

Supplementary information

Plastic adjustments in xylem vessel traits to drought events in three *Cedrela* species from Peruvian Tropical Andean forests

Ernesto C. Rodríguez–Ramírez^{1*}, M. Eugenia Ferrero², Ingrith Acevedo–Vega¹, Doris B. Crispin–DelaCruz^{1,3}, Ginette Ticse–Otarola¹ and Edilson J. Requena–Rojas¹

¹Laboratorio de Dendrocronología, Universidad Continental, Urbanización San Antonio, Avenida San Carlos 1980, Huancayo, Junín, Perú.

²Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales (IANIGLA), CONICET, Avenida Ruiz Leal S/N, Mendoza, Argentina.

³Programa de Pós-Graduação em Ciências Florestais, Universidade Federal Rural de Pernambuco, Recife 52171-900, Brazil.

* Corresponding authors: Ernesto C. Rodríguez–Ramírez (erodriguezr@continental.edu.pe).

Table S1. Growth-ring statistics for *Cedrela* species at the three study sites in Peruvian Tropical Andean cloud forests.

	<i>Cedrela fissilis</i>	<i>Cedrela nebulosa</i>	<i>Cedrela angustifolia</i>
Timespan	1896-2015	1958-2016	1923-2016
Series intercorrelation	0.41	0.49	0.56
Tree samples	15	17	37
EPS	0.821	0.817	0.810
Rbar	0.193	0.207	0.420

Table S2. GLMM with Gaussian distribution statistical analysis results between vessel traits and climate factors.

Cedrela fissilis

Climate and environmental factors	Vessel traits											
	<i>D</i>			<i>V_D</i>			<i>VI</i>			<i>D_H</i>		
	β	<i>P</i>	AICc	β	<i>P</i>	AICc	β	<i>P</i>	AICc	β	<i>P</i>	AICc
EvT	0.005	0.018*		-0.004	0.324		0.004	0.049*		-0.005	0.080**	
T _{max}	0.545	0.040**	53.70	0.000	0.000	70.55	-0.960	0.006*	44.70	0.000	0.000	69.50
Prec	0.000	0.000		-0.001	0.762		0.000	0.000		0.001	0.546	

Cedrela nebulosa

Climate and environmental factors	Vessel traits											
	<i>D</i>			<i>V_D</i>			<i>VI</i>			<i>D_H</i>		
	β	<i>P</i>	AICc	β	<i>P</i>	AICc	β	<i>P</i>	AICc	β	<i>P</i>	AICc
EvT	-0.002	0.047		-0.006	0.069**		0.001	0.098		0.000	0.000	
T _{max}	0.837	0.017*	54.50	0.000	0.000	68.40	0.199	0.285	45.60	-0.648	0.221	64.40
Prec	0.000	0.000		0.098	0.367		0.000	0.000		0.001	0.804	

Cedrela angustifolia

Climate and environmental factors	Vessel traits											
	<i>D</i>			<i>V_D</i>			<i>VI</i>			<i>D_H</i>		
	β	<i>P</i>	AICc	β	<i>P</i>	AICc	β	<i>P</i>	AICc	β	<i>P</i>	AICc
EvT	-0.002	0.188		-0.006	0.069**		0.001	0.143		0.000	0.000	
T _{max}	0.747	0.025*	44.75	0.000	0.000	69.78	0.120	0.345	36.50	-0.538	0.189	64.40
Prec	0.000	0.000		0.001	0.246		0.000	0.000		0.001	0.705	

*= $P < 0.01$; **= $P < 0.05$

Study area and location of sampling sites

- 1) Mamac locality, Mariscal Castilla District, Concepcion Province, Junin Department (11° 32'38''S, 75°8'47''W, 2588 m a.s.l.), average annual precipitation of ~925 mm and an average temperature of 10.1°C (Figure. S1B). The study site is located in southeast-facing steep slopes (35°) with a tree layer dominated by *Cedrela fissilis* Vell., *Cinchona micrantha*, *C. officinalis*, *C. pubescens*, *Ficus* spp.
- 2) Agua de las Nieves locality, Monobamba District, Jauja Province, Junin Department (11°18'28'' S, 75°20'19'' W, 2161 m a.s.l.), average annual precipitation of 925 mm and an average temperature of 10.1°C (Figure S1B). The study site is located in the east-west steep slope (15°) located near the creeks, the canopy stratum is composed of trees up to 25 m in height as *Cedrela nebulosa* T.D. Penn. & A. Daza and *Prumnopitys montana* (Humb. & Bonpl. ex Willd.) de Laub. The mid-canopy is mostly characterized by *Eugenia* sp., *Miconia* spp., *Myrcia* sp., among others.
- 3) Salinas de Alcanfor locality, Monobamba District, Jauja Province, Junin Department (11°18'15''S, 75°20'58''W, 1966 m a.s.l.), average annual precipitation of 520 mm and an average temperature of 13°C (Figure S1B). The study site is the east-west steep slope (20°), the canopy stratum is dominated by *Cedrela angustifolia* Sessé & Moc. ex DC., *P. montana*, *Juglans neotropica* Diels. The understory stratum is dominated by *Ficus* spp, *Eugenia* sp., *Miconia* spp. and *Myrcia* sp.

