Dynamics of leaf hydraulic conductance with water status: quantification and analysis of species differences under steady-state

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Table S1. A summary of previous studies of leaf hydraulic vulnerability on whole leaves, indicating the various methods used, the different functions fitted to the data, and whether the data were binned or not before line-fitting. *Functions were selected for apparent fit "by eye" in most studies, though two studies used maximum likelihood to select the sigmoidal over a linear function for their species and method (Johnson *et al.*, 2009a; Johnson *et al.*, 2009b).

Study	Measurement method	Function fitted*	Plot for fitting function
Kikuta et al., 1997	UAE	No function	Ψ_{lowest} unbinned
Salleo et al., 2000	UAE	No function	Ψ_{lowest} unbinned
Nardini et al., 2001	UAE/VPM	Polynomial	Ψ_{lowest} binned
Salleo et al., 2001	UAE /Visual	No function	Ψ_{lowest} unbinned
Brodribb and Holbrook, 2003a	RKM	Cumulative normal distribution	Ψ_{lowest} unbinned
Lo Gullo et al., 2003	UAE /VPM	Polynomial	Ψ_{lowest} unbinned
Nardini *et al.*, 2003	VPM/Visual	Sigmoidal	Ψ_{lowest} binned
Nardini and Salleo, 2003	UAE/HPFM	No function	Ψ_{lowest} unbinned
Salleo et al., 2003	VPM/ Visual	Polynomial	Ψ_{lowest} binned
Trifilo *et al.*, 2003a	VPM	Linear ($y = ax + b$)	Ψ_{lowest} unbinned
Trifilo *et al.*, 2003b	VPM/Visual	Linear ($y = ax + b$)	Ψ_{lowest} unbinned
Brodribb and Holbrook, 2004a	RKM	Cumulative normal distribution	Ψ_{lowest} unbinned
Brodribb and Holbrook, 2004b	RKM	Cumulative normal distribution	Ψ_{lowest} binned
Brodribb and Holbrook, 2006	RKM/ Heat-FM	Linear ($y = ax + b$) and sigmoidal ($y = a/(1 + e^{-((x-x_0)/b)})$)	Ψ_{final}
Brodribb and Holbrook, 2007	Heat-FM	Linear ($y = ax + b$) and sigmoidal ($y = a/(1 + e^{-((x-x_0)/b)})$)	Ψ_{final}
Woodruff et al., 2007	RKM	Sigmoidal ($y = a/(1 + e^{-((x-x_0)/b)})$)	Ψ_{lowest} unbinned
Hao et al., 2008	RKM	Sigmoidal	Ψ_{lowest} unbinned
Woodruff et al., 2008	RKM for K_{shoot} as proxy for K_{leaf}	Logistic ($y = a/(1 + (x/x_0)^b)$)	Ψ_{lowest} binned
Blackman et al., 2009	RKM	Sigmoidal ($y = a/(1 + e^{-((x-x_0)/b)})$)	Ψ_{lowest} unbinned
Brodribb and Cochard, 2009	Dynamic RKM	Sigmoidal ($y = a/(1 + e^{-((x-x_0)/b)})$)	Ψ_{lowest} unbinned
Chen et al., 2009	DKM	Sigmoidal ($y = a/(1 + e^{-b(x-c)})$)	Ψ_{lowest} binned
Johnson *et al.*, 2009a	UAE/RKM	Linear and sigmoidal	Ψ_{lowest} unbinned
Johnson *et al.*, 2009b	RKM	Sigmoidal ($y = a/(1 + e^{-((x-x_0)/b)})$)	Ψ_{lowest} unbinned
Saha *et al.*, 2009	RKM	No function	Ψ_{lowest} unbinned
Blackman *et al.*, 2010	Dynamic RKM	Sigmoidal ($y = a/(1 + e^{-((x-x_0)/b)})$)	Ψ_{lowest} unbinned

Abbreviations: DKM, dehydration kinetics method; Heat-FM, evaporative flux method with heat gun; HPFM, high pressure flow method; RKM, rehydration kinetics method; UAE, ultrasonic acoustic emissions; Visual, visual method using dyes (i.e., Fluorescein, Phloxine B); VPM, vacuum pump method;.

