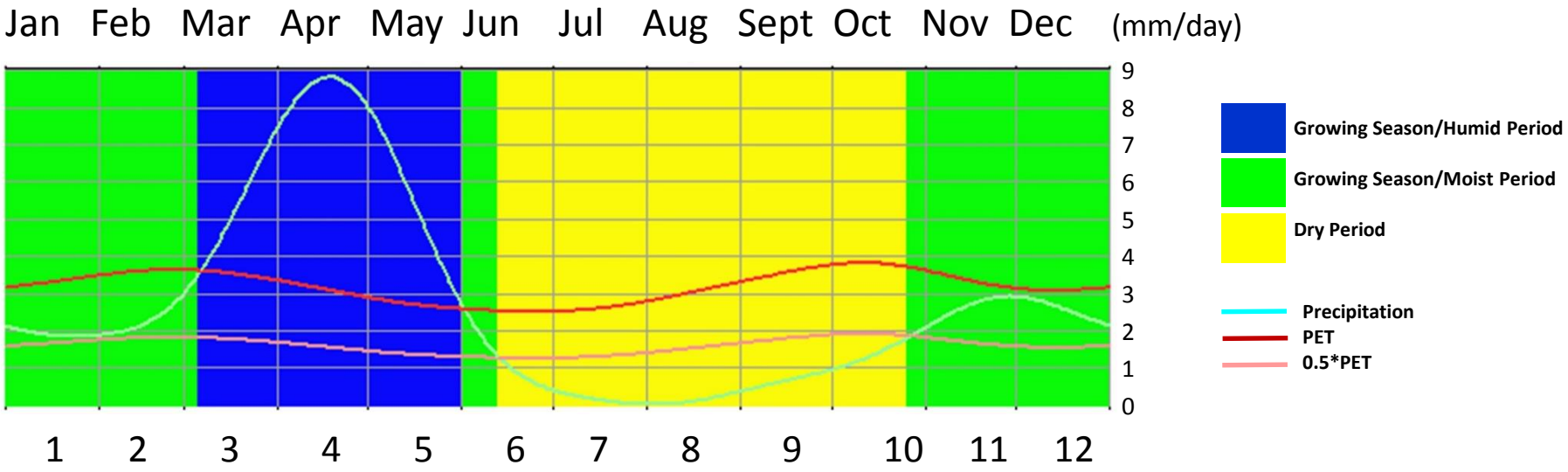
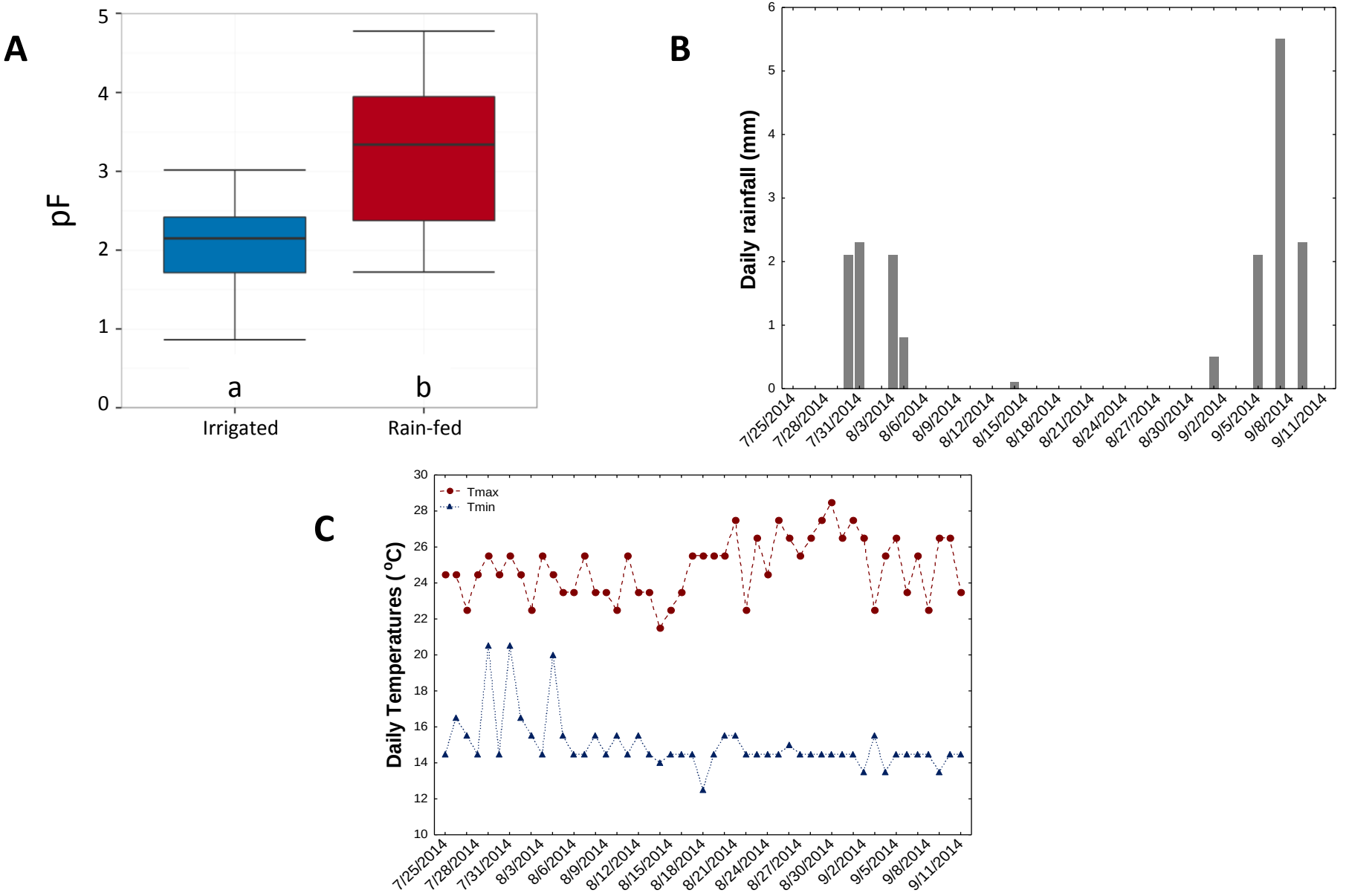
Supplementary Information

