

Oecologia
Electronic Supplemental Material (ESM)

Online Resource 2. Leaf traits among species and groups (means \pm CI, 95%; g_s = stomatal conductance; A_{n280} = light-saturated net photosynthesis at an intercellular $[CO_2]$ of 280 $\mu\text{mol mol}^{-1}$; V_{cmax} = maximum rates of photosynthetic carboxylation; J_{max} = maximum rates of electron transport; g_1 = parameter describing the relationship between photosynthesis and stomatal conductance in combined leaf gas exchange models (see Eq 3); WUE = water use efficiency; K_p = leaf area-specific plant hydraulic conductance; LMA = leaf mass area; g_{smax} = maximum stomatal conductance calculated from stomatal density and dimensions; N_R = fractional leaf N invested in rubisco; N_B = fractional leaf N invested in bioenergetics; N_{LH} = fractional leaf N invested in light harvesting).

Group	Family	Species	g_s at	g_s change at	A_{n280}	V_{cmax}	J_{max}	g_1	WUE
			ambient $[CO_2]$	elevated $[CO_2]$					
Gymnosperms	Araucariaceae	<i>Araucaria angustifolia</i>	0.047 \pm 0.020	-13.1 \pm 10.2	2.4 \pm 1.2	16.1 \pm 4.4	n \pm n	4.04 \pm 1.61	3.92 \pm 1.29
	Cupressaceae	<i>Cupressus lusitanica</i>	0.181 \pm 0.061	-5.4 \pm 7.7	9.8 \pm 1.7	56.4 \pm 6.9	129.2 \pm 19.2	3.44 \pm 0.99	4.46 \pm 0.88
	Pinaceae	<i>Pinus patula</i>	0.245 \pm 0.077	-10.6 \pm 7.1	14.3 \pm 3.0	70.5 \pm 12.5	131.6 \pm 24.4	4.93 \pm 1.77	4.38 \pm 0.56
	Podocarpaceae	<i>Podocarpus latifolius</i>	0.112 \pm 0.032	-17.3 \pm 12.1	8.1 \pm 2.2	41.0 \pm 10.0	92.1 \pm 12.0	3.32 \pm 0.49	3.91 \pm 0.28
	Podocarpaceae	<i>Podocarpus falcatus</i>	0.081 \pm 0.022	-15.8 \pm 16.0	6.6 \pm 1.1	44.7 \pm 10.7	108.2 \pm 21.9	2.25 \pm 0.71	5.29 \pm 0.79
		Mean	0.133 \pm 0.070	-12.4 \pm 4.1	8.2 \pm 3.8	45.7 \pm 17.7	115.3 \pm 18.3	3.59 \pm 0.86	4.39 \pm 0.49
Monocots	Arecaceae	<i>Phoenix reclinata</i>	0.089 \pm 0.044	-18.8 \pm 17.9	4.2 \pm 2.3	22.1 \pm 10.3	71.2 \pm 23.3	3.49 \pm 2.22	4.15 \pm 1.28
	Poaceae	<i>Dendrocalamus giganteus</i>	0.268 \pm 0.083	-27.4 \pm 6.2	10.4 \pm 3.5	52.9 \pm 13.5	93.2 \pm 28.2	5.07 \pm 1.83	3.09 \pm 0.26
	Poaceae	<i>Bambusa vulgaris</i>	0.134 \pm 0.022	-26.2 \pm 8.8	8.3 \pm 0.6	42.7 \pm 5.4	76.5 \pm 10.0	3.60 \pm 0.68	4.09 \pm 0.96
