genotypes (G)	0.02*	0.04*	0.01**
G*T	0.32ns	0.23ns	0.15ns
CV	13.9	17.1	11.9

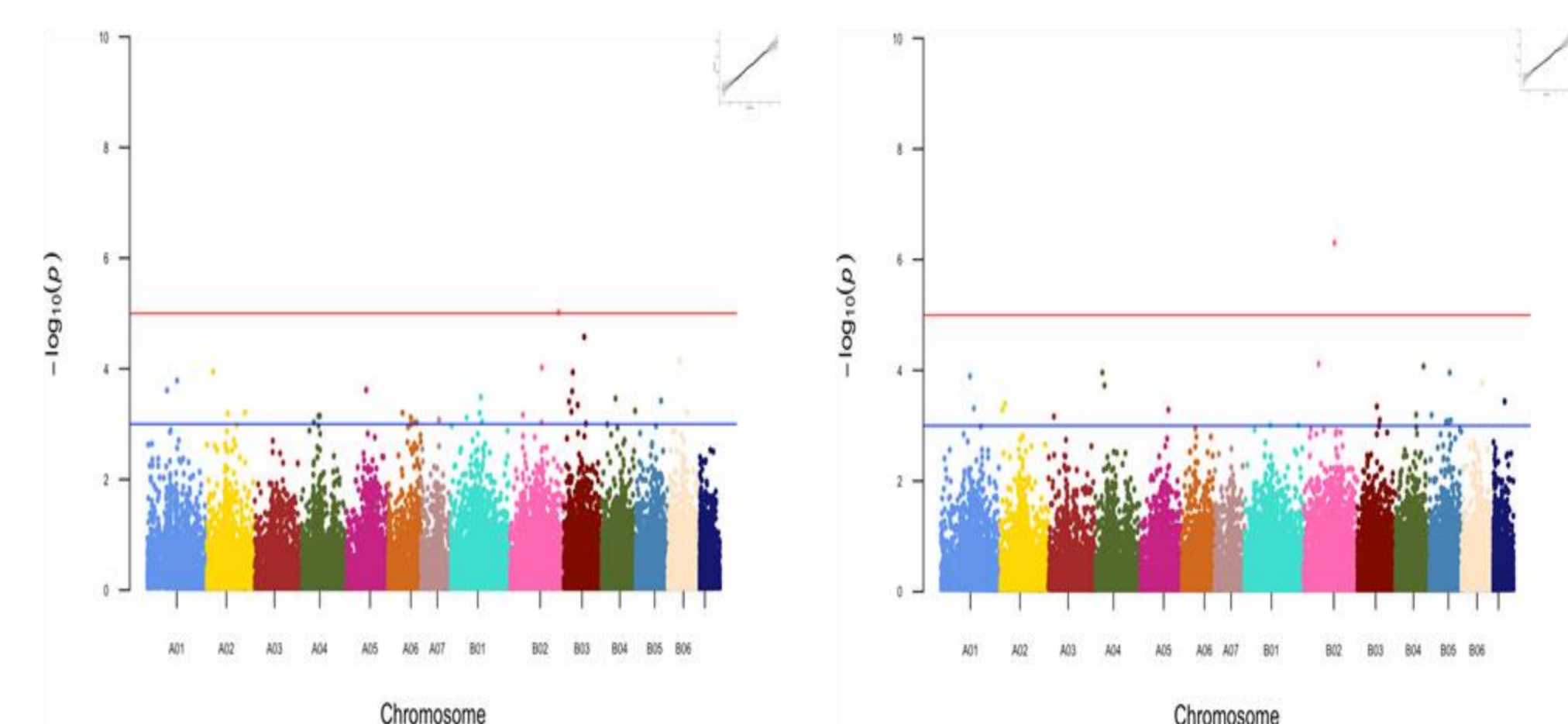
- Napier grass genotypes show significant variation for NSC accumulation regardless of the stress level (Table 1).
- The performance of genotypes did not differentially alter by the stress treatments.

Figure 3 Starch accumulation under MWS (Blue) and SWS (Orange)



- The accumulation of starch was affected by moisture severity level (figure 3).
- The reduction in starch accumulation when drought severity increases indicate starch catabolism.

Figure 4. Manhattan plots showing SNPs Significantly Associated with NSC in MWS (Left) and SWS (Right)



- Significant SNP markers identified for NSC in both MWS and SWS conditions (Figure 4).
- The identified markers in both condition would be candidate for marker assisted selection.

Material and Methods

- Napier grass genotypes were grown either in moderate water stress (MWS) or severe water stress (SWS) in dry season (Figure 2).
- After eight weeks of growth, plant samples from 76 genotypes were collected.
- NSC analysis:- Water soluble carbohydrates (WSC) and Starch were determined by Anthrone method as described by Yoshida (1976).
- A marker-trait association was done for NSC with multi-locus GWAS algorithms.