Effect of seasonal drought on the agronomic performance of four banana genotypes (*Musa* spp.) in the East African highlands

Brigitte Uwimana, Yasmín Zorrilla-Fontanesi, Jelle van Wesemael, Hassan Mduma, Allan Brown, Sebastien Carpentier and Rony Swennen



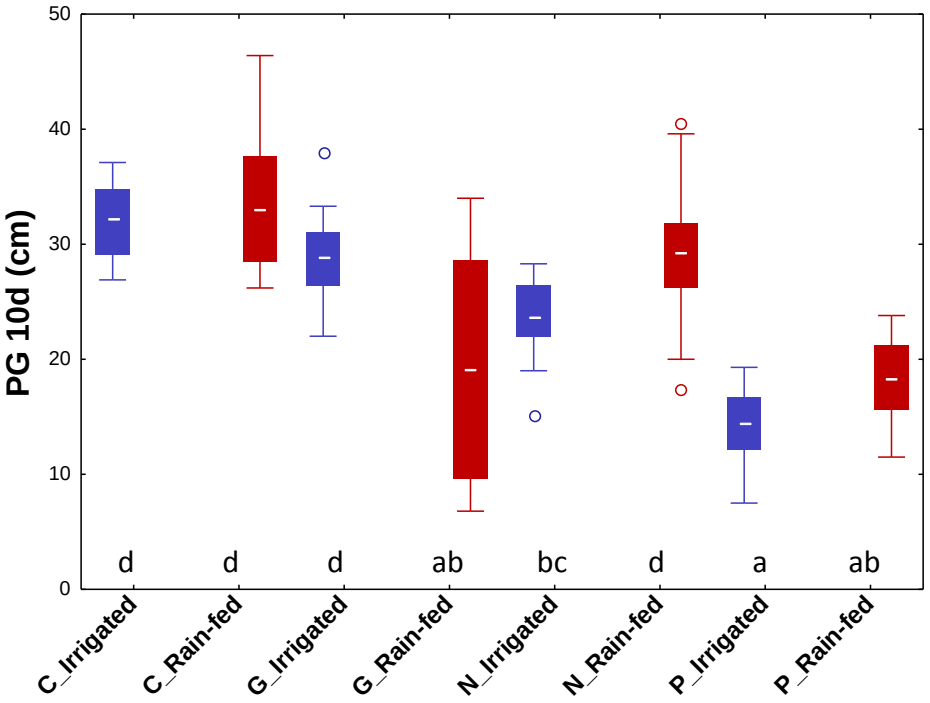
Supplementary Figure S1. Vegetation period for Arusha (Tanzania). Source: New_LocClim (http://www.fao.org/nr/climpag/pub/en3_051002_en.asp). Data collected over the last 30 years, as accessed on May 31st, 2019. PET: potential evapotranspiration.

