

1 Supplementary Tables

2 *Supplemental Table S1: Leaf area (LA) at the start and end of the experiment, water use (WU) and transpiration efficiency (TE) of*
 3 *8 wild banana genotypes during the Phenodyn phenotyping experiment for well-watered (WW) and water deficit plants (WD).*
 4 *Data represent mean \pm se (n = 7-8). Note that at the start of the experiment plants there was not yet a separation between WW*
 5 *and WD (n=15-16). Additionally, LA at the start were obtained non-destructively by calibrating top and side view images as*
 6 *described in Eq. 1. Different letters indicate significant differences between genotypes and treatments (P < 0.05; A>B>C>D>E>F).*
 7 *G represents the genotype-effect, T the treatment effect and G x T the genotype treatment interaction (***) for P<0.001, NA; not*
 8 *applicable).*

| genotype | LA at start (m ²) | LA at end (m ²) | | WU (g H ₂ O/day) | | TE (g FW/l H ₂ O) | |
|---------------------|-------------------------------|-----------------------------|---------------|-----------------------------|----------------|------------------------------|----------------|
| | NA | WW | WD | WW | WD | WW | WD |
| Balbisiana | 0.020±0.001(E) | 0.24±0.01(G) | 0.15±0.01(HI) | 178.3±6.6(D) | 92.3±7.6(I) | 85.3±4.3(DEF) | 101.5±3.9(CDE) |
| Banksii_11 | 0.052±0.002(B) | 0.53±0.02(B) | 0.34±0.01(E) | 365.4±15.2(A) | 160.9±6.6(DEF) | 87.1±3(DEF) | 117.7±4.3(BC) |
| Banksii_17 | 0.062±0.002(A) | 0.62±0.02(A) | 0.36±0.01(E) | 359.8±19.4(A) | 147.7±8.8(DEF) | 90.8±4.4(DEF) | 113±5.9(BC) |
| Burmannicoides | 0.066±0.002(A) | 0.54±0.02(B) | 0.35±0.01(E) | 335.2±8.8(AB) | 173.7±12.9(DE) | 72.2±2.4(F) | 88.7±2.6(DEF) |
| Errans | 0.03±0.001(D) | 0.18±0.02(H) | 0.12±0.01(I) | 113.3±9(GHI) | 46.9±6.2(J) | 100±4.1(CDE) | 169.4±18.8(A) |
| Malaccensis_33 | 0.042±0.002(C) | 0.43±0.01(D) | 0.29±0.01(F) | 239.3±16.8(C) | 104±6.4(HI) | 90.6±4.9(DEF) | 123.4±6.8(B) |
| Malaccensis_ITC0074 | 0.065±0.002(A) | 0.47±0.02(C) | 0.32±0.01(EF) | 267.7±10.2(C) | 143.4±7.5(EFG) | 86.4±2.4(DEF) | 104.6±4.1(BCD) |
| Microcarpa | 0.032±0.002(D) | 0.47±0.02(CD) | 0.29±0.01(F) | 312.2±14.6(B) | 129±9.7(FGH) | 82.5±2.4(EF) | 119.1±7.4(BC) |
| G | *** | *** | | *** | | *** | |
| T | NA | *** | | *** | | *** | |
| G x T | NA | *** | | *** | | *** | |

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11 *Supplemental Table S2: Leaf area (LA) at the start and end of the experiment, water use (WU) and transpiration efficiency (TE) of*
 12 *3 wild banana genotypes during the second phenotyping experiment for well-watered (WW) and water deficit plants (WD). Data*
 13 *of LA represent mean \pm se of the second set of plants put on the balances ($n_{WW} = 4$ & $n_{WD} = 4$), data of WU and TE represent mean*
 14 *\pm se of the all plants included in the experiment ($n_{WW} = 4$ & $n_{WD} = 8$). Note that at the start of the experiment plants there was not*
 15 *yet a separation between WW and WD. Additionally, LA at the start were obtained non-destructively by calibrating top and side*
 16 *view images as described in Eq. 1. Different letters indicate significant differences between genotypes and treatments ($P < 0.05$;*
 17 *$A > B > C$). G represents the genotype-effect, T the treatment effect and G x T the genotype treatment interaction (n.s. for not*
 18 *significant, ** for $P < 0.01$, *** for $P < 0.001$; NA; not applicable).*