Table S2. Minimum and maximum transpirational flow rates (*E*) for each species measured with the evaporative flux method and corresponding estimated stomatal conductances (*g*), and cuticular conductances for these species. The *g* was determined by dividing by laboratory average mole fraction vapor pressure deficit (0.015 mol mol^{-1}). Means ± standard errors are reported for the five highest and five lowest *E* and *g* values for each species ($E_{highest}$, E_{lowest}, g_{higest} and g_{lowest} respectively).

Species	$E_{highest}$ ± SE ($mmol·m^{-2}·s^{-1}$)	E_{lowest} ± SE ($mmol·m^{-2}·s^{-1}$)	$g_{highest}$ ($mmol·m^{-2}·s^{-1}$)	g_{lowest} ($mmol·m^{-2}·s^{-1}$)	g_{min}^{*} ($mmol·m^{-2}·s^{-1}$)
Camellia sasanqua	1.52 ± 0.091	0.453 ± 0.047	101 ± 6.70	30.2 ± 3.14	1.77 ± 0.13
Cercocarpus betuloides	2.82 ± 0.199	0.300 ± 0.037	188 ± 13.2	20.0 ± 2.48	3.99 ± 0.41
Comarostaphylos diversifolia	2.28 ± 0.056	0.314 ± 0.087	152 ± 3.73	20.9 ± 5.78	2.87 ± 0.35
Hedera canariensis	2.30 ± 0.111	0.226 ± 0.032	153 ± 7.43	15.04 ± 2.15	0.44 ± 0.03
Helianthus annuus	4.30 ± 0.191	0.618 ± 0.089	286 ± 12.7	41.2 ± 5.95	18.3 ± 1.92
Heteromeles arbutifolia	5.57 ± 0.087	0.156 ± 0.023	384 ± 5.80	10.4 ± 1.50	4.21 ± 1.22
Lantana camara	4.73 ± 0.116	0.618 ± 0.088	315 ± 7.70	41.2 ± 5.88	12.0 ± 0.85
Magnolia grandiflora	1.51 ± 0.146	0.286 ± 0.041	100 ± 9.76	19.1 ± 2.72	3.88 ± 0.41
Platanus racemosa	2.66 ± 0.170	0.545 ± 0.150	177 ± 11.4	36.3 ± 10.0	6.61 ± 0.41
Quercus agrifolia	1.14 ± 0.074	0.152 ± 0.006	76.0 ± 4.96	10.1 ± 0.43	1.72 ± 0.23

* data from Scoffoni *et al.*, 2011

Table S3. Parameters for the decline of leaf hydraulic conductance (K_{leaf}) with declining leaf water potential for 10 species fitted with four different functions, R^2 for observed values plotted against predicted values from the fitted function, and values for Akaike Information Criterion (AIC). For each function, three plots were tested for K_{leaf} against leaf water potential: (1) "Ψ_{lowest} unbinned", (2) "Ψ_{lowest} binned", (3) and "Ψ_{final}" (see "*Methods*" for additional information). Bold and grey shading indicate the best fit model(s) for each plot for each species. Cells were left blank when the maximum likelihood parameters were extremely large or small values.