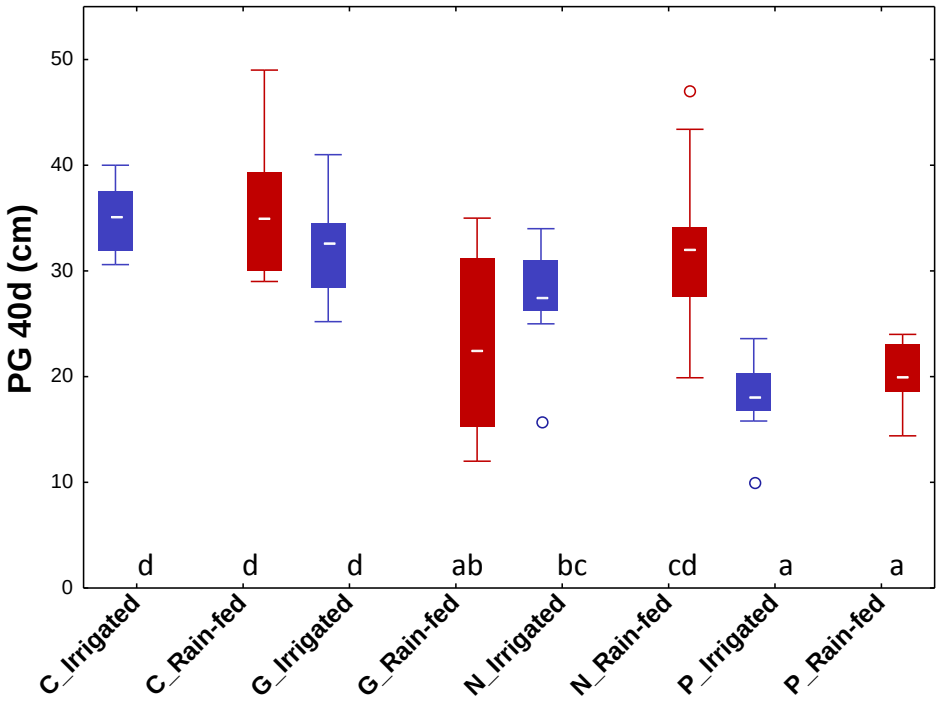


Supplementary Figure S2. A) Boxplot for soil water retention (pF values) of irrigated *vs*. rain-fed plots measured between 30 and 45 days after stopping irrigation. Different letters indicate significant differences based on t-test (a-b, α=0.05). N=8/8 (irrigated/rain-fed). **B-C)** Weather data between 25th July (stop of irrigation) and 11th September (48 days after stopping irrigation), 2014: B) daily cumulative rainfall, C) daily temperatures (maximum, and minimum).

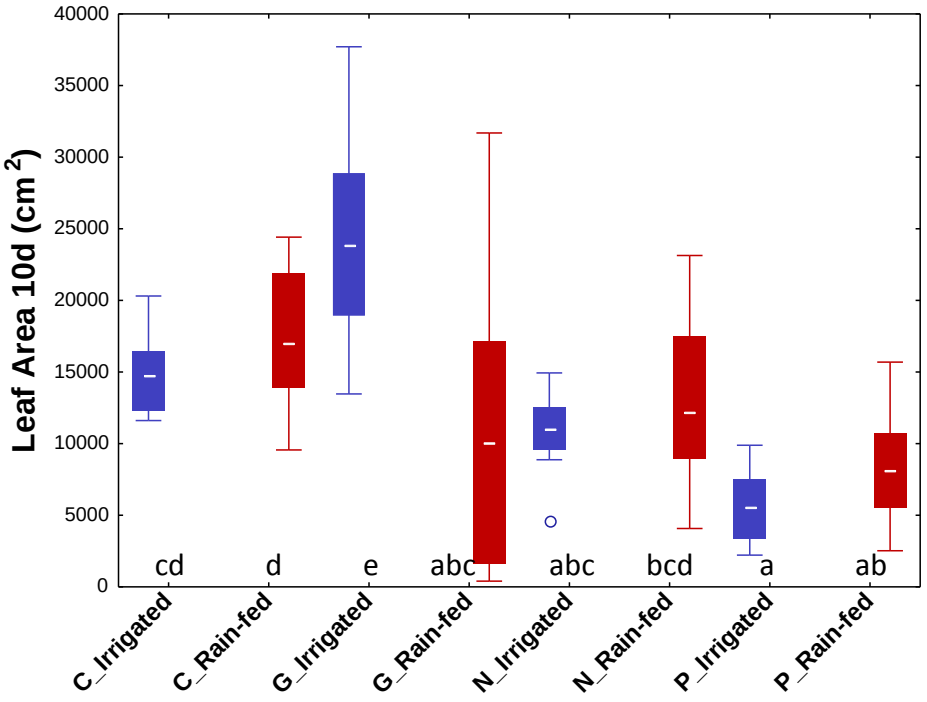
Supplementary Table S1. Results of the analysis of variance (ANOVA) on early plant growth parameters and mean leaf temperature measured at 10, 40 and 47-48 days after stopping irrigation. [1]Overall residual; $^{*}p \leq 0.05$, $^{***}p \leq 0.001$, ns: not significant ($p > 0.05$); d: days after stopping irrigation.

