Root system architecture, root development and transpiration rates of bahiagrass mutants under dry down and well-water conditions.

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Solution: Bahiagrass (Paspalum notatum Flugge).

Screening for drought responsive turfgrass species is a promising strategy to face these challenges. However, bahiagrass (BH) cultivars available in the market, for turfgrass, have negative attributes including unsightly seedheads, poor color and lack of density.

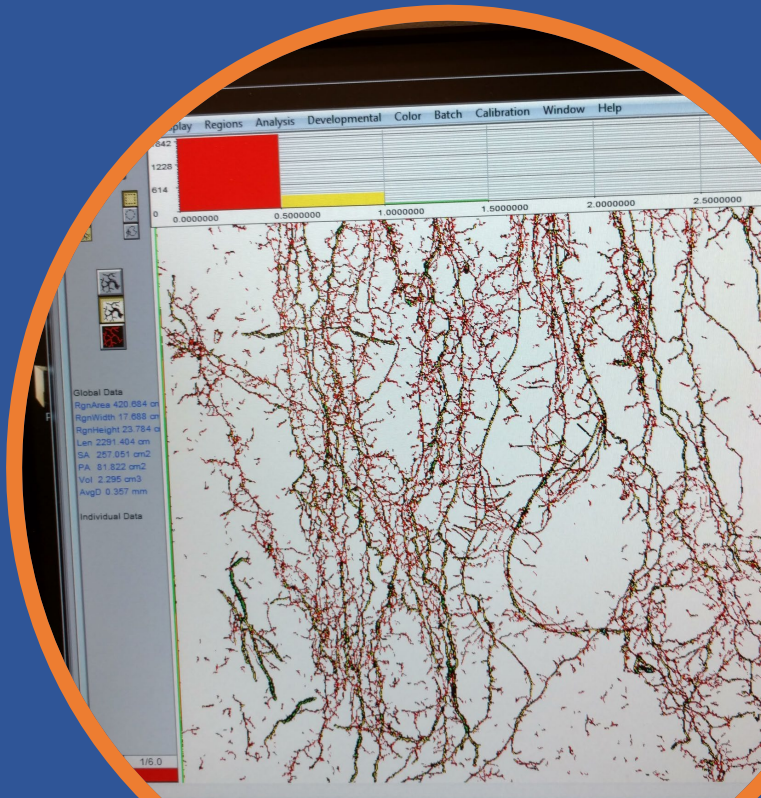
Bahiagrass breeding program

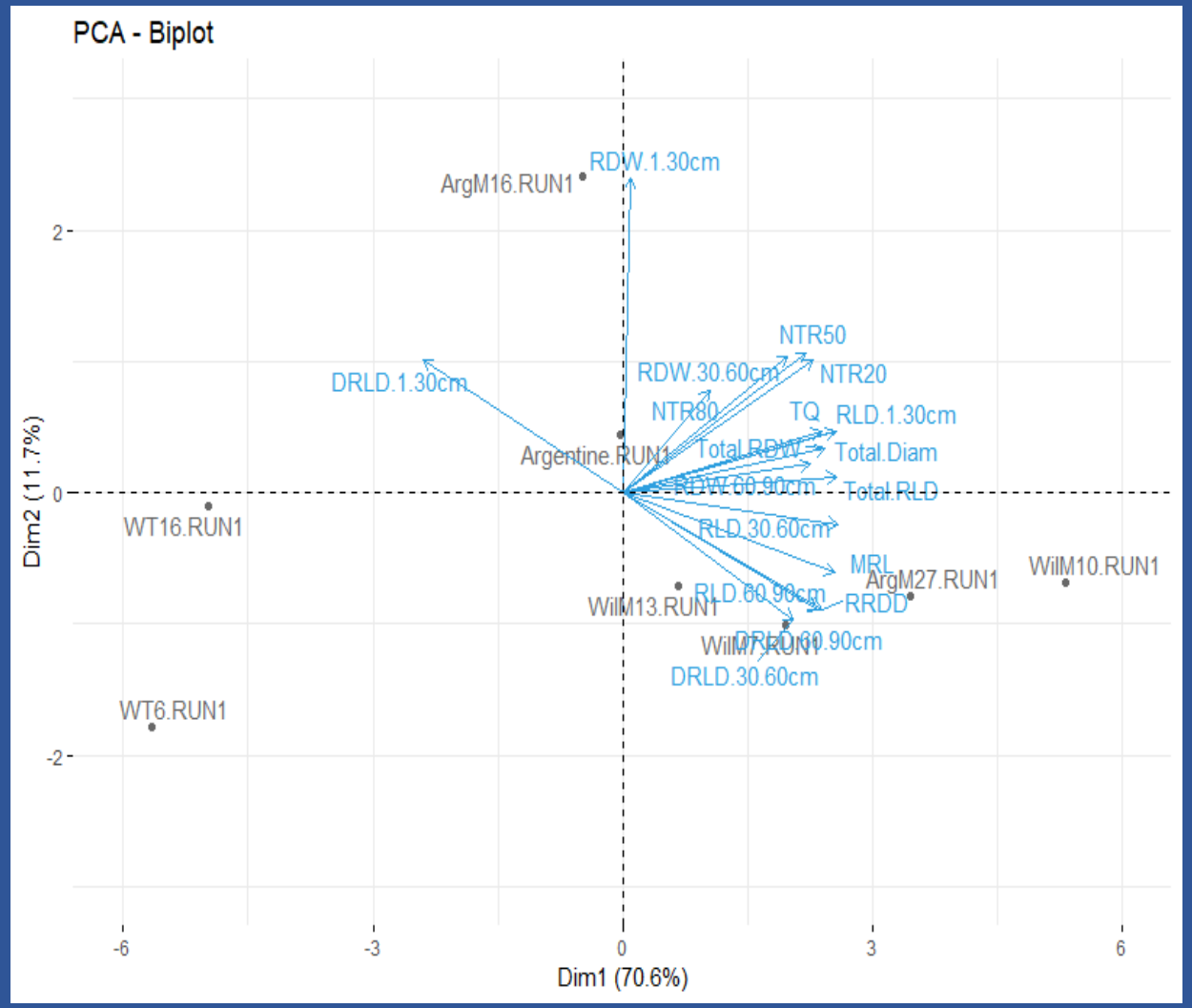
Objectives

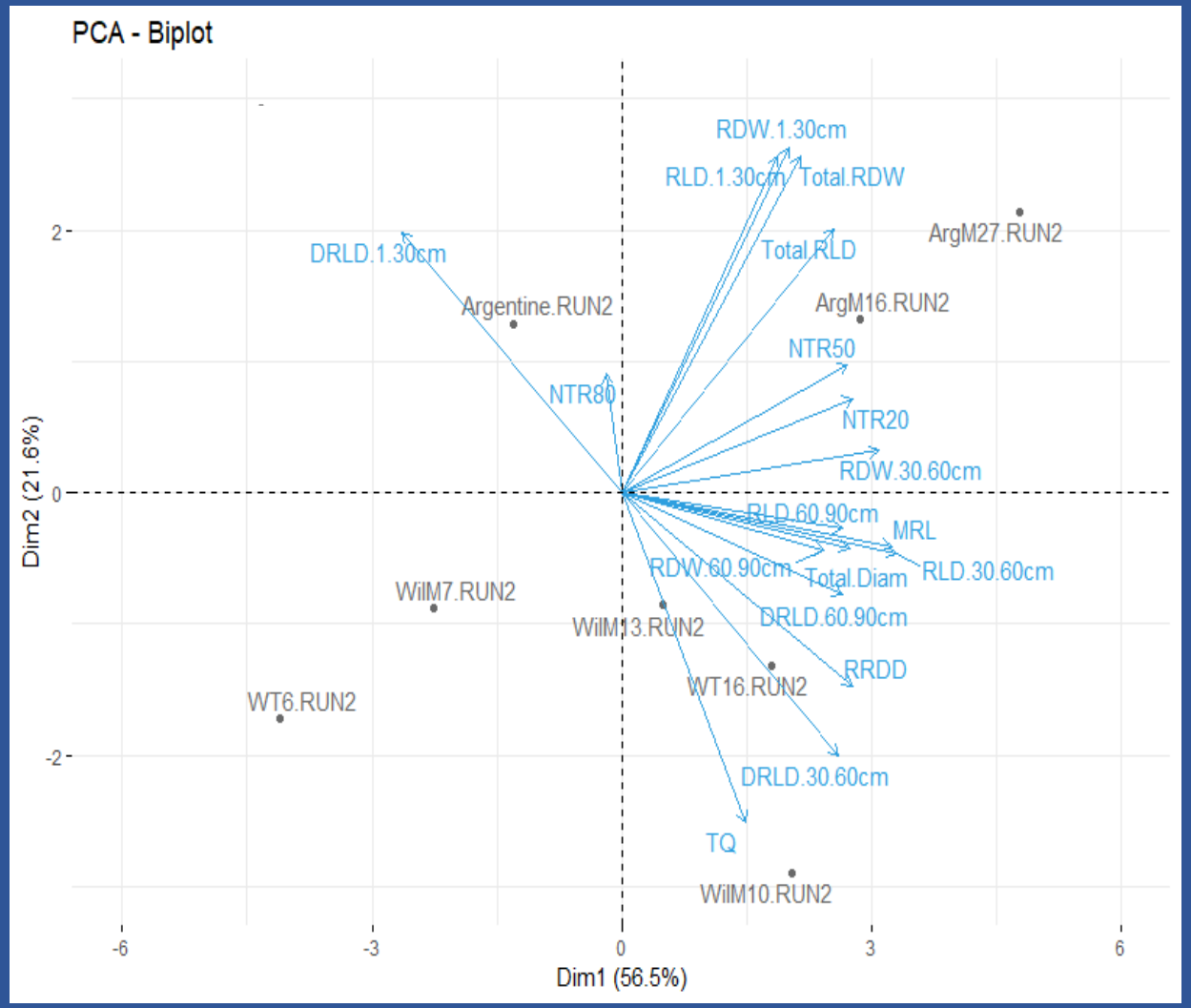
Compare root architecture, root development, transpiration rates and visual quality of the new BH lines with ¨Argentine¨, under dry down conditions.