	Heliconiaceae	<i>Heliconia sp.</i>	0.215 \pm 0.119	-41.7 \pm 8.0	11.0 \pm 3.2	57.1 \pm 10.4	106.1 \pm 15.4	2.43 \pm 0.63	4.92 \pm 1.08
	Musaceae	<i>Musa sapientum</i>	0.235 \pm 0.093	-32.7 \pm 17.9	16.0 \pm 5.6	82.2 \pm 10.5	171.9 \pm 21.5	2.67 \pm 1.31	7.88 \pm 3.95
		Mean	0.188 \pm 0.065	-29.4 \pm 7.5	10.0 \pm 3.8	51.4 \pm 19.2	103.8 \pm 35.5	3.45 \pm 0.91	4.83 \pm 1.60
Rosids	Chrysobalanaceae	<i>Macaranga kilimandscharica</i>	0.167 \pm 0.043	-22.2 \pm 3.0	9.6 \pm 3.4	52.5 \pm 13.6	103.8 \pm 19.7	3.56 \pm 0.53	3.94 \pm 0.47
	Rosaceae	<i>Prunus careta</i>	0.220 \pm 0.043	-17.8 \pm 14.7	10.3 \pm 2.2	49.3 \pm 10.0	95.6 \pm 11.2	5.11 \pm 1.12	3.46 \pm 0.69
	Myrtaceae	<i>Eucalyptus maculata</i>	0.138 \pm 0.053	-26.3 \pm 7.0	9.4 \pm 2.0	54.1 \pm 8.2	131.7 \pm 26.8	2.54 \pm 0.70	5.25 \pm 0.56
	Meliaceae	<i>Carapa grandiflora</i>	0.073 \pm 0.017	-24.2 \pm 13.8	6.5 \pm 3.0	34.6 \pm 13.7	84.9 \pm 16.1	3.17 \pm 1.85	4.97 \pm 1.51
	Meliaceae	<i>Cedrela serrate</i>	0.126 \pm 0.019	-20.2 \pm 10.3	9.9 \pm 1.8	56.3 \pm 11.4	115.8 \pm 17.3	2.49 \pm 0.31	5.98 \pm 1.53
	Malvaceae	<i>Brachychiton acerifolius</i>	0.040 \pm 0.011	-17.8 \pm 6.2	5.5 \pm 1.6	35.3 \pm 9.0	56.8 \pm 17.3	1.00 \pm 0.42	7.66 \pm 1.41
		Mean	0.127 \pm 0.052	-21.4 \pm 2.7	8.5 \pm 1.6	47.0 \pm 7.7	98.1 \pm 20.7	2.98 \pm 1.09	5.21 \pm 1.20
Asterids	Bignoniaceae	<i>Jacaranda mimosifolia</i>	0.318 \pm 0.074	-20.8 \pm 10.8	9.9 \pm 3.3	68.1 \pm 17.4	138.3 \pm 40.7	6.24 \pm 1.77	2.56 \pm 0.47
	Boraginaceae	<i>Cordia alliodora</i>	0.344 \pm 0.265	-7.8 \pm 27.8	13.1 \pm 4.4	64.1 \pm 21.8	137.4 \pm 53.7	4.39 \pm 0.86	3.80 \pm 0.62
	Oleaceae	<i>Ligustrum lucidum</i>	0.087 \pm 0.041	-34.4 \pm 7.1	9.2 \pm 3.5	51.6 \pm 20.2	99.9 \pm 22.7	1.40 \pm 0.67	7.39 \pm 1.04
	Solanaceae	<i>Cyphomandra betaceae</i>	0.242 \pm 0.056	-21.8 \pm 16.6	19.9 \pm 2.8	96.1 \pm 13.0	201.9 \pm 10.9	2.70 \pm 1.03	4.79 \pm 0.50
	Asteraceae	<i>Tithonia diversifolia</i>	0.476 \pm 0.073	-18.7 \pm 11.9	26.8 \pm 0.9	128.6 \pm 4.9	188.1 \pm 14.2	4.08 \pm 0.70	4.71 \pm 0.46
		Mean	0.293 \pm 0.125	-20.7 \pm 8.3	15.8 \pm 6.6	81.7 \pm 27.0	153.1 \pm 36.4	3.76 \pm 1.60	4.65 \pm 1.56

n = Not measured

Stomatal CO₂ responsiveness and photosynthetic capacity of tropical woody species in relation to taxonomy and functional traits