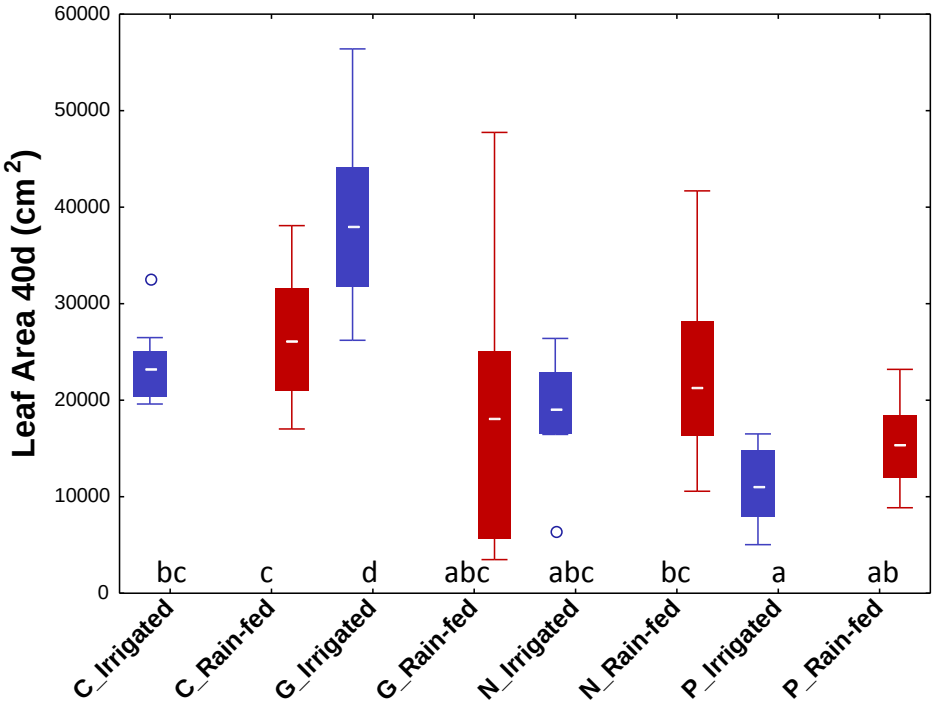
Trait	Time of measurement	Source of variation	Mean squares
Pseudostem height growth (cm)	(10d – 40d)	Treatment	303.76^{ns}
		Genotype	269.44^{ns}
		Genotype × Treatment	35.64^{ns}
		Residual[1]	58.02
Pseudostem girth growth (cm)	(10d – 40d)	Treatment	10.65***
		Genotype	7.65^{ns}
		Genotype x Treatment	1.05^{ns}
		Residual[1]	4.08
Leaf growth (m^2)	(10d – 40d)	Treatment	7.77^{ns}
		Genotype	74.78*
		Genotype × Treatment	66.90*
		Residual[1]	9.860
Leaf temperature (°C)	47d, 48d	Treatment	470.85^{ns}
		Genotype	18.57^{ns}
		Genotype × Treatment	2.44^{ns}
		Residual[1]	7.24