Methodology

Three Wilmington mutants: WilM7-WilM10-WilM13; Two Argentine mutants: ArgM16- ArgM27; Two wild type lines: WT6 -WT16.



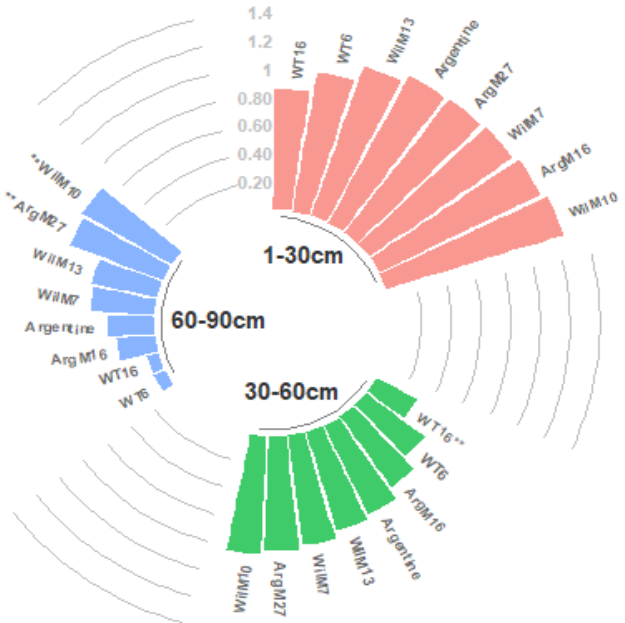




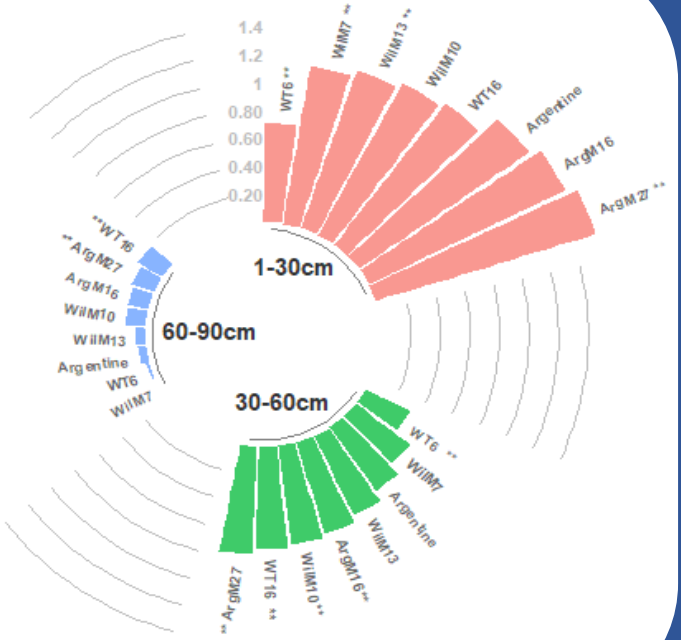
Principal component analysis (PCA). Two-dimensional biplot showing the loading values on the first and second principal components (Dim1 vs. Dim2). (A) Experiment 1. (B) Experiment 2. Root length density (RLD), distribution of RLD (DRLD) and root dry weight (RDW) in depths (1–30 cm), (30–60 cm), (60–90 cm); Total RLD and Total RDW; rate of root depth development (RRDD); maximum root length (MRL), total diameter (TD); Level of fraction of transpirable soil water required to reduce normalized transpiration ratio; a 20% (NTR20), 50% (NTR50) and 80% (NTR80).

Genotype Comparison

Experiment 1



Experiment 2



Root length density (cm cm-3). Asterisks show the statistical differences compared to Argentine.

