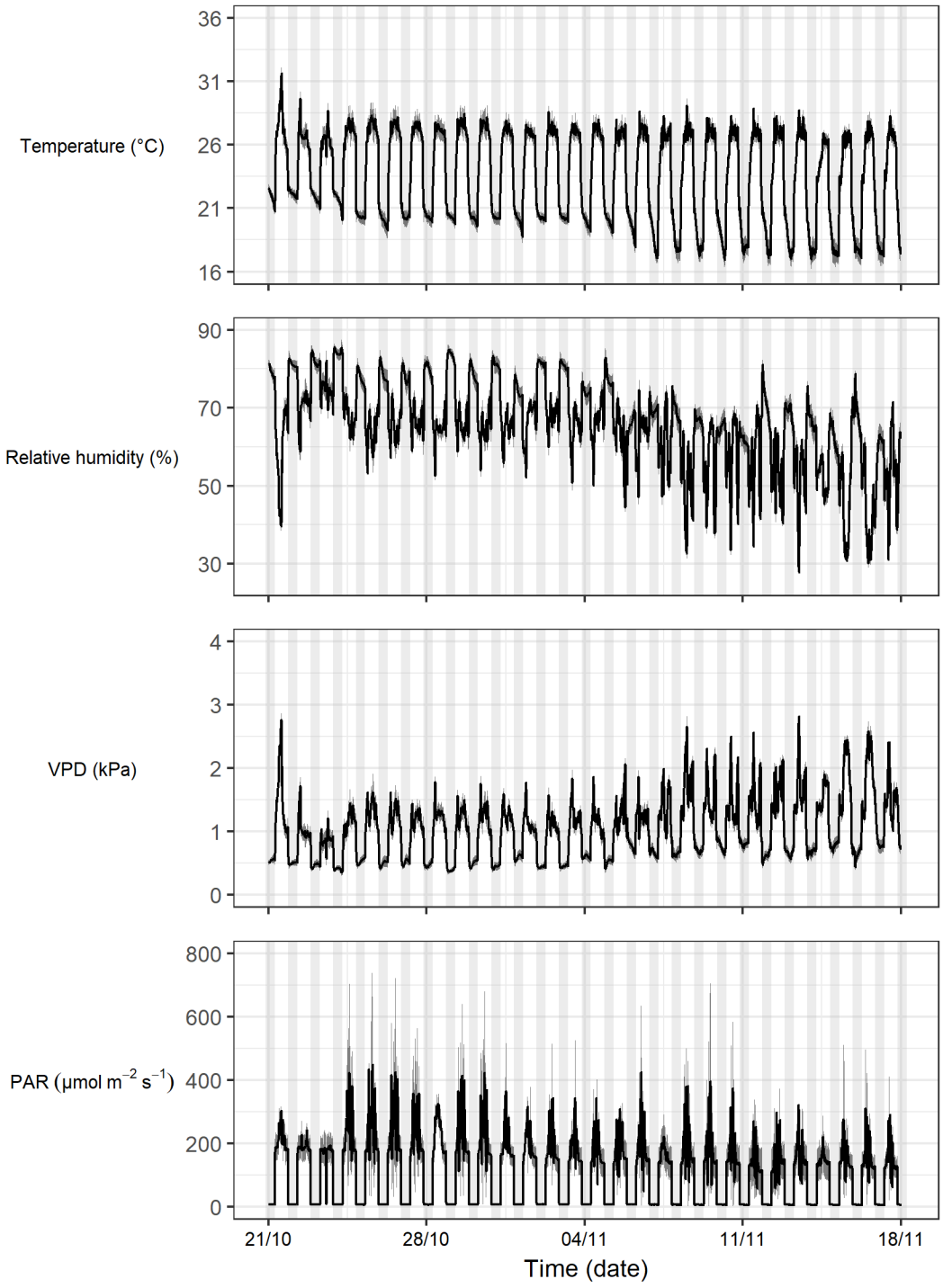
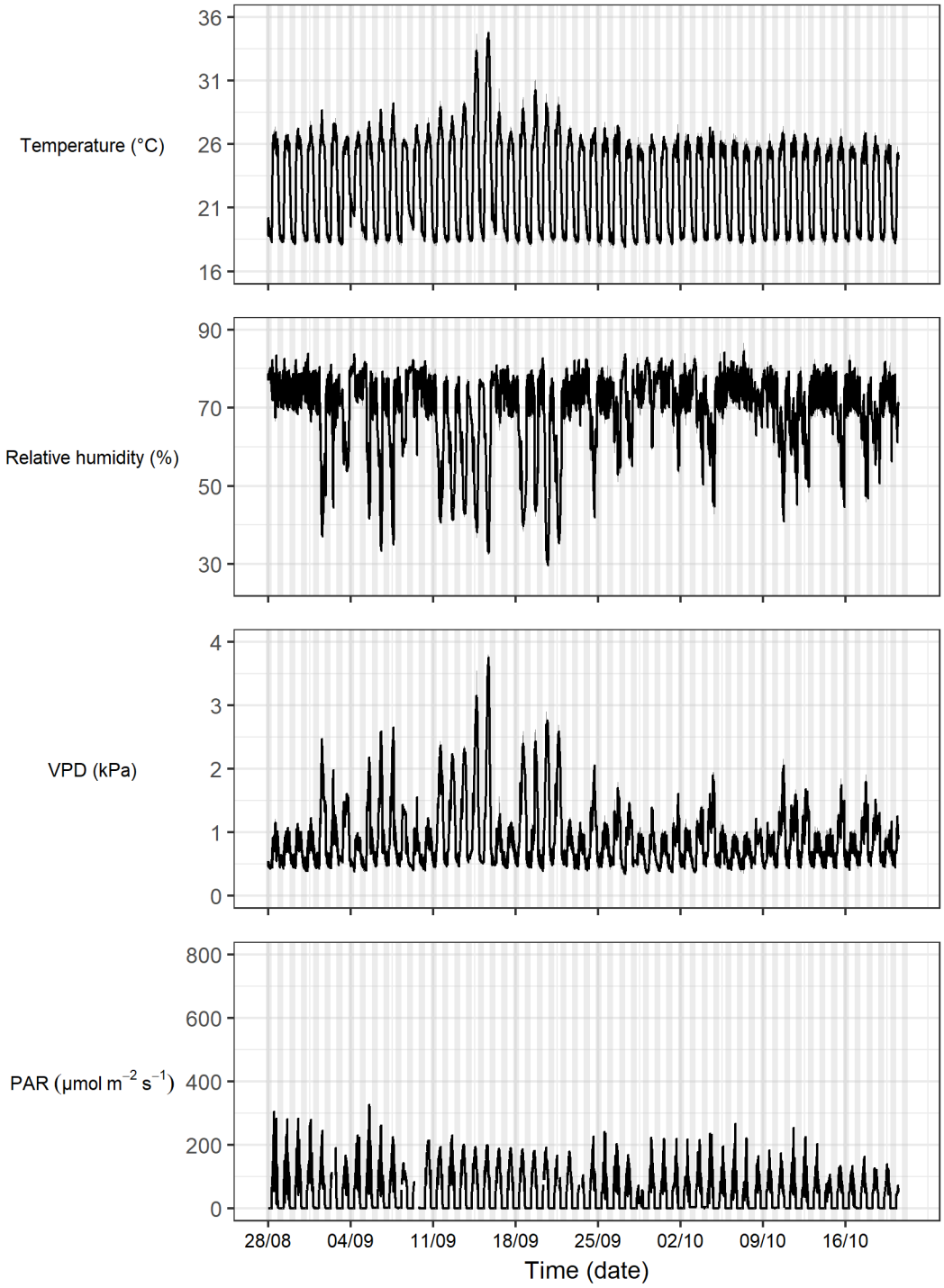
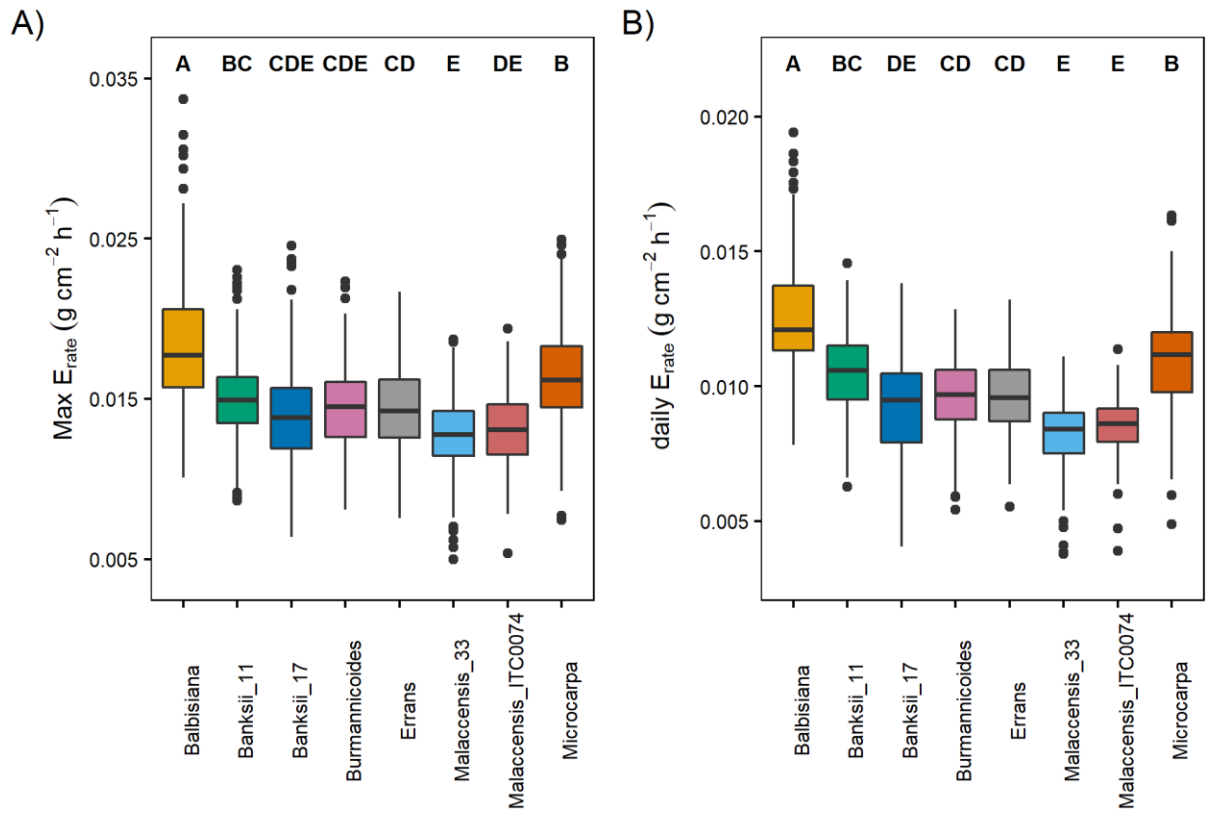
Supplementary Figures