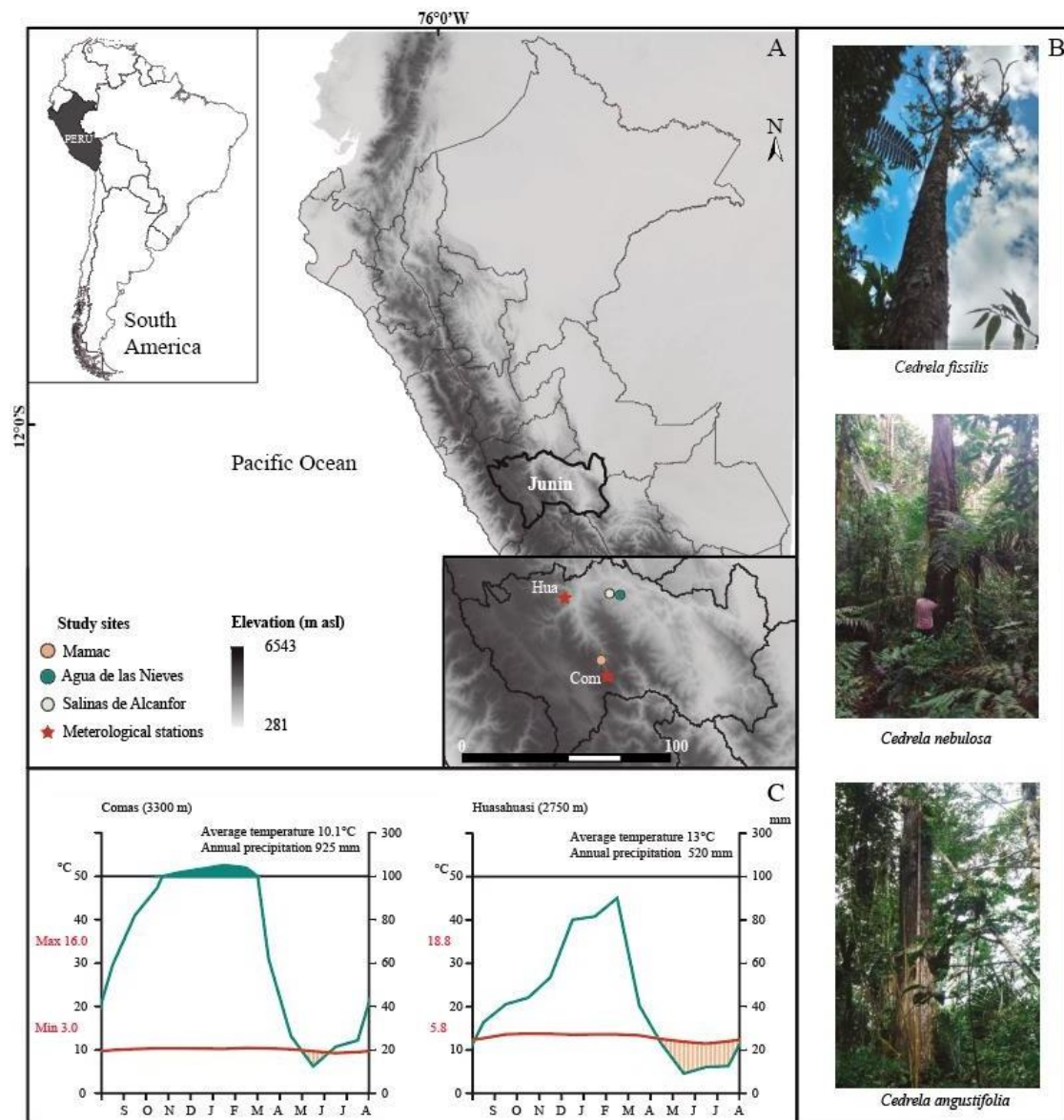


Figure S1. A) Map showing the location of the tree-ring sampling sites; B) View of *Cedrela* species; C) Walter climatic diagrams of Comas (period 1960–2002; $-11^{\circ}44'S$, $-75^{\circ}7'W$; 3300 m a.s.l.) and Huasahuasi (period 1960–2002; $-11^{\circ}15'S$, $-75^{\circ}37'W$; 2750 m a.s.l.) weather stations. Green filled tips mean high moisture. This map was created by Ernesto C. Rodríguez-Ramírez using Adobe Illustrator v. 23.0 (www.adobe.com).