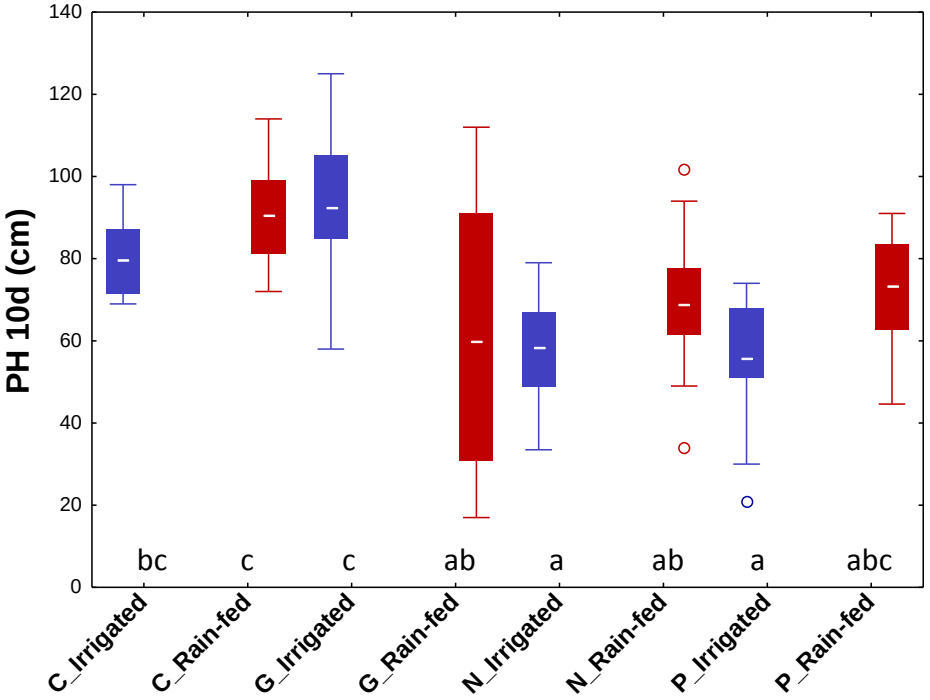


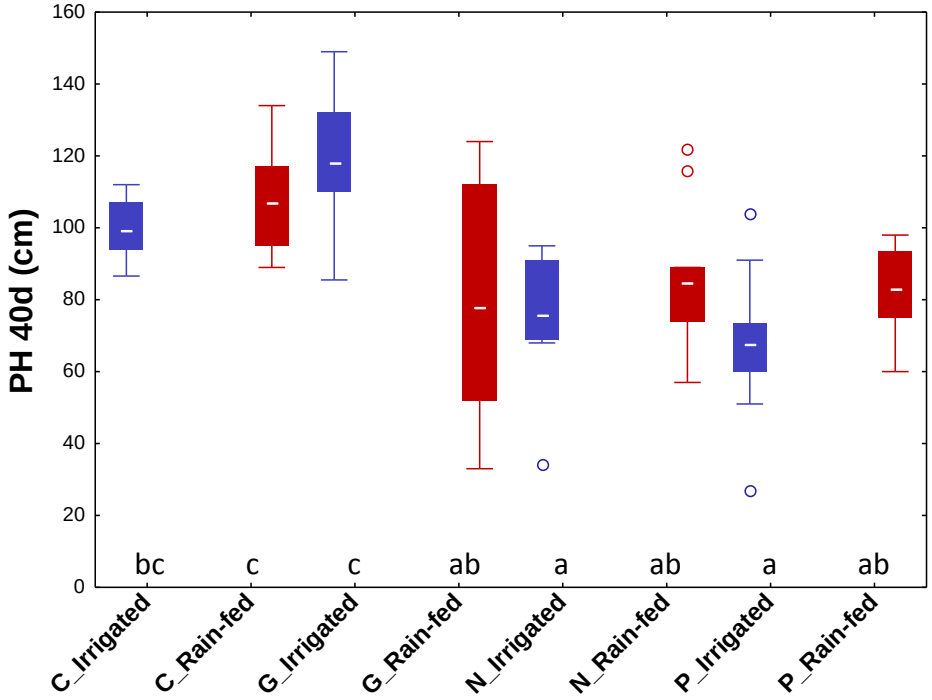
Supplementary Figure S3. Boxplots for pseudostem girth per genotype and per treatment at 10 and 40 days after stopping irrigation. Different letters indicate significant differences based on comparison over genotypes and treatments (LSD; α=0.05). Boxes represent the interquartile range (25%-75%) and whiskers the non-outlier range. Horizontal lines inside boxes indicate the mean values, Outliers are indicated as dots. C: 'Cachaco', G: 'Guyod', N: 'Nakitengwa', P: 'Pahang'. N =10/10 (irrigated/rain-fed). PG: pseudostem girth. d: days after stopping irrigation.