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Group	Family	Species	K_p (mmol m ⁻² s ⁻¹ MPa ⁻¹)	Stomata density (stomata mm ⁻²)	Stomatal length (μm)	Wood density (g cm ⁻³)	LMA (g m ⁻²)	g_{smax} (mol m ⁻² s ⁻¹)	N_R (%)	N_B (%)	N_{LH} (%)
Gymnosperms	Araucariaceae	<i>Araucaria angustifolia</i>	0.78 ± 0.37	68.4 ± 3.2	38.63 ± 2.76	0.51 ± 0.03	119.0 ± 18.7	1.12 ± 0.09	5.5 ± 3.6	n ± n	22.9 ± 4.8
	Cupressaceae	<i>Cupressus lusitanica</i>	1.35 ± 0.68	27.0 ± 4.2	37.58 ± 5.26	0.60 ± 0.07	315.9 ± 23.6	0.43 ± 0.12	10.3 ± 1.5	2.62 ± 0.49	13.9 ± 2.4
	Pinaceae	<i>Pinus patula</i>	2.12 ± 0.91	57.0 ± 2.4	15.64 ± 3.14	0.48 ± 0.05	172.5 ± 10.0	0.38 ± 0.04	19.3 ± 2.7	3.79 ± 0.30	19.1 ± 8.3
	Podocarpaceae	<i>Podocarpus latifolius</i>	1.32 ± 0.13	131.3 ± 8.2	36.16 ± 3.61	0.58 ± 0.04	141.8 ± 28.2	2.01 ± 0.29	13.1 ± 1.3	3.51 ± 0.68	17.4 ± 4.9
	Podocarpaceae	<i>Podocarpus falcatus</i>	0.34 ± 0.09	96.4 ± 5.7	32.98 ± 3.63	0.63 ± 0.25	120.7 ± 11.2	1.35 ± 0.18	15.4 ± 3.3	4.03 ± 0.76	17.1 ± 3.9
		Mean	1.18 ± 0.59	76.0 ± 34.8	32.20 ± 8.33	0.56 ± 0.05	174.0 ± 72.1	1.06 ± 0.60	12.7 ± 4.6	3.49 ± 0.61	18.1 ± 2.9
Monocots	Arecaceae	<i>Phoenix reclinata</i>	2.02 ± 1.32	174.9 ± 7.0	16.92 ± 1.83	0.47 ± 0.03	144.6 ± 7.6	1.25 ± 0.11	6.0 ± 2.6	2.05 ± 0.60	7.5 ± 3.5
	Poaceae	<i>Dendrocalamus giganteus</i>	4.01 ± 1.85	381.0 ± 7.6	18.19 ± 1.83	0.77 ± 0.12	39.6 ± 9.3	2.94 ± 1.18	26.3 ± 1.7	5.24 ± 0.45	18.5 ± 3.0
	Poaceae	<i>Bambusa vulgaris</i>	2.44 ± 0.56	57.1 ± 3.5	18.20 ± 2.83	0.60 ± 0.17	47.9 ± 7.5	0.44 ± 0.06	23.0 ± 1.7	4.30 ± 0.46	17.1 ± 2.8
	Heliconiaceae	<i>Heliconia sp.</i>	2.93 ± 0.95	171.6 ± 5.0	25.40 ± 2.18	n ± n	60.7 ± 5.0	1.85 ± 0.05	22.4 ± 2.9	4.57 ± 0.54	6.2 ± 0.7
	Musaceae	<i>Musa sapientum</i>	3.70 ± 1.50	138.1 ± 3.4	26.33 ± 3.38	n ± n	52.9 ± 10.4	1.54 ± 0.13	30.7 ± 6.0	6.96 ± 0.68	7.0 ± 1.3
		Mean	3.02 ± 0.73	184.5 ± 104.9	21.01 ± 3.92	0.61 ± 0.17	69.1 ± 37.6	1.60 ± 0.80	21.7 ± 8.2	4.63 ± 1.55	11.2 ± 5.3