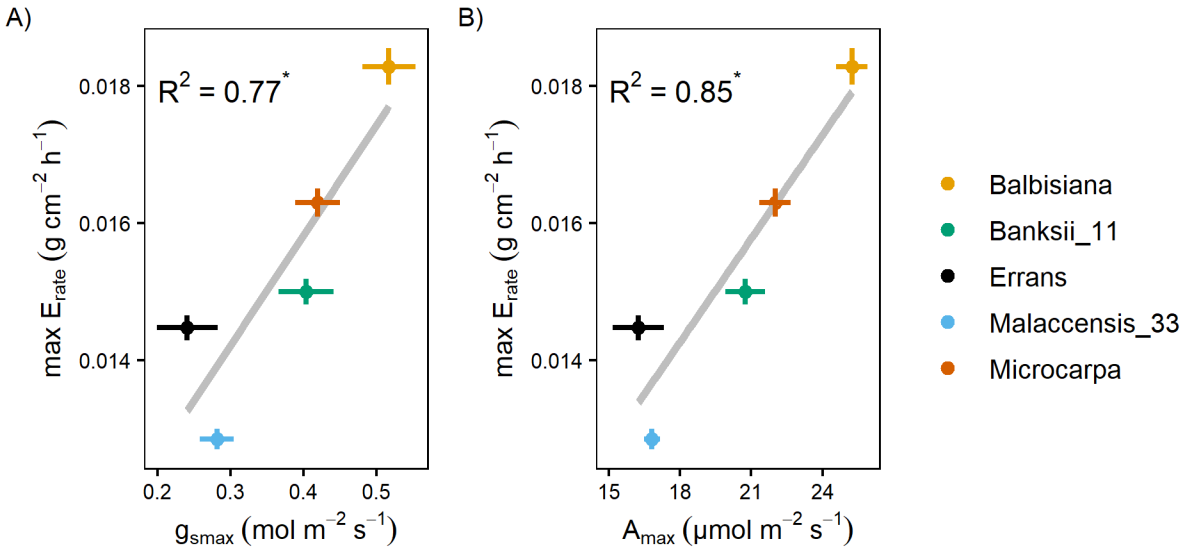
Supplemental Figure S1: Environmental conditions measured during the high-throughput phenotyping experiment at the Phenodyn platform. Data are the mean ± stdev of 6 environmental sensors evenly distributed across the greenhouse.