| genotype | LA at start (m ²) | LA at end (m ²) | | WU (g H ₂ O/day) | | TE (g FW/l H ₂ O) | |
|-----------------------|-------------------------------|-----------------------------|---------------------|-----------------------------|----------------------|------------------------------|---------------------|
| | NA | WW | WD | WW | WD | WW | WD |
| Balbisiana | 0.037 \pm 0.002 (B) | 0.60 \pm 0.06 (B) | 0.50 \pm 0.03 (B) | 175.1 \pm 16.9 (B) | 114.9 \pm 8.6 (C) | 70.1 \pm 2.8 (A) | 57.3 \pm 7 (A) |
| Banksii_11 | 0.059 \pm 0.003 (A) | 1.26 \pm 0.14 (A) | 0.67 \pm 0.04 (B) | 335.4 \pm 30.1 (A) | 125 \pm 8 (C) | 79.2 \pm 5 (A) | 72.5 \pm 11.5 (A) |
| Malaccensis_33 | 0.069 \pm 0.007 (A) | 1.33 \pm 0.10 (A) | 0.71 \pm 0.07 (B) | 325.6 \pm 15.9 (A) | 127.1 \pm 11.1 (C) | 84.6 \pm 1.4 (A) | 67.3 \pm 12.2 (A) |
| G | *** | *** | | *** | | n.s. | |
| T | NA | *** | | *** | | n.s. | |
| G x T | NA | ** | | *** | | n.s. | |

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21 *Supplemental Table S3: Parameter estimates of the Jarvis-Stewart model for both phenotyping experiments (Eq 9-12). Data*
 22 *represent the optimal parameter value and the 95% confidence interval within brackets. E_{max} represents the maximum*
 23 *transpiration rate; SWC_{crit} ; critical soil water content threshold at which transpiration rate starts to decrease; SWC_{slope} ; slope of*
 24 *transpiration rate decrease with decreasing soil water content after SWC_{crit} ; SWC_{wilt} , the soil water content at which water uptake*
 25 *and consequently transpiration is halted ; k_1 , parameter describing the sensitivity of the light response; k_2 , parameter describing*
 26 *the sensitivity of the vapour pressure deficit response.*

| genotype | E_{max} (g cm ⁻² h ⁻¹) | SWC_{crit} (g g ⁻¹) | SWC_{slope} (g cm ⁻² h ⁻¹) | SWC_{wilt} (g g ⁻¹) | k_1 | k_2 |
|---|---|-----------------------------------|---|-----------------------------------|------------------------|------------------|
| High-throughput phenotyping experiment | | | | | | |
| Balbisiana | 0.024 [0.023;0.026] | 1.10 [1.08;1.13] | 0.030 [0.028;0.32] | 0.29 [0.26;0.30] | 58.22 [51.62;65.37] | 0.31 [0.28;0.33] |
| Banksii_11 | 0.020 [0.019;0.021] | 1.18 [1.17;1.19] | 0.023 [0.022;0.024] | 0.31 [0.30;0.33] | 48.79 [43.34;54.33] | 0.29 [0.27;0.31] |
| Banksii_17.8.1 | 0.022 [0.021;0.023] | 1.20 [1.19;1.21] | 0.026 [0.025;0.028] | 0.38 [0.36;0.39] | 95.29 [85.79;104.55] | 0.27 [0.24;0.29] |
| Burmannicoides | 0.020 [0.019;0.021] | 1.21 [1.21;1.22] | 0.021 [0.020;0.022] | 0.28 [0.26;0.29] | 45.91 [39.01;52.54] | 0.24 [0.21;0.26] |
| Errans | 0.021 [0.020;0.022] | 1.38 [1.35;1.40] | 0.030 [0.029;0.032] | 0.68 [0.67;0.69] | 53.21 [46.56;59.88] | 0.24 [0.21;0.26] |
| Malaccensis_33 | 0.015 [0.015;0.016] | 1.28 [1.27;1.28] | 0.016 [0.016;0.017] | 0.34 [0.33;0.36] | 28.21 [23.14;33.08] | 0.26 [0.24;0.29] |
| Malaccensis_ITC0074 | 0.018 [0.018;0.019] | 1.23 [1.21;1.25] | 0.018 [0.017;0.020] | 0.22 [0.20;0.24] | 41.96 [33.16;51.51] | 0.20 [0.18;0.22] |
| Microcarpa | 0.024 [0.023;0.025] | 1.20 [1.19;1.21] | 0.028 [0.027;0.030] | 0.37 [0.36;0.38] | 54.56 [48.90;60.41] | 0.23 [0.21;0.26] |
| Validation phenotyping experiment | | | | | | |
| Balbisiana | 0.033 [0.032;0.035] | 1.82 [1.77;1.88] | 0.023 [0.021;0.024] | 0.35 [0.29;0.29] | 109.61 [94.43;129.82] | 0.08 [0.07;0.10] |
| Banksii_11 | 0.027 [0.026;0.028] | 2.14 [2.11;2.17] | 0.017 [0.016;0.017] | 0.53 [0.51;0.51] | 75.69 [68.22;84.38] | 0.13 [0.12;0.14] |
| Malaccensis_33 | 0.023 [0.022;0.024] | 2.06 [2.03;2.09] | 0.015 [0.015;0.016] | 0.57 [0.54;0.54] | 164.45 [133.34;203.50] | 0.11 [0.08;0.13] |

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