Supplementary Figure S4. Boxplots for leaf area per genotype and per treatment at 10 and 40 days after stopping irrigation. Different letters indicate significant differences based on comparison over genotypes and treatments (LSD; α=0.05). Boxes represent the interquartile range (25%-75%) and whiskers the non-outlier range. Horizontal lines inside boxes indicate the mean values, Outliers are indicated as dots. C: 'Cachaco', G: 'Guyod', N: 'Nakitengwa', P: 'Pahang'. N =10/10 (irrigated/rain-fed). d: days after stopping irrigation.





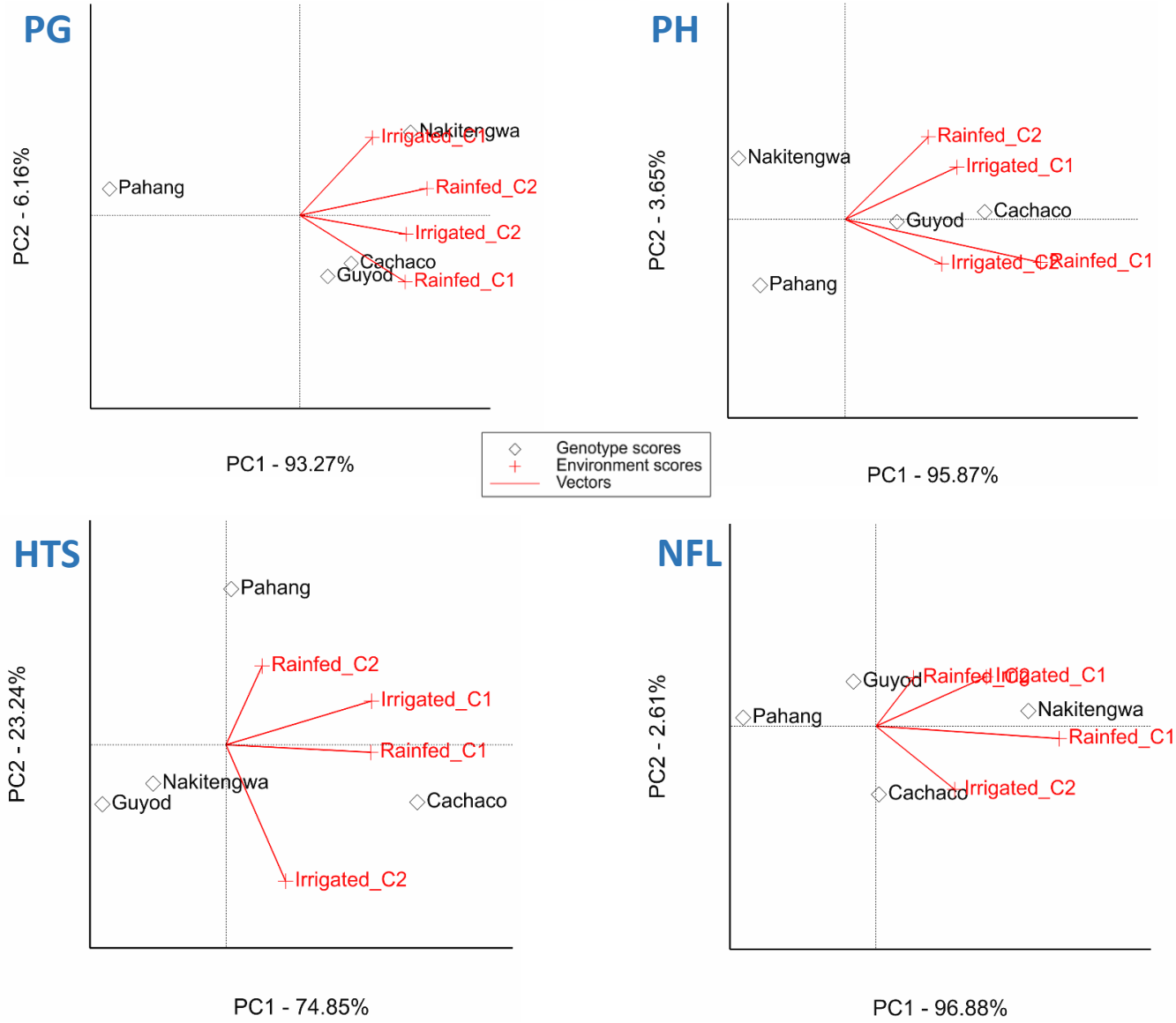
Supplementary Figure S5. Boxplots for pseudostem height per genotype and per treatment at 10 and 40 days after stopping irrigation. Different letters indicate significant differences based on comparison over genotypes and treatments (LSD; α=0.05). Boxes represent the interquartile range (25%-75%) and whiskers the non-outlier range. Horizontal lines inside boxes indicate the mean values, Outliers are indicated as dots. C: 'Cachaco', G: 'Guyod', N: 'Nakitengwa', P: 'Pahang'. N =10/10 (irrigated/rain-fed). PH: pseudostem height. d: days after stopping irrigation.