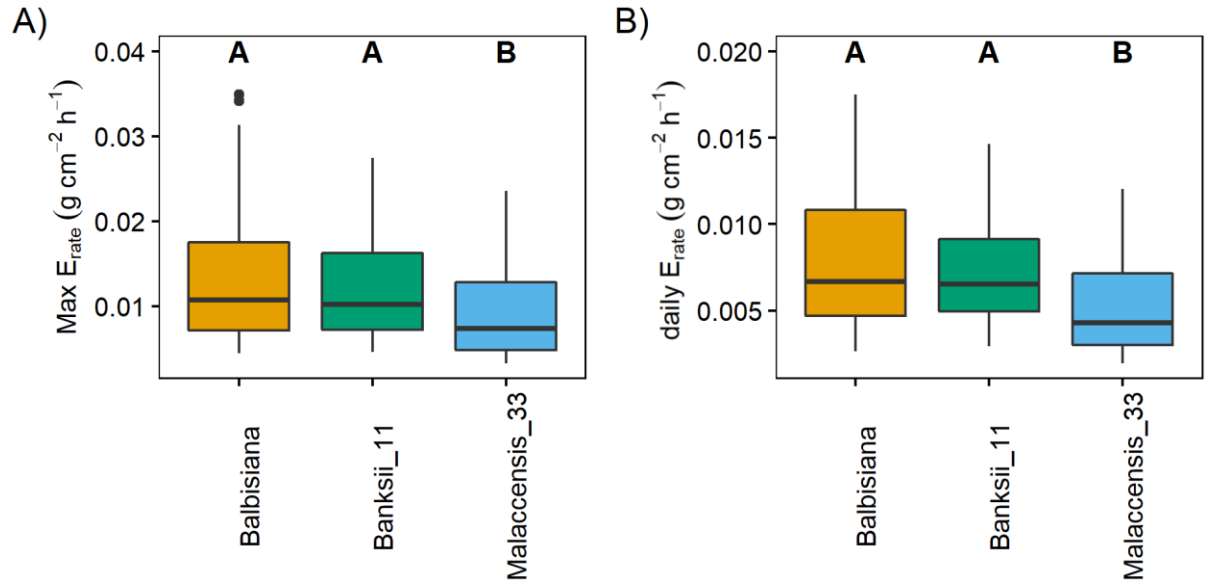
Supplemental Figure S2: Environmental conditions measured during the validation experiment at the Bioversity phenotyping platform. Data of temperature, relative humidity and VPD are the mean ± stdev of 8 environmental sensors evenly distributed across the greenhouse. Light intensity was measured in the middle of the greenhouse.



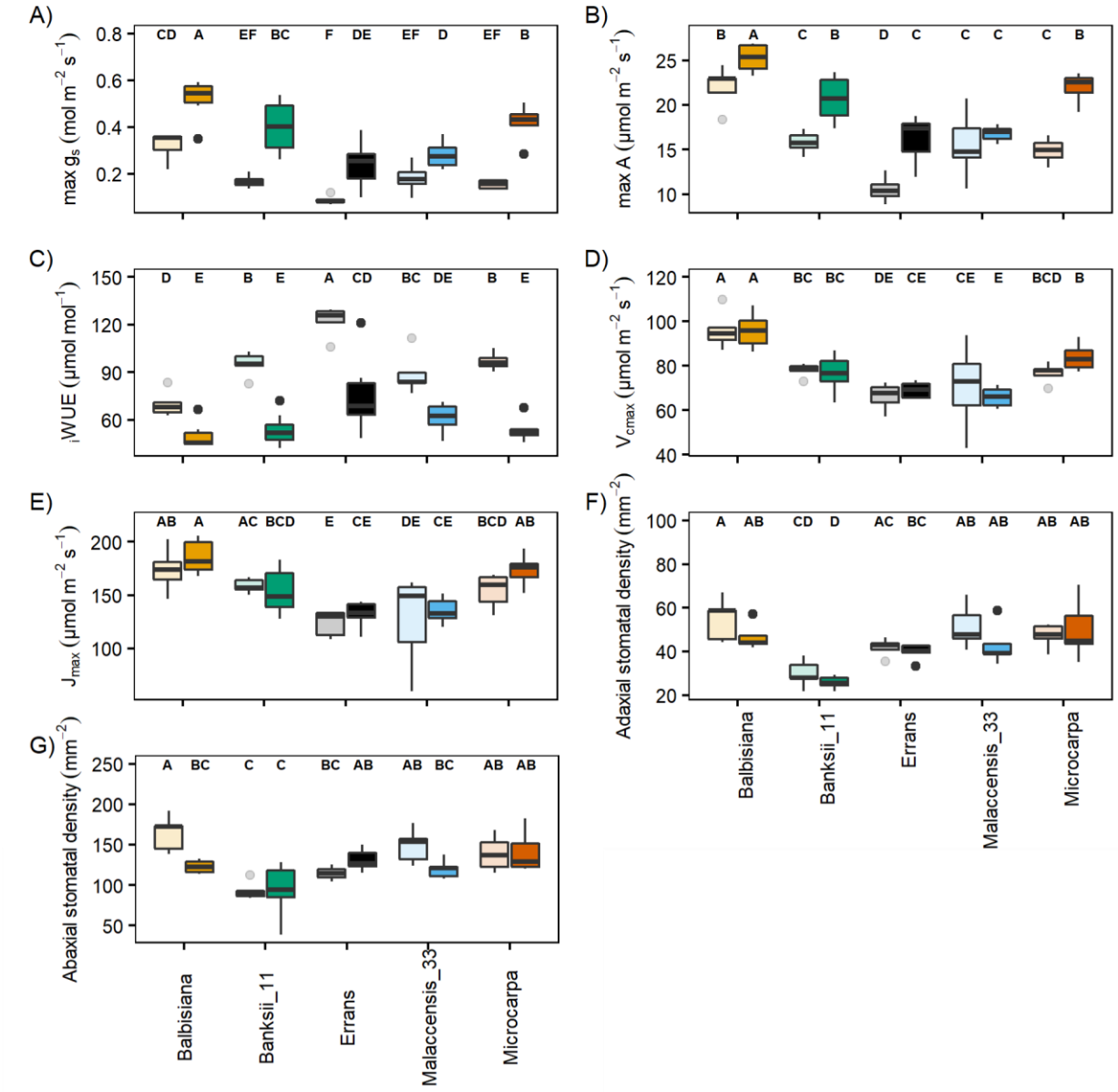
Supplemental Figure S3: Maximum daily transpiration rate (A) and daily transpiration rate (B) under well-watered conditions differed significantly across 8 wild banana genotypes. Different letters indicate significant differences (P < 0.05; A>B>C>D>E) (29 days, n=8 per genotype).



