

Supplementary Figure S1. Correlation between stem water potential measured with stems psychrometers and covered leaves in a pressure chamber for three species, *Eucalyptus saligna* (black circles), *Eucalyptus crebra* (black circles), *Quercus palustis* (green circles), during experimental dehydration. A standardized major axis model fit to pooled dataset (dashed line) did not differ from the 1:1 relationship (solid line).

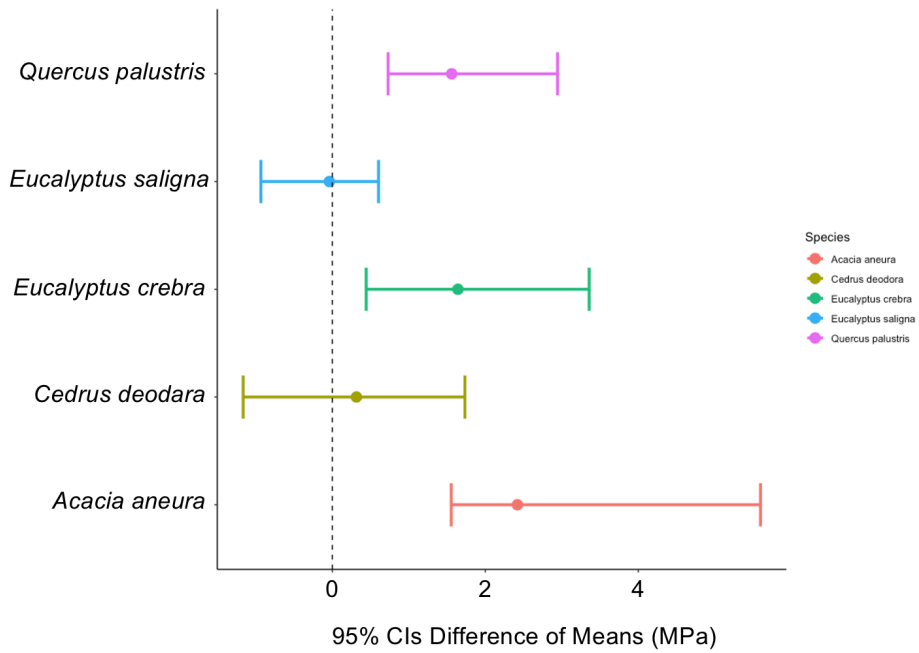


Figure S2. Difference of means for root and shoot P50 of five woody plant species. Bars show 95% confidence intervals for difference of means. Where 95% CIs overlap with zero, there is no significant difference between root and stem P50 for that species.