Species	Plot	LINEAR: $K_{leaf} = a\,\Psi_{leaf} + y_o$				SIGMOIDAL: $K_{leaf} = a/(1+e^{-(\frac{\Psi_{leaf}-x_0}{b})})$					LOGISTIC: $K_{leaf} = a/(1+(\frac{\Psi_{leaf}}{x_0})^b)$					EXPONENTIAL: $K_{leaf} = y_0 + ae^{-b\times\Psi_{leaf}}$				
		a	y_0	r^2	AIC	a	b	x_0	r^2	AIC	a	B	x_0	r^2	AIC	a	b	y_0	r^2	AIC
C. betuloides	(1)	**-0.60±0.07**	**4.01±0.25**	**0.49**	**217.24**	**7.09±5.76**	**-2.16±1.06**	**1.01±3.53**	**0.52**	**215.81**	**4.02±0.49**	**2.06±0.76**	**2.94±0.54**	**0.51**	**216.56**	**5.24±1.38**	**0.23±0.13**	**-0.66±1.59**	**0.52**	**216.14**
	(2)	**-0.56±0.08**	**4.00±0.30**	**0.78**	**28.15**						4.43±0.82	1.14±0.59	2.59±0.92	0.82	30.84	4.58±1.11	0.27±0.18	0.02±1.36	0.83	30.36
	(3)	-1.46 ±0.27	3.31±0.25	0.29	240.75						**9.43±14.1**	**0.82±0.49**	**0.13±0.42**	**0.38**	**234.25**	**4.36±0.74**	**1.72±0.90**	**0.59±0.65**	**0.36**	**235.55**
C. diversifolia	(1)	**-0.52±0.06**	**2.96±1.78**	**0.54**	**130.60**	3.09±1.49	-1.32±0.10	2.81±1.71	0.53	134.94	7.06±12.6	0.60±0.47	0.23±0.13	0.52	136.01					
	(2)	**-0.53±0.08**	**2.95±0.24**	**0.80**	**19.08**	2.55±0.47	-0.83±0.50	3.30±0.50	0.59	27.21	2.33±0.21	5.56±2.82	3.44±0.28	0.78	25.75					
	(3)	-0.50± 0.06	2.62±0.12	0.64	116.45						**5.13±1.80**	**1.08±0.27**	**0.49±0.33**	**0.74**	**101.97**	**3.70±0.38**	**0.91±0.23**	**0.22±0.21**	**0.73**	**103.32**
H. arbutifolia	(1)	**-4.02±0.42**	**20.7±1.22**	**0.61**	**350.53**	34.7±34.1	-1.73±0.95	0.87±3.45	0.60	354.64	22.3 ±3.95	1.52±0.57	1.95±0.68	0.58	357.58	56.8±82.0	0.09±0.16	-35.3±83.4	0.61	352.534
	(2)	**-3.94±0.41**	**20.2±0.53**	**0.84**	**56.74**	54.9±163	-2.06±0.79	-0.79±10.2	0.82	63.97	23.0±5.63	1.40±0.59	1.73±0.84	0.80	65.19	63.8±156	0.07±0.22	-42.9±158	0.84	62.64
	(3)	**-19.2±4.44**	**17.0±1.71**	**0.24**	**389.29**						**20.8 ±7.11**	**1.61±0.78**	**0.29±0.14**	**0.28**	**389.02**	**22.0±4.78**	**3.29±2.39**	**1.97±5.15**	**0.27**	**389.17**
H. canariensis	(1)	-1.53±0.18	3.79±0.30	0.63	121.51	**26.7±53.3**	**-0.59±0.15**	**-0.60±0.15**	**0.87**	**79.75**	**5.74±0.57**	**2.27±0.34**	**0.64±0.08**	**0.88**	**79.13**	**7.49±0.57**	**1.55±0.21**	**0.05±0.21**	**0.88**	**79.92**
	(2)	**-1.61±0.39**	**4.06±0.69**	**0.74**	**33.21**						**5.88±0.22**	**2.24±0.12**	**0.63±0.03**	**0.999**	**31.95**	**8.10±0.19**	**1.73±0.07**	**0.15±0.05**	**0.999**	**31.30**
	(3)	-1.71±0.24	3.68±0.33	0.56	129.08	**15.7±16.8**	**-0.45±0.13**	**-0.08±0.80**	**0.83**	**91.89**	**5.75±0.63**	**2.53±0.44**	**0.60±0.07**	**0.84**	**91.06**	**7.98±0.73**	**1.73±0.27**	**-0.06±0.07**	**0.83**	**92.45**
Q. agrifolia	(1)	**-0.83±0.12**	**3.96±0.29**	**0.49**	**141.72**	**3.99±0.82**	**-0.93±0.43**	**2.39±0.53**	**0.50**	**143.46**	**3.45±0.28**	**3.77±1.53**	**2.61±0.24**	**0.50**	**143.55**					
	(2)	**-0.78±0.16**	**3.95±0.42**	**0.75**	**26.96**	3.76±0.87	-0.88±0.54	2.71±0.63	0.76	35.68	3.37±0.35	4.21±2.07	2.86±0.33	0.77	35.39					