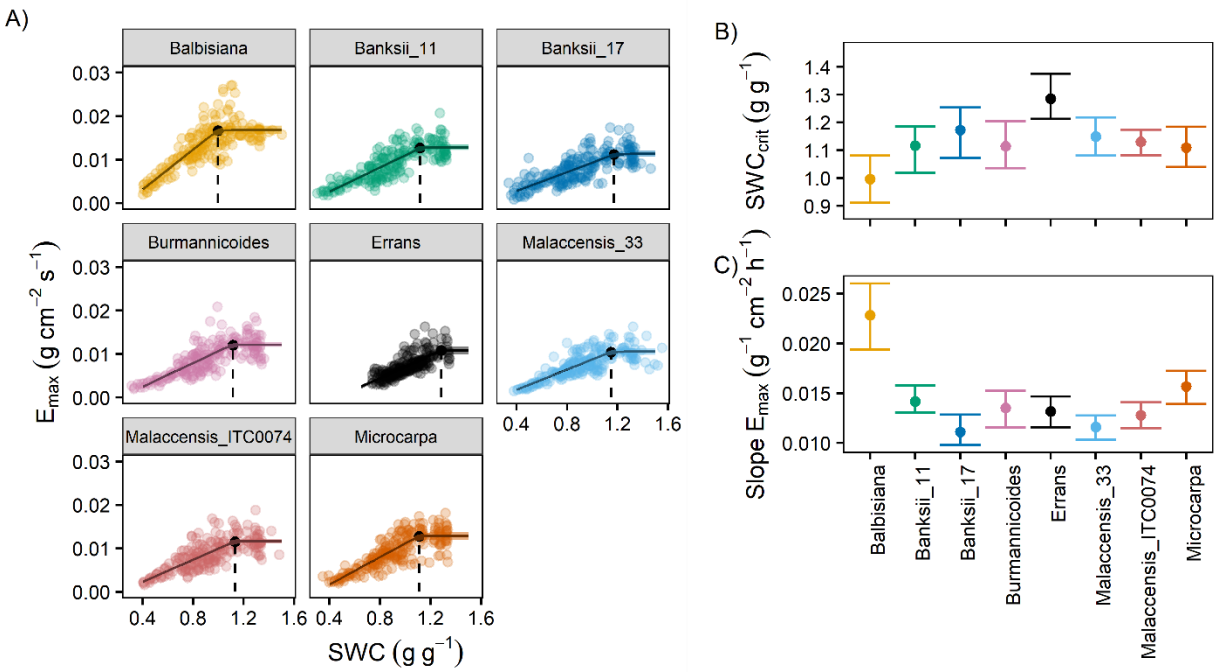
Supplemental Figure S4: Maximum daily transpiration rate was significantly correlated with (A) maximum stomatal conductance ($g_{s,max}$) and (B) photosynthesis (A_{max}) for 5 selected wild banana genotypes. Data represent mean±se and R^2 values represent the correlation across the means for every genotype (Transpiration rate: 29 days, 8 plants per genotype; gas-exchange data: n=6-8).



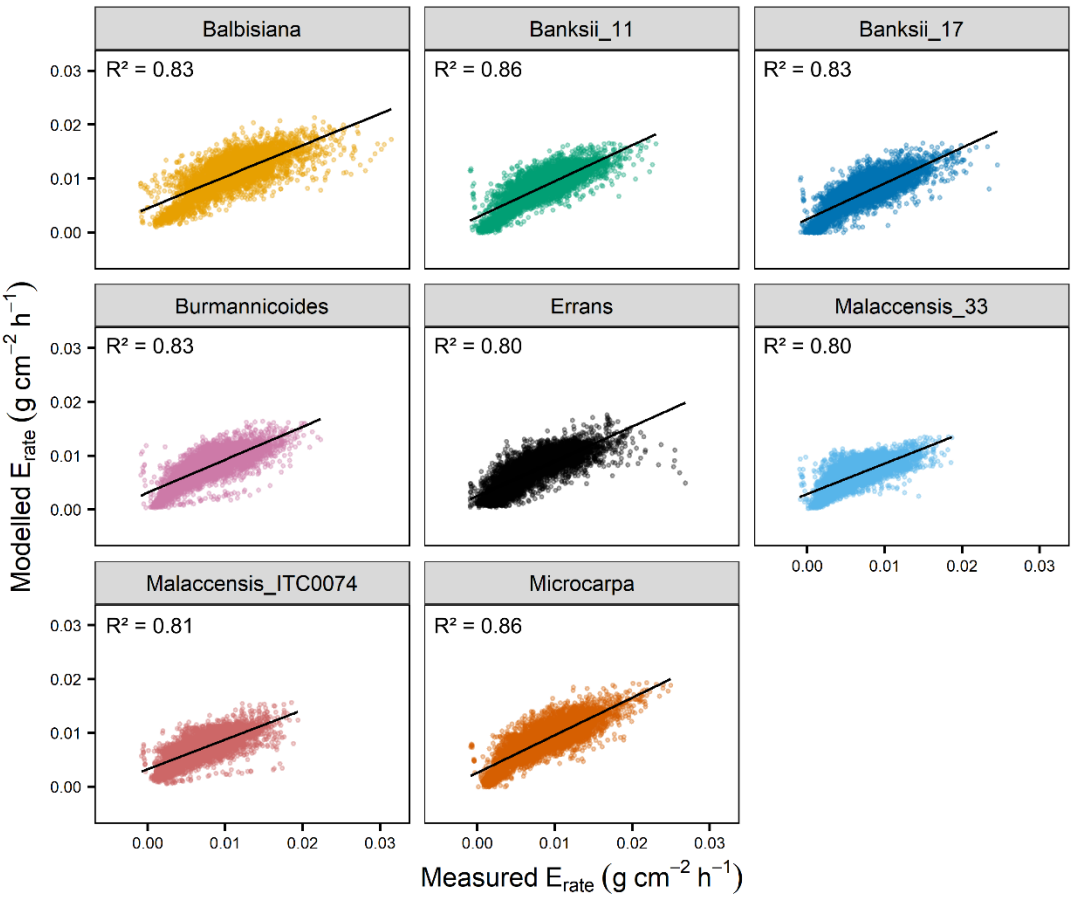
Supplemental Figure S5: Maximum transpiration rate (A) and daily transpiration rate (B) under well-watered conditions differed significantly across 3 wild banana genotypes during the validation phenotyping experiment. Different letters indicate significant differences ($P < 0.05$; A>B) (48 days, n=4 per genotype).