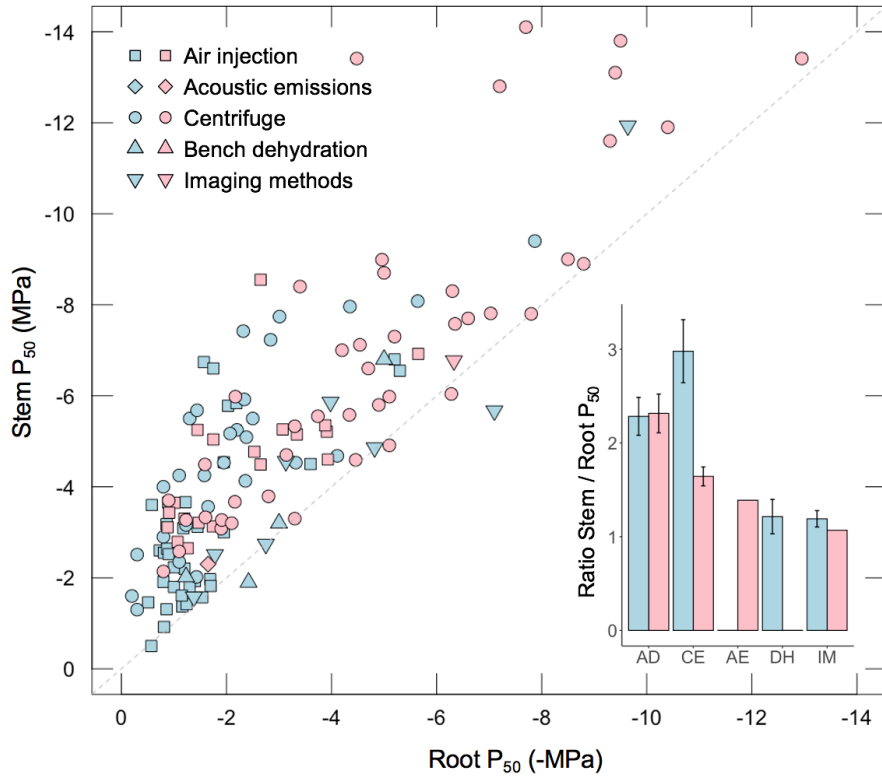


Figure S3. Data synthesis showing the relationship between stem and root P_{50} values based on previously published studies. Data are shown for a total of 87 species with 67 independent populations for angiosperms (blue) and 64 populations for conifers (pink) measured in studies published between 1994 and 2018. Within each group, methodology used to measure vulnerability is shown by symbol. The dashed line shows the 1:1 relationship. Inset shows the ratio stem to root P_{50} within a plant as a function of methodology (AD = air injection, CE = centrifuge, AE = acoustic emissions, DH = bench dehydration, IM = imaging methods). Data and references used in this analysis are provided in Table S1.

Table S1. Values of water potential at 50% loss of hydraulic conductivity (P_{50}) for roots and stems, including method (DH = dehydration, CE = centrifuge, AD = air-injection, AE = acoustic emissions, IM=imaging) and wood porosity type (diffuse-porous, semi-ring-porous, ring porous, vesseless). Data were taken from the Xylem Functional Traits database (Choat et al. 2012), updated from papers published between 2012-present.

Group	Species	Root P_{50} (MPa)	Stem P_{50} (MPa)	Method	Porosity	Reference
Angiosperm	<i>Acacia aneura</i>	-9.64	-11.93	IM	diffuse-porous	Peters et al. in review
Angiosperm	<i>Acer grandidentatum</i>	-1.22	-3.66	AD	diffuse-porous	Alder et al. 1996
Angiosperm	<i>Acer grandidentatum</i>	-0.58	-3.60	AD	diffuse-porous	Alder et al. 1996
Angiosperm	<i>Acer grandidentatum</i>	-0.80	-4.00	CE	diffuse-porous	Sperry & Hacke 2004
Angiosperm	<i>Acer monspessulanum</i>	-1.57	-6.74	AD	diffuse-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Acer pseudoplatanus</i>	-1.78	-2.51	IM	diffuse-porous	Losso et al. 2019
Angiosperm	<i>Acer rubrum</i>	-1.69	-1.97	AD	diffuse-porous	Maherali et al. 2006
Angiosperm	<i>Acer saccharum</i>	-2.42	-1.90	DH	diffuse-porous	Tsuda & Tyree 1997
Angiosperm	<i>Alnus glutinosa</i>	-1.20	-2.20	AD	diffuse-porous	Hacke & Sauter 1996
Angiosperm	<i>Alnus incana</i>	-0.20	-1.60	CE	diffuse-porous	Hacke et al. 2001
Angiosperm	<i>Ambrosia dumosa</i>	-0.81	-2.55	AD	ring-porous	Mencuccini & Comstock 1997
Angiosperm	<i>Arbutus unedo</i>	-1.18	-3.09	AD	semi-ring-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Atriplex canescens</i>	-1.30	-5.50	CE	diffuse-porous	Hacke et al. 2000a
Angiosperm	<i>Atriplex confertifolia</i>	-1.58	-4.25	CE	diffuse-porous	Sperry & Hacke 2002
Angiosperm	<i>Betula occidentalis</i>	-0.51	-1.46	AD	diffuse-porous	Sperry & Saliendra 1994
Angiosperm	<i>Betula occidentalis</i>	-1.10	-2.35	CE	diffuse-porous	Alder et al. 1997
Angiosperm	<i>Betula occidentalis</i>	-0.30	-1.30	CE	diffuse-porous	Hacke et al. 2001
Angiosperm	<i>Blepharocalyx salicifolius</i>	-1.40	-1.93	AD	diffuse-porous	Domec et al. 2006a
Angiosperm	<i>Ceanothus crassifolius</i>	-7.87	-9.40	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Ceanothus crassifolius</i>	-2.84	-7.23	CE	semi-ring-porous	Pratt et al. 2008