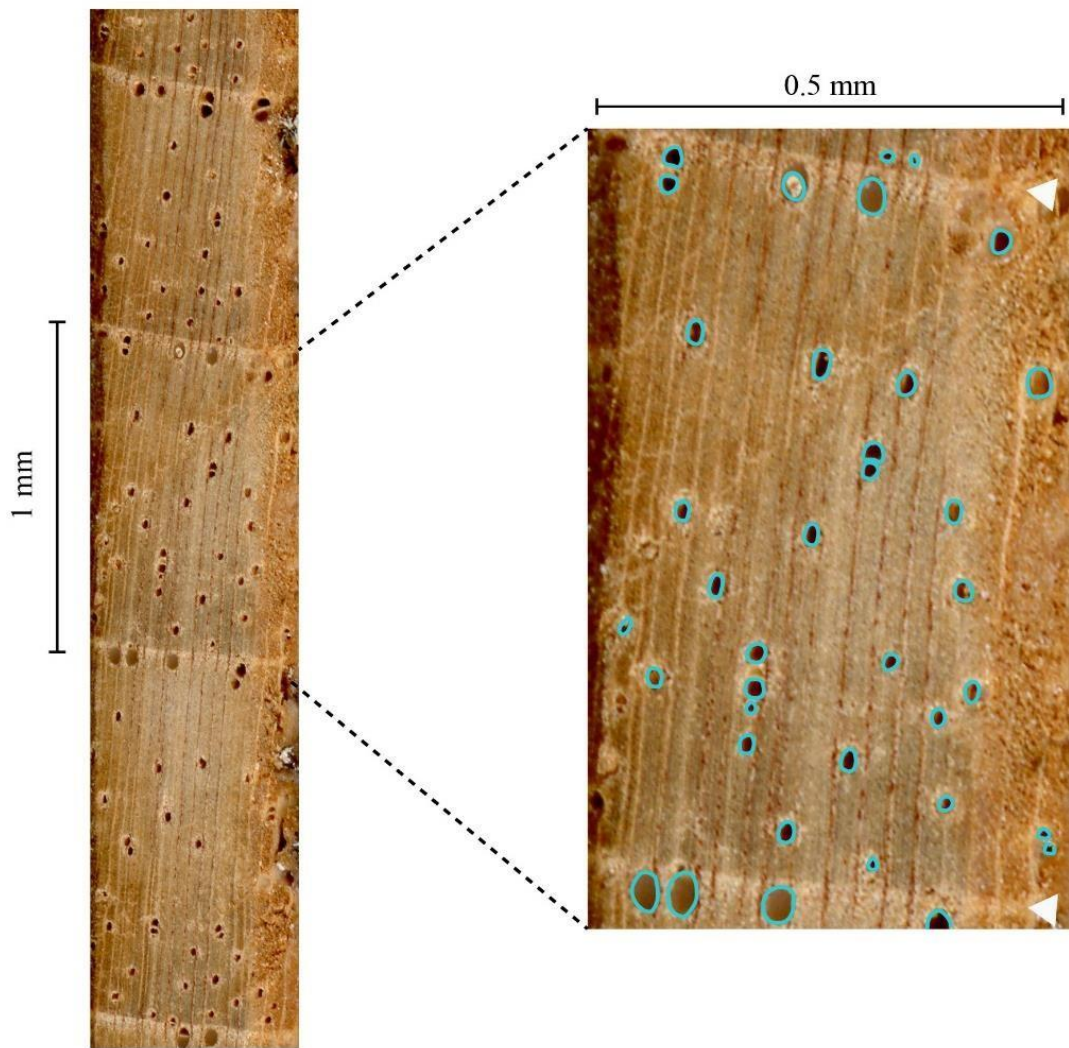


Figure S2. Assessment of xylem vessel traits (cyan color) in Peruvian *Cedrela* species as manually defined using the software ImageJ, in a region of ~1 mm of length $\times$ 0.5 mm of width of each tree ring. White arrows in the right panel show the location of the parenchyma wall of the grow-ring. This figure was developed by Ernesto C. Rodríguez-Ramírez using Adobe Illustrator v. 23.0 (www.adobe.com).