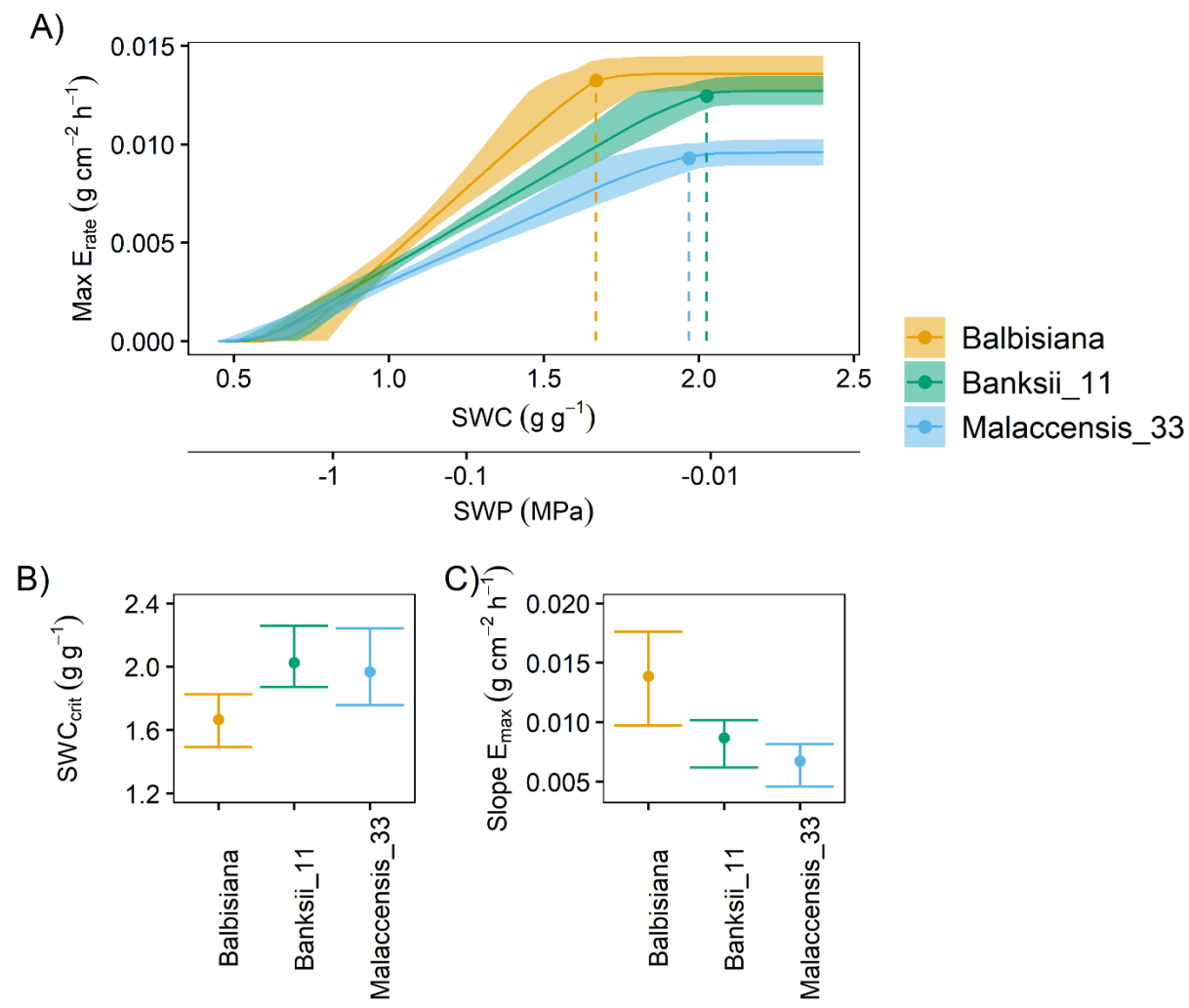
Supplemental Figure S6: Gas exchange data and stomatal density of 5 representative wild banana genotypes. (A) Maximum stomatal conductance ($g_{s,max}$); (B) maximum photosynthesis (A_{max}); (C) intrinsic water use efficiency ($_i$WUE), (D) maximum rate of Rubisco activity ($V_{c,max}$), (E) the potential rate of electron transport (J_{max}), (F) Adaxial stomatal density and (G) Abaxial stomatal density. Faded colours represent water deficit plants (SWC 0.75 g g^{-1}, -0.13 MPa), bold colours well-watered plants (n=5-8).