Angiosperm	<i>Ceanothus cuneatus</i>	-4.35	-7.96	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Ceanothus cuneatus</i>	-3.01	-7.74	CE	semi-ring-porous	Pratt et al. 2008
Angiosperm	<i>Ceanothus leucodermis</i>	-1.65	-3.56	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Ceanothus leucodermis</i>	-3.32	-4.53	CE	semi-ring-porous	Pratt et al. 2008
Angiosperm	<i>Ceanothus megacarpus</i>	-5.64	-8.08	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Ceanothus megacarpus</i>	-2.32	-7.42	CE	semi-ring-porous	Pratt et al. 2008
Angiosperm	<i>Ceanothus oliganthus</i>	-2.36	-4.13	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Ceanothus oliganthus</i>	-1.95	-4.53	CE	semi-ring-porous	Pratt et al. 2008
Angiosperm	<i>Ceanothus spinosus</i>	-4.11	-4.68	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Ceanothus spinosus</i>	-1.23	-3.16	CE	semi-ring-porous	Pratt et al. 2008
Angiosperm	<i>Cercis canadensis</i>	-0.90	-2.52	AD	semi-ring-porous	Maherali et al. 2006
Angiosperm	<i>Chrysothamnus nauseosus</i>	-0.80	-2.90	CE	diffuse-porous	Hacke et al. 2000a
Angiosperm	<i>Chrysothamnus viscidiflorus</i>	-1.10	-4.25	CE	diffuse-porous	Hacke et al. 2000a
Angiosperm	<i>Cistus albidus</i>	-2.03	-5.78	AD	diffuse-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Cistus laurifolius</i>	-0.89	-3.65	AD	semi-ring-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Cornus florida</i>	-2.19	-5.84	AD	diffuse-porous	Maherali et al. 2006
Angiosperm	<i>Dispyros texana</i>	-5.20	-6.80	AD	diffuse-porous	Johnson 2018
Angiosperm	<i>Eucalyptus crebra</i>	-3.98	-5.86	IM	diffuse-porous	Peters et al. in review
Angiosperm	<i>Eucalyptus saligna</i>	-4.82	-4.86	IM	diffuse-porous	Peters et al. in review
Angiosperm	<i>Fagus sylvatica</i>	-2.75	-2.74	IM	diffuse-porous	Losso et al. 2019
Angiosperm	<i>Grayia spinosa</i>	-2.20	-5.25	CE	diffuse-porous	Hacke et al. 2000a
Angiosperm	<i>Hymenoclea salsola</i>	-0.87	-2.64	AD	ring-porous	Mencuccini & Comstock 1997
Angiosperm	<i>Ilex aquifolium</i>	-1.75	-6.60	AD	diffuse-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Kielmeyera coriacea</i>	-0.80	-1.91	AD	diffuse-porous	Domec et al. 2006a
Angiosperm	<i>Liquidambar styraciflua</i>	-1.45	-3.12	AD	diffuse-porous	Maherali et al. 2006
Angiosperm	<i>Nyssa sylvatica</i>	-1.70	-1.82	AD	diffuse-porous	Maherali et al. 2006
Angiosperm	<i>Olea europaea</i>	-7.10	-5.67	IM	diffuse-porous	Rodriguez-Dominguez et al. 2018