	(3)	-0.86±0.25	2.68±0.22	0.20	162.96	**3.17±0.60**	**-0.09±0.08**	**0.37±0.05**	**0.32**	**157.64**	**2.98±0.28**	**4.94±2.93**	**0.37±0.05**	**0.32**	**157.50**	**3.77±0.83**	**2.07±0.92**	**0.04±0.70**	**0.31**	**158.56**
C. sansanqua	(1)	**-1.69±0.33**	**5.99±0.52**	**0.39**	**160.18**	**5.53±0.78**	**-0.54±0.24**	**1.93±0.23**	**0.41**	**161.08**	**5.26±0.48**	**3.49±1.44**	**1.94±0.20**	**0.42**	**160.93**					
	(2)	**-1.90 ±0.29**	**-6.22±0.48**	**0.88**	**28.43**	5.46±0.46	-0.47±0.12	1.90±0.14	0.94	54.56	5.27±0.32	3.93±0.98	1.88±0.13	0.94	54.4					
	(3)	-3.36±0.78	4.98±0.40	0.31	168.09						**13.8±13.2**	**1.05±0.54**	**0.10±0.18**	**0.54**	**153.60**	**8.95±1.54**	**4.09±1.52**	**0.86±0.90**	**0.54**	**154.24**
H. annuus	(1)	-4.63±0.76	7.50±0.73	0.51	153.57	**7.41±2.06**	**-0.24±0.12**	**0.78±1.17**	**0.58**	**150.94**	**6.45±0.75**	**4.15±1.45**	**0.83±0.08**	**0.59**	**149.49**	11.71±1.80	1.17±0.72	-1.20±2.61	0.55	152.99
	(2)	**-3.88±0.82**	**6.80±0.88**	**0.76**	**34.45**	6.17±1.10	-0.19±0.11	0.88±0.10	0.86	44.68	5.83±0.59	4.96±1.80	0.88±0.07	0.88	43.47	10.83±2.49	0.92±0.75	-1.82±3.66	0.81	46.98
	(3)	-4.28±0.92	6.64±0.77	0.38	162.26	**5.61±0.76**	**-0.13±0.07**	**0.79±0.07**	**0.44**	**160.78**	**5.48±0.58**	**5.72±2.55**	**0.79±0.07**	**0.46**	**159.77**	11.1±5.66	0.74±0.86	-3.18±6.96	0.39	164.01
L. camara	(1)	-5.40±0.52	10.8±0.67	0.81	103.21	**34.6±55.5**	**-0.61±0.21**	**-0.19±1.54**	**0.89**	**91.66**	**11.4±1.44**	**2.43±0.49**	**0.80±0.12**	**0.89**	**91.17**	**16.4±1.33**	**1.31±0.36**	**-0.20±1.19**	**0.89**	**91.89**
	(2)	**-5.12±0.74**	**10.6±1.01**	**0.90**	**44.53**	38.5±13.3	-0.63±0.04	-0.29±0.33	0.999	Inf	11.4±0.06	2.45±0.02	0.81±0.01	0.999	Inf	16.50±0.35	1.29±0.09	-0.23±0.28	0.998	Inf
	(3)	**-5.27±1.16**	**8.71±1.04**	**0.44**	**130.84**	**7.73±2.03**	**-0.23±0.16**	**0.87±0.18**	**0.47**	**132.46**	**7.11±0.96**	**4.31±2.32**	**0.89±0.13**	**0.47**	**132.22**	17.1±19.1	0..49±0.93	-7.35±21.0	0.45	133.36
M. grandiflora	(1)	-0.58±0.08	2.54±0.19	0.40	194.76						**5.24±2.62**	**0.87±0.29**	**0.42±0.50**	**0.48**	**187.02**	3.22±0.63	1.14±0.67	0.68±0.33	0.46	189.47
	(2)	**-0.55±0.10**	**2.47±0.28**	**0.76**	**21.07**						**21.4±34.6**	**0.75±0.13**	**0.03±0.09**	**0.89**	**20.94**	3.33±0.48	0.71±0.41	0.22±0.49	0.86	23.66
	(3)	-0.68±0.11	2.06±0.16	0.32	203.52											**7.43±1.50**	**4.49±0.94**	**0.64±0.15**	**0.67**	**153.15**
P. racemosa	(1)	-3.25±0.63	7.28±0.90	0.46	154.75						**34.1±23.2**	**1.06±0.23**	**0.09±0.11**	**0.82**	**121.24**	19.45±2.73	3.39±0.64	1.53±0.38	0.81	123.73
	(2)	**-2.87±0.83**	**7.08±1.42**	**0.66**	**40.80**											20.2±6.28	2.89±0.95	1.06±0.41	0.95	58.91
	(3)	-4?92±1.08	6.73±0.90	0.39	158.119											**20.4±5.97**	**6.41±2.33**	**1.63±0.58**	**0.69**	**139.85**