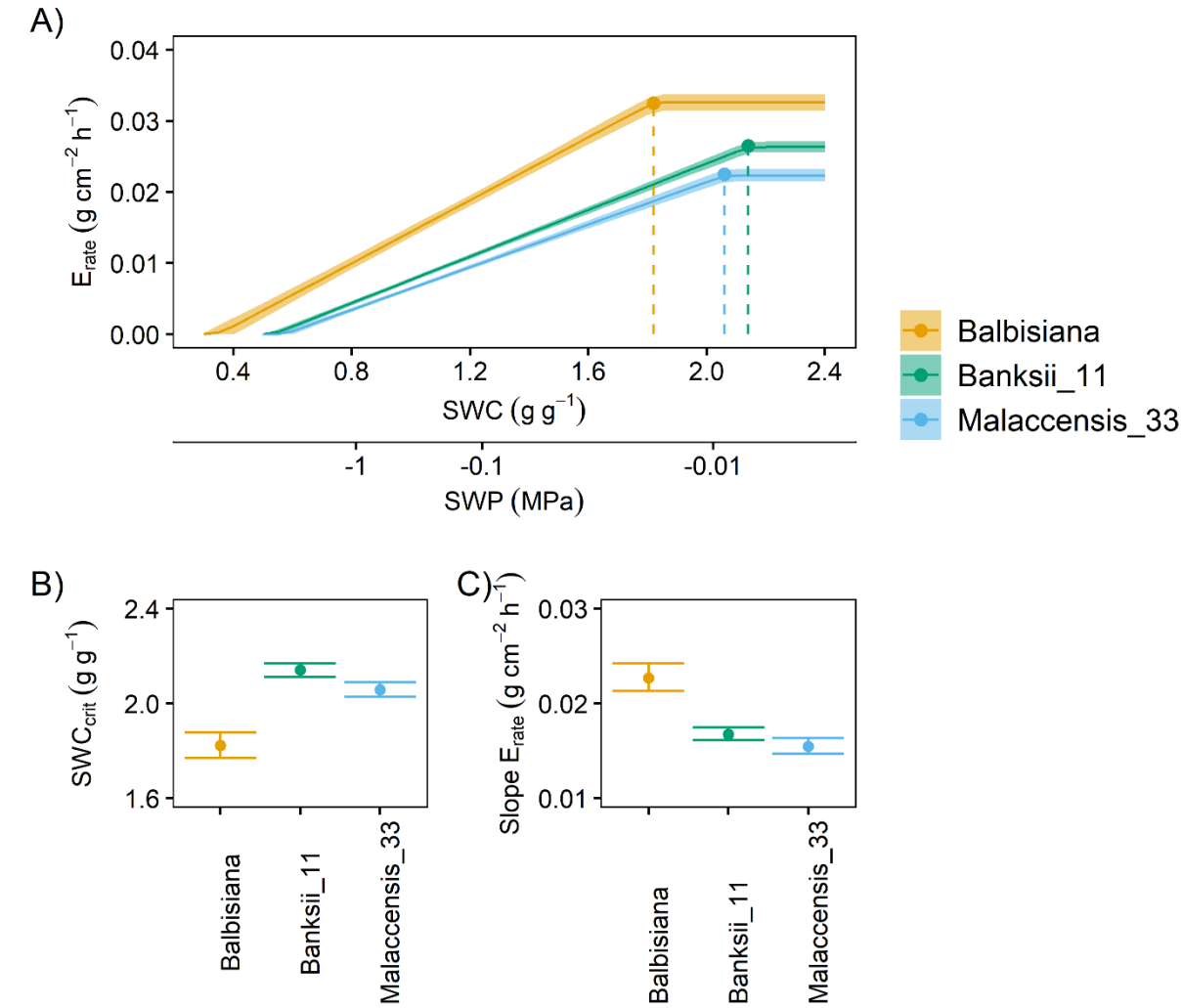
Supplemental Figure S7: Maximum daily transpiration rate (E_{max}) as a function of soil water content (SWC) for 8 wild banana genotypes. (A) E_{max} did not differ from well-watered conditions until a critical soil water content threshold (SWC_{crit}) was reached. After this SWC_{crit}, water content becomes limiting and E_{max} decreased strongly. The black line represent modelled response according to Eq. 12 with SWC_{crit} indicated by the solid black line. (B) SWC_{crit} at which E_{max} started to decrease. Data represent the modelled parameter with 95% confidence interval. (C) Slope of E_{max} decrease after SWC_{crit} was reached. Data represent the modelled parameter with 95% confidence interval.



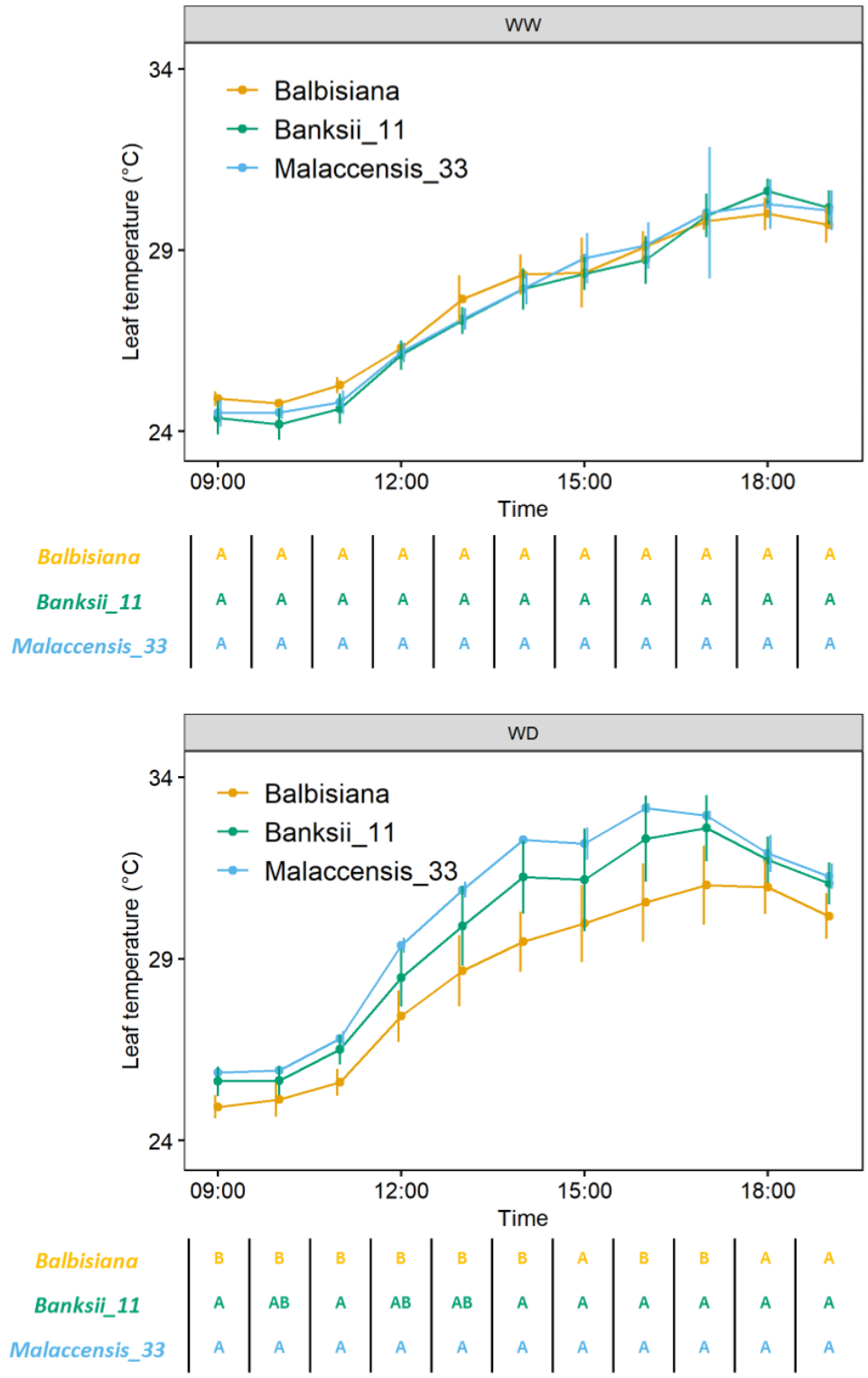
Supplemental Figure S8: Measured and modelled transpiration rate during the daytime for 8 wild banana genotypes. The black line represents the linear regression between measured and modelled transpiration rate.