Angiosperm	<i>Oxydendrum arboreum</i>	-1.95	-4.54	AD	semi-ring-porous	Maherali et al. 2006
Angiosperm	<i>Phillyrea latifolia</i>	-5.30	-6.55	AD	diffuse-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Populus balsamifera</i>	-1.00	-1.80	AD	diffuse-porous	Hacke & Sauter 1996
Angiosperm	<i>Prosopis velutina</i>	-1.95	-3.00	AD	diffuse-porous	Hultine et al. 2006
Angiosperm	<i>Prosopis velutina</i>	-1.54	-1.57	AD	diffuse-porous	Hultine et al. 2006
Angiosperm	<i>Prosopis glandulosa</i>	-3.60	-4.50	AD	diffuse-porous	Johnson 2018
Angiosperm	<i>Qualea parviflora</i>	-1.00	-2.23	AD	diffuse-porous	Domec et al. 2006a
Angiosperm	<i>Quercus alba</i>	-1.16	-1.37	AD	ring-porous	Maherali et al. 2006
Angiosperm	<i>Quercus falcata</i>	-0.81	-0.92	AD	ring-porous	Maherali et al. 2006
Angiosperm	<i>Quercus fusiformis</i>	-1.30	-1.80	AD	ring-porous	Johnson 2018
Angiosperm	<i>Quercus fusiformis</i>	-0.57	-0.50	AD	ring-porous	McElrone et al. 2004
Angiosperm	<i>Quercus ilex</i>	-1.23	-2.02	DH	diffuse-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Quercus ilex</i>	-5.00	-6.80	DH	ring-porous	Rodriguez-calcerrada 2016
Angiosperm	<i>Quercus nigra</i>	-0.86	-1.31	AD	ring-porous	Maherali et al. 2006
Angiosperm	<i>Quercus palustris</i>	-3.13	-4.56	IM	diffuse-porous	Peters et al. in review
Angiosperm	<i>Quercus phellos</i>	-1.24	-1.42	AD	ring-porous	Maherali et al. 2006
Angiosperm	<i>Quercus rubra</i>	-1.15	-1.61	AD	ring-porous	Maherali et al. 2006
Angiosperm	<i>Rhamnus californica</i>	-0.30	-2.51	CE	diffuse-porous	Pratt et al. 2007a, b
Angiosperm	<i>Rhamnus californica</i>	-1.43	-2.02	CE	diffuse-porous	Pratt et al. 2008
Angiosperm	<i>Rhamnus crocea</i>	-2.07	-5.17	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Rhamnus crocea</i>	-1.44	-5.68	CE	semi-ring-porous	Pratt et al. 2008
Angiosperm	<i>Rhamnus ilicifolia</i>	-2.34	-5.92	CE	semi-ring-porous	Pratt et al. 2007a, b
Angiosperm	<i>Rhamnus ilicifolia</i>	-2.38	-5.09	CE	semi-ring-porous	Pratt et al. 2008
Angiosperm	<i>Sideroxylon lanuginosum</i>	-0.73	-2.60	AD	diffuse-porous	McElrone et al. 2004
Angiosperm	<i>Solanum lycopersicum</i>	-1.38	-1.58	IM		Skelton et al. 2017
Angiosperm	<i>Sorbus torminalis</i>	-0.86	-3.18	AD	diffuse-porous	Martinez-Vilalta et al. 2002
Angiosperm	<i>Tetradymia glabrata</i>	-2.50	-5.50	CE	diffuse-porous	Hacke et al. 2000a

Angiosperm	<i>Ulmus minor</i>	-3.00	-3.20	DH	ring-porous	Rodriguez-calcerrada 2016
Gymnosperm	<i>Abies balsamea</i>	-2.80	-3.79	CE	vesselless	Hacke & Jansen 2009
Gymnosperm	<i>Abies balsamea</i>	-1.60	-3.33	CE	vesselless	Hacke & Jansen 2009
Gymnosperm	<i>Abies balsamea</i>	-1.59	-4.49	CE	vesselless	Hacke & Jansen 2009
Gymnosperm	<i>Abies concolor</i>	-3.40	-8.40	CE	vesselless	Hacke et al. 2004
Gymnosperm	<i>Abies lasiocarpa</i>	-3.30	-3.30	CE	vesselless	Hacke et al. 2004
Gymnosperm	<i>Abies lasiocarpa</i>	-3.14	-4.70	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Agathis australis</i>	-1.10	-2.58	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Cedrus deodara</i>	-6.33	-6.77	IM	vesselless	Peters et al. in review
Gymnosperm	<i>Dacrydium cupressiformis</i>	-1.90	-3.08	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Juniperus arizonica</i>	-9.50	-13.80	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus ashei</i>	-12.95	-13.41	CE	vesselless	McElrone et al. 2004
Gymnosperm	<i>Juniperus ashei</i>	-4.48	-13.41	CE	vesselless	McElrone et al. 2004
Gymnosperm	<i>Juniperus ashei</i>	-9.40	-13.10	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus barbadensis</i>	-7.20	-12.80	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus deppeana</i>	-8.80	-8.90	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus flaccida</i>	-7.80	-7.80	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus lucayana</i>	-6.30	-8.30	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus maritima</i>	-6.35	-7.58	CE	vesselless	Ogle et al 2009
Gymnosperm	<i>Juniperus monosperma</i>	-9.30	-11.60	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus occidentalis</i>	-8.50	-9.00	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus osteosperma</i>	-5.65	-6.92	AD	vesselless	Linton et al. 1998
Gymnosperm	<i>Juniperus osteosperma</i>	-7.03	-7.81	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Juniperus osteosperma</i>	-10.40	-11.90	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus pinchotii</i>	-7.70	-14.10	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus scopulorum</i>	-5.20	-7.30	CE	vesselless	Hacke et al. 2004
Gymnosperm	<i>Juniperus scopulorum</i>	-4.96	-8.99	CE	vesselless	Ogle et al 2009