Rosids	Chrysobalanaceae	<i>Macaranga kilimandscharica</i>	4.04 ± 2.32	203.1 ± 3.3	16.19 ± 1.81	0.49 ± 0.04	85.3 ± 12.7	1.39 ± 0.50	18.9 ± 3.6	4.67 ± 0.60	14.8 ± 2.9
	Rosaceae	<i>Prunus careta</i>	3.05 ± 0.92	228.7 ± 10.2	26.10 ± 2.24	0.72 ± 0.05	98.9 ± 23.3	2.53 ± 0.32	16.5 ± 1.6	3.59 ± 0.31	11.1 ± 3.2
	Myrtaceae	<i>Eucalyptus maculata</i>	1.88 ± 0.81	202.1 ± 4.1	26.27 ± 3.50	0.66 ± 0.02	170.6 ± 22.7	2.25 ± 0.24	19.0 ± 3.9	4.99 ± 0.46	12.8 ± 2.7
	Meliaceae	<i>Carapa grandiflora</i>	1.74 ± 1.07	783.3 ± 5.2	14.78 ± 2.25	0.53 ± 0.05	118.3 ± 13.8	4.91 ± 0.66	11.1 ± 3.6	2.69 ± 0.40	14.0 ± 2.0
	Meliaceae	<i>Cedrela serrate</i>	1.94 ± 0.63	413.5 ± 6.6	14.18 ± 1.71	0.42 ± 0.03	72.1 ± 7.8	2.48 ± 0.89	19.8 ± 1.3	4.49 ± 0.11	12.2 ± 1.5
	Malvaceae	<i>Brachychiton acerifolius</i>	0.86 ± 0.24	184.2 ± 10.8	28.43 ± 2.62	0.42 ± 0.03	92.0 ± 9.9	2.22 ± 0.35	11.7 ± 3.1	2.04 ± 0.56	12.5 ± 4.3
		Mean	2.25 ± 0.90	335.8 ± 188.1	20.99 ± 5.28	0.54 ± 0.10	106.2 ± 28.0	2.63 ± 0.95	16.2 ± 3.1	3.74 ± 0.95	12.9 ± 1.0
Asterids	Bignoniaceae	<i>Jacaranda mimosifolia</i>	5.28 ± 0.90	142.5 ± 3.0	14.14 ± 2.89	0.46 ± 0.04	119.2 ± 26.1	0.85 ± 0.07	17.2 ± 2.6	3.76 ± 0.43	6.3 ± 2.9
	Boraginaceae	<i>Cordia alliodora</i>	3.57 ± 0.90	135.0 ± 8.6	22.86 ± 4.03	0.44 ± 0.04	62.1 ± 7.3	1.31 ± 0.55	27.4 ± 7.4	6.05 ± 1.66	6.1 ± 0.8
	Oleaceae	<i>Ligustrum lucidum</i>	1.18 ± 0.69	308.8 ± 4.9	21.70 ± 2.03	0.56 ± 0.02	106.4 ± 21.3	2.84 ± 0.22	13.0 ± 4.9	2.76 ± 0.63	13.6 ± 2.5
	Solanaceae	<i>Cyphomandra betaceae</i>	4.24 ± 1.13	136.9 ± 5.9	36.79 ± 3.71	0.09 ± 0.01	63.3 ± 5.0	2.13 ± 0.54	24.4 ± 4.3	5.96 ± 0.60	10.0 ± 1.0
	Asteraceae	<i>Tithonia diversifolia</i>	5.87 ± 1.08	n ± n	n ± n	0.32 ± 0.08	37.6 ± 4.8	n ± n	51.7 ± 7.0	7.96 ± 0.50	8.5 ± 2.2
		Mean	4.03 ± 1.60	180.8 ± 83.7	23.87 ± 9.25	0.37 ± 0.16	77.7 ± 29.7	1.78 ± 0.86	26.7 ± 13.2	5.30 ± 1.80	8.9 ± 2.7

n = Not measured

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