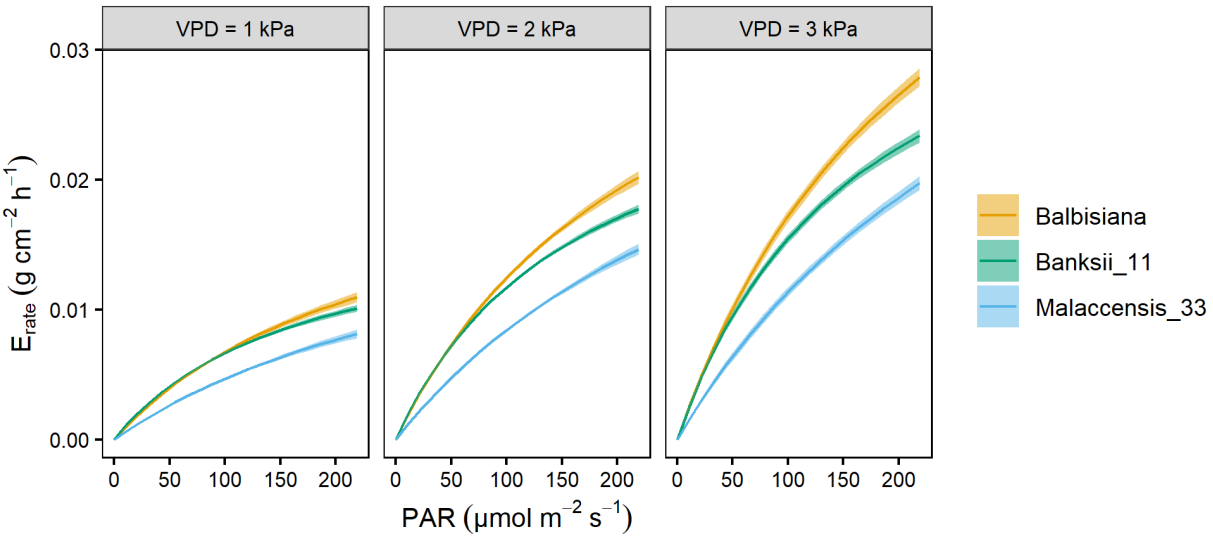
Supplemental Figure S9: Maximum daily transpiration rate (E_{max}) as a function of soil water content (SWC) and soil water potential (SWP) for 3 wild banana genotypes during the validation phenotyping experiment. (A) E_{max} did not differ from well-watered conditions until a critical soil water content threshold (SWC_{crit}) was reached. After this SWC_{crit}, water content becomes limiting and E_{max} decreased strongly. Data represent modelled response according to Eq. 12 with 95% confidence interval. Note the logarithmic scale of the soil water potential. (B) SWC_{crit} at which E_{max} started to decrease. Data represent the modelled parameter with 95% confidence interval. (C) Slope of E_{max} decrease after SWC_{crit} was reached. Data represent the modelled parameter with 95% confidence interval.



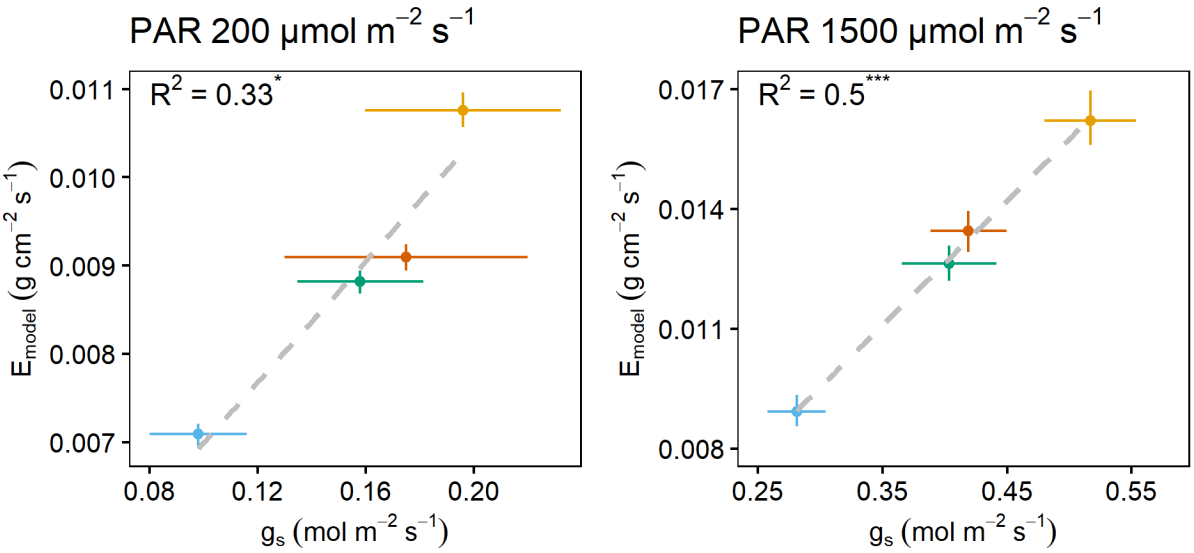
Supplemental Figure S10: Modelled transpiration rate (E_{rate}; Eq. 9) as a function of soil water content (SWC) and soil water potential (SWP) for 3 wild banana genotypes during the validation phenotyping experiment. (A) E_{rate} did not differ from well-watered conditions until a critical soil water content threshold (SWC_{crit}) was reached. After this SWC_{crit}, water content becomes limiting and E_{max} decreased strongly. Data represent modelled response according to Eq 12 with 95% confidence interval at VPD = 1.5 kPa and PAR = 200 µmol m^{-2} s^{-1}. Note the logarithmic scale of the soil water potential. (B) SWC_{crit} at which E_{max} started to decrease. Data represent the modelled parameter with 95% confidence interval. (C) Slope of E_{max} decrease after the SWC_{crit} was reached.Data represent the modelled parameter with 95% confidence interval.