Gymnosperm	<i>Juniperus scopulorum</i>	-6.60	-7.70	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus virginiana</i>	-4.54	-7.12	CE	vesselless	Maherali et al. 2006
Gymnosperm	<i>Juniperus virginiana</i>	-4.90	-5.80	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Juniperus virginiana</i>	-4.70	-6.60	CE	vesselless	Willson et al. 2008
Gymnosperm	<i>Picea engelmannii</i>	-5.10	-4.91	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Picea engelmannii</i>	-5.00	-8.70	CE	vesselless	Hacke et al. 2004
Gymnosperm	<i>Picea mariana</i>	-4.46	-4.59	CE	vesselless	Hacke & Jansen 2009
Gymnosperm	<i>Picea mariana</i>	-3.30	-5.33	CE	vesselless	Hacke & Jansen 2009
Gymnosperm	<i>Picea mariana</i>	-2.17	-5.98	CE	vesselless	Hacke & Jansen 2009
Gymnosperm	<i>Picea mariana</i>	-5.10	-5.98	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Pinus caribaea</i>	-1.91	-3.27	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Pinus contorta</i>	-2.16	-3.67	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Pinus echinata</i>	-1.47	-3.21	AD	vesselless	Maherali et al. 2006
Gymnosperm	<i>Pinus edulis</i>	-4.20	-7.00	CE	vesselless	Hacke et al. 2004
Gymnosperm	<i>Pinus halepensis</i>	-0.88	-3.11	AD	vesselless	Oliveras et al. 2003
Gymnosperm	<i>Pinus monophylla</i>	-3.74	-5.55	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Pinus pinea</i>	-1.01	-3.65	AD	vesselless	Oliveras et al. 2003
Gymnosperm	<i>Pinus ponderosa</i>	-1.26	-2.65	AD	vesselless	Domec et al. 2004
Gymnosperm	<i>Pinus ponderosa</i>	-1.07	-2.79	AD	vesselless	Stout & Sala 2003
Gymnosperm	<i>Pinus ponderosa</i>	-0.91	-3.43	AD	vesselless	Stout & Sala 2003
Gymnosperm	<i>Pinus sylvestris</i>	-1.65	-2.30	AE	vesselless	Mencuccini et al 1997
Gymnosperm	<i>Pinus taeda</i>	-1.74	-3.13	AD	vesselless	Maherali et al. 2006
Gymnosperm	<i>Pinus taeda</i>	-1.23	-3.27	CE	vesselless	Ewers et al. 2000
Gymnosperm	<i>Pinus taeda</i>	-2.10	-3.20	CE	vesselless	Hacke et al. 2000b
Gymnosperm	<i>Pinus taeda</i>	-0.90	-3.70	CE	vesselless	Hacke et al. 2000b
Gymnosperm	<i>Prumnopitys ferruginea</i>	-4.34	-5.58	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Pseudotsuga menziesii</i>	-1.20	-3.30	AD	vesselless	Domec et al. 2006b, 2009

Gymnosperm	<i>Pseudotsuga menziesii</i>	-3.91	-5.21	AD	vesselless	Kavanagh et al. 1999
Gymnosperm	<i>Pseudotsuga menziesii</i>	-3.88	-5.35	AD	vesselless	Kavanagh et al. 1999
Gymnosperm	<i>Pseudotsuga menziesii</i>	-3.34	-5.15	AD	vesselless	Kavanagh et al. 1999
Gymnosperm	<i>Pseudotsuga menziesii</i>	-3.07	-5.26	AD	vesselless	Kavanagh et al. 1999
Gymnosperm	<i>Pseudotsuga menziesii</i>	-2.53	-4.77	AD	vesselless	Kavanagh et al. 1999
Gymnosperm	<i>Pseudotsuga menziesii</i>	-3.93	-4.60	AD	vesselless	Sperry & Ikeda 1997
Gymnosperm	<i>Pseudotsuga menziesii</i>	-1.75	-5.04	AD	vesselless	Sperry & Ikeda 1997
Gymnosperm	<i>Pseudotsuga menziesii</i>	-2.65	-4.49	AD	vesselless	Stout & Sala 2003
Gymnosperm	<i>Pseudotsuga menziesii</i>	-1.45	-5.25	AD	vesselless	Stout & Sala 2003
Gymnosperm	<i>Sequoia sempervirens</i>	-6.28	-6.04	CE	vesselless	Pittermann et al. 2006a, b
Gymnosperm	<i>Taxodium distichum</i>	-0.80	-2.14	CE	vesselless	Pittermann et al. 2006a, b

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