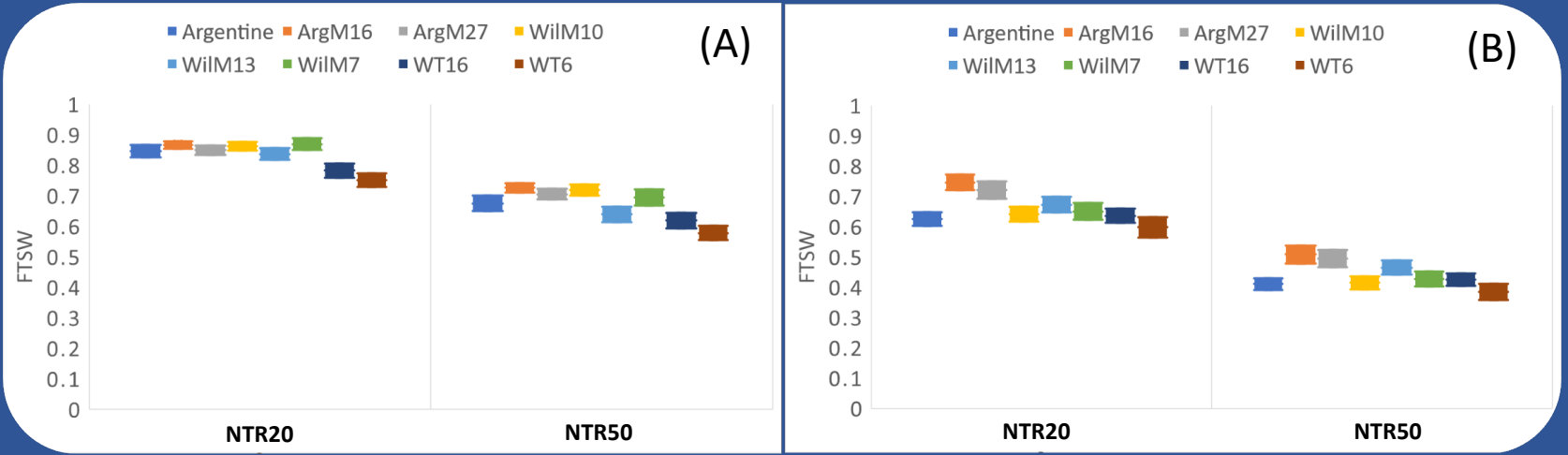
Experiment 1

Genotype	RRDD	MRL	TD	TQ
Argentine	1.08 bc	71.1 abcd	1.4 ab	4.5 b
ArgM16	0.83 **a**	66.7 abc	1.34 ab	5 bc
ArgM27	1.14 cd	82.4 cd	1.53 bcd	5.5 **c**
WilM10	1.35 **de**	100 **ef**	1.67 **cd**	5.5 **c**
WilM13	1.12 cd	73.1 bcd	1.42 bc	5.5 **cd**
WilM7	1.29 cd	83.1 de	1.42 abc	4.75 bc
WT16	0.77 **a**	53.4 a	1.09 a	3 **a**
WT6	0.72 **a**	55.4 ab	1.07 a	3.25 **a**

Experiment 2

Genotype	RRDD	MRL	TD	TQ
Argentine	0.64 bc	57.1 bcd	1.08 abc	4.75 ab
ArgM16	0.8 **d**	66.4 de	1.19 abcd	5.5 bcd
ArgM27	0.77 cd	67.2 **e**	1.42 **e**	5 abc
WilM10	0.81 **d**	62.6 cd	1.41 cde	6.25 **d**
WilM13	0.75 cd	60.2 bcd	1.38 **de**	5.5 **cd**
WilM7	0.59 ab	51.1 bc	0.97 abc	5.75 **cd**
WT16	0.73 bcd	62.4 de	1.18 bcde	5.25 **cd**
WT6	0.67 bcd	49.2 ab	1 ab	5 **cd**

Rate of root depth development (RRDD); maximum root length (MRL), total diameter (TD); turf quality (TQ). Letters represent the statistical differences between genotypes from the protected LSD test P=0.05.



Level of fraction of transpirable soil water (FTSW) when the normalized transpiration ration NTR depart 20% (NTR20) and 50% (NTR50) from its upper limit. (A) Experiment 1. (B) Experiment 2. Bars length represent the standard error.

Conclusions

The only mutant with a lower performance than Argentine was WT6, while it would not be possible to classify WT16, because of its inconsistency. During drought stress **WilM13**, **ArgM16** and **WilM7** may have similar responses compared to Argentine, while **WilM10** and **ArgM27** may have improved drought avoidance characteristics.

Poster# 74