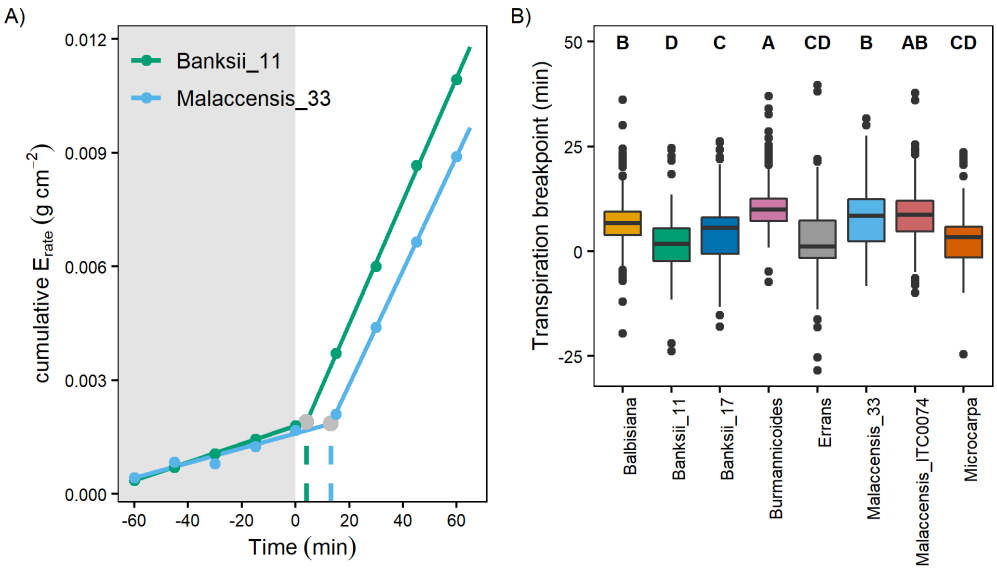
Supplemental Figure S11: Leaf temperature development across 3 wild banana genotypes during the validation phenotyping experiment. Data represent the mean ± stdev (n=4 per treatment and genotype, (P < 0.05; A>B).



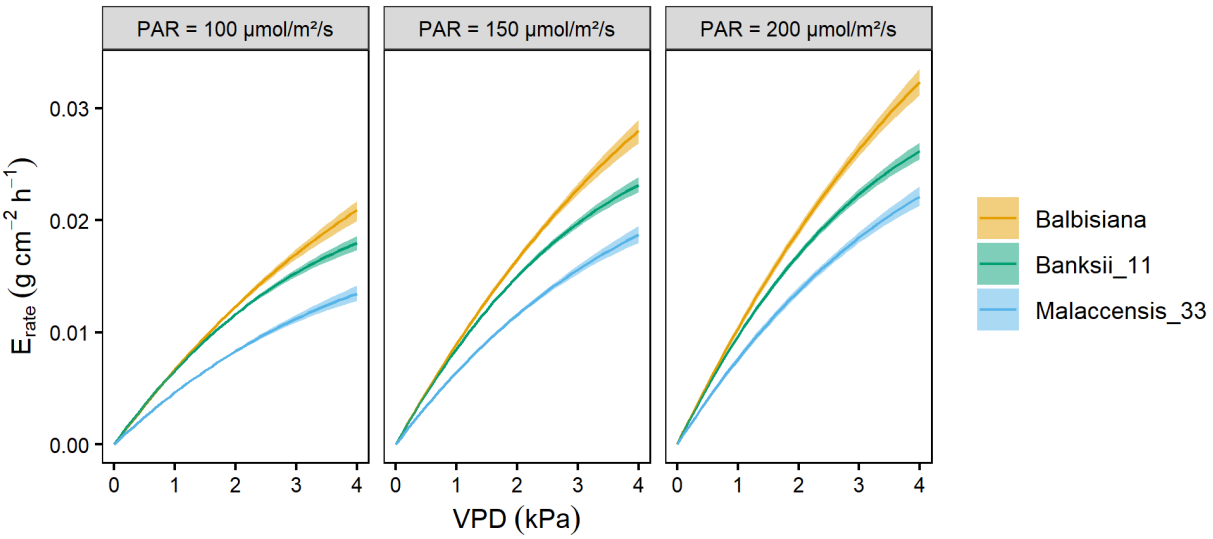
Supplemental Figure S12: Modelled transpiration rate response as a function of light intensity (PAR; photosynthetic active radiation) for the validation phenotyping experiment under well-watered conditions at three VPD levels (1 , 2 and 3 kPa). Data represent the modelled response according to Eq. 10 with 95% confidence interval.



Supplemental Figure S13: Modelled transpiration rate at light intensity of 200 and 1500 µmol m^{-2} s^{-1} are significantly correlated to mean gas exchange measurements at these light intensities for 4 wild banana genotypes (for P<0.05, ** for P<0.001, n_{PAR200}=2-5, $n_{PAR1500}$ =6-8).*



Supplemental Figure S14: Transpiration response during the first hour after light onset. (A) A breakpoint in cumulative transpiration was determined, representing the speed of transpiration rate increase. Data show two representative individuals of the genotypes M. acuminata ssp. banksii and malaccensis on a similar day. Grey bullet represents the time at which a significant increase in transpiration rate was observed. Grey areas indicate times of darkness. (B) The breakpoint in morning transpiration differed significantly in 8 wild banana genotypes ($P < 0.05$; A>B>C>D) (29 days, n=8 per genotype).



Supplemental Figure S15: Modelled transpiration rate response as a function of vapour pressure deficit (VPD) under well-watered conditions at three light levels (photosynthetic active radiation (PAR) 100 , 150 and 200 µmol m^{-2} s^{-1}). Data represent the modelled response according to Eq. 11 with 95% confidence interval.

Supplemental Figure S16: Repeated measures correlation matrix of transpiration rate (E), leaf patch clamp pressure (Pp) and climate variables (Photosynthetic active radiation, PAR ; vapour-pressure deficit, VPD; air temperature, T ; relative humidity, RH). Values above the diagonal represent significant correlation coefficients ($p < 0.05$) of well-watered plants. Values below, the significant coefficients of the water deficit plants.