Supplementary Table S2. Pearson's correlations among the traits evaluated in cycle 2 under irrigated and rain-fed treatments. Trait abbreviations are as given in Table 2 of the manuscript. $^{*}p \leq 0.05$, $^{**}p \leq 0.01$, $^{***}p \leq 0.001$, n.s.: not significant ($p > 0.05$).

Category	Trait	Treatment	PG	PH	HTS	NFL	FTH	BW	FFI	NH
Vegetative growth	PH	Irrigated	0.10^{ns}	-						
		Rain-fed	0.39^{*}	-						
	HTS	Irrigated	0.20^{ns}	0.56^{***}	-					
		Rain-fed	-0.38^{*}	-0.10^{ns}	-					
	NFL	Irrigated	0.28^{ns}	-0.18^{ns}	-0.23^{ns}	-				
		Rain-fed	0.11^{ns}	0.16^{ns}	-0.10^{ns}	-				
Maturity	FTH	Irrigated	-0.22^{ns}	0.41^{**}	-0.11^{ns}	-0.04^{ns}	-			
		Rain-fed	-0.34^{ns}	-0.14^{ns}	0.42^{*}	0.03^{ns}	-			
Fruit yield	BW	Irrigated	0.74^{***}	0.05^{ns}	0.14^{ns}	0.35^{*}	-0.08^{ns}	-		
		Rain-fed	0.89^{***}	0.41^{*}	-0.32^{ns}	0.17^{ns}	-0.33^{ns}	-		
	FFI	Irrigated	0.75^{***}	-0.14^{ns}	0.17^{ns}	0.32^{ns}	-0.45^{**}	0.88^{***}	-	
		Rain-fed	0.87^{***}	0.34^{ns}	-0.38^{*}	0.13^{n}	-0.51^{**}	0.97^{***}	-	
	NH	Irrigated	0.00^{ns}	-0.33^{*}	-0.35^{*}	-0.21^{ns}	-0.32^{ns}	-0.02^{ns}	0.07^{ns}	-
		Rain-fed	0.42^{*}	0.02^{ns}	-0.44^{*}	0.29^{ns}	-0.31^{ns}	0.49^{**}	0.51^{**}	-
	NF	Irrigated	0.17^{ns}	-0.68^{***}	-0.41^{**}	0.01^{ns}	-0.48^{**}	0.18^{ns}	0.31^{ns}	0.64^{***}
		Rain-fed	0.30^{ns}	-0.45^{**}	-0.36^{*}	0.38^{*}	-0.07^{ns}	0.27^{ns}	0.27^{ns}	0.58^{***}

Supplementary Table S3. Results of ANOVA on expected yield for the four *Musa* genotypes under irrigation and rain-fed treatments in cycle 1. [1]Overall residual.

Source of variation	Mean squares	*p-value*
Genotype	1323.77	<0.001
Treatment	130.61	0.34
Genotype x Treatment	89.06	0.04
Residual[1]	20.46	



Supplementary Figure S6. Genotype and genotype by environment interaction (GGE) biplots for vegetative growth agronomic traits based on the best linear unbiased estimators (BLUEs) from ANOVA in the four cycle – treatment combination environments and the four *Musa* genotypes. PG: plant girth; PH: plant height; HTS: height of the tallest sucker; NFL: number of functional leaves; C1: first crop cycle, C2: second crop cycle; PC1: first principal component, PC2: second principal component.