Australian Journal of Botany, 2021, **69**, 121–130
https://doi.org/10.1071/BT20052_AC

Supplementary material

Drought promotes early leaf abscission regardless of leaf habit but increases litter phosphorus losses only in evergreens

Caroline Dallstream[A,B] *and Frida I. Piper*[A]

[A]Centro de Investigación en Ecosistemas de la Patagonia (CIEP), Moraleda 16,

Coyhaique 5951601, Chile.

[B]Corresponding author. Email: csdallstream@gmail.com

Table S1. Statistical results of linear mixed-effects models testing the effects of leaf habit (deciduous, evergreen), watering regime (control, drought) and their interaction on the growth and litter nutrient content of only surviving saplings of four *Nothofagus* species subjected to a drought experiment in southern Chile, with block and species as random factors (evergreen and deciduous controls *n* = 8, evergreen drought *n* = 7, deciduous drought *n* = 5)

d.f., degrees of freedom for the factor and denominator respectively, and significant *P*-values (≤0.05) are in bold

Response variable	d.f.	*F*-ratio	*P*-value
Spring relative growth (cm cm^{-1})			
Leaf habit	1, 1.96	0.774	0.473
Watering	1, 19	2.789	0.111
LH × water	1, 20	1.684	0.209
Season relative growth (cm cm^{-1})			
Leaf habit	1, 1.97	0.81	0.464
Watering	1, 20	1.951	0.178
LH × water	1, 20	1.86	0.187
N proficiency 2018–19 (%)			
Leaf habit	1, 2.14	1.966	0.288
Watering	1, 22	0.119	0.734
LH × water	1, 22	0.475	0.498
Litter N content (mg)			
Leaf habit	1, 1.79	0.011	0.927
Watering	1, 20	0.035	0.854
LH × water	1, 21	0.05	0.825
P proficiency (%)			
Leaf habit	1, 20	4.247	0.175
Watering	1, 19	1.088	0.31
LH × water	1, 20	5.637	**0.028**
log_{10} Litter P content (mg)			
Leaf habit	1, 1.98	2.416	0.261
Watering	1, 21	0.225	0.64
LH × water	1, 21	7.224	**0.014**

Table S2. Species averages (±s.e.) for relative growth (cm cm^{-1}) over spring and the entire growing season for two evergreen and two deciduous *Nothofagus* species from southern temperate forests grown under well-watered and drought conditions

Species	Watering	Spring			Growing season		
N. betuloides	control	0.01	±	0.00	0.02	±	0.01
	drought	0.02	±	0.01	0.04	±	0.03
N. nitida	control	0.06	±	0.03	0.06	±	0.03
	drought	0.01	±	0.01	0.02	±	0.01
N. antarctica	control	0.45	±	0.14	0.71	±	0.24
	drought	0.13	±	0.02	0.17	±	0.05
N. pumilio	control	0.02	±	0.01	0.03	±	0.02
	drought	0.02	±	0.01	0.02	±	0.01

Table S3. Means (±s.e.) total litter biomass (g) for the 2018–2019 growing season for two evergreen and two deciduous Nothofagus saplings grown under drought and well-watered conditions

	Control			Drought		
Evergreen	1.41	±	0.25	1.74	±	0.33
Deciduous	1.28	±	0.11	1.23	±	0.22

Table S4. Mean (±s.e.) total litter biomass (g) for the 2018-2019 growing season for two deciduous and two evergreen *Nothofagus* species grown under well-watered and drought conditions

Species	Watering	Litter biomass		
N. betuloides	control	1.42	±	0.23
	drought	2.06	±	0.52
N. nitida	control	1.39	±	0.48
	drought	1.42	±	0.40
N. antarctica	control	1.27	±	0.18
	drought	0.74	±	0.06
N. pumilio	control	1.29	±	0.16
	drought	1.71	±	0.27

Table S5. Species averages (±s.e.) for cumulative litter (percentage of total) for four collection dates for two evergreen and two deciduous *Nothofagus* species from southern temperate forests grown under well-watered and drought conditions

Species	Watering	21 December 2018			9 January 2019			11 February 2019			28 July 2019
N. betuloides	control	17.08	±	7.48	26.65	±	10.30	34.14	±	12.28	100
	drought	10.18	±	5.24	62.32	±	6.66	73.61	±	6.37	100
N. nitida	control	22.73	±	7.31	31.69	±	10.23	43.19	±	14.16	100
	drought	26.46	±	9.33	34.69	±	8.02	56.40	±	8.06	100
N. antarctica	control	2.21	±	1.40	4.18	±	2.54	7.66	±	3.63	100
	drought	20.47	±	4.15	55.45	±	5.22	74.91	±	5.58	100
N. pumilio	control	1.06	±	0.70	3.03	±	1.38	10.50	±	6.55	100
	drought	6.95	±	4.36	15.48	±	7.49	28.85	±	15.85	100

Table S6. Species averages (±s.e.) for growing season litter nutrient content (mg) for two evergreen and two deciduous *Nothofagus* species from southern temperate forests grown under well-watered and drought conditions

Species	Watering	N content			P Content		
N. betuloides	control	8.10	±	0.85	1.28	±	0.19
	drought	12.66	±	2.34	2.90	±	0.46
N. nitida	control	15.01	±	5.41	0.99	±	0.22
	drought	10.90	±	3.62	1.29	±	0.31
N. antarctica	control	11.66	±	1.78	0.57	±	0.06
	drought	7.54	±	1.18	0.33	±	0.04
N. pumilio	control	12.09	±	0.99	1.01	±	0.15
	drought	20.04	±	4.66	1.42	±	0.47

Table S7. Species averages (±s.e.) for leaf nutrient resorption proficiency (percentage of dry weight) for two evergreen and two deciduous *Nothofagus* species from southern temperate forests grown under well-watered and drought conditions

Values include nitrogen proficiency for 2018 and 2019 and phosphorus proficiency for 2019

Species	Watering	N proficiency 2018			N proficiency 2019			P proficiency 2019		
N. betuloides	control	0.55	±	0.02	0.58	±	0.04	0.091	±	0.003
	drought	0.63	±	0.05	0.65	±	0.07	0.151	±	0.018
N. nitida	control	0.63	±	0.02	1.05	±	0.10	0.082	±	0.016
	drought	0.57	±	0.05	0.73	±	0.09	0.100	±	0.017
N. antarctica	control	0.58	±	0.04	0.94	±	0.15	0.046	±	0.005
	drought	0.62	±	0.05	1.02	±	0.15	0.045	±	0.007
N. pumilio	control	0.66	±	0.06	0.99	±	0.17	0.083	±	0.015
	drought	0.58	±	0.07	1.21	±	0.25	0.081	±	0.018

Fig. S1. Rain exclusion roof at the start of the experiment in February 2018. One sapling per each of four species were subjected to drought, whereas another four were well-watered over the experiment and considered as controls. Notice the net separating the groups of control and drought-subjected saplings, which was done to avoid the mixing of litter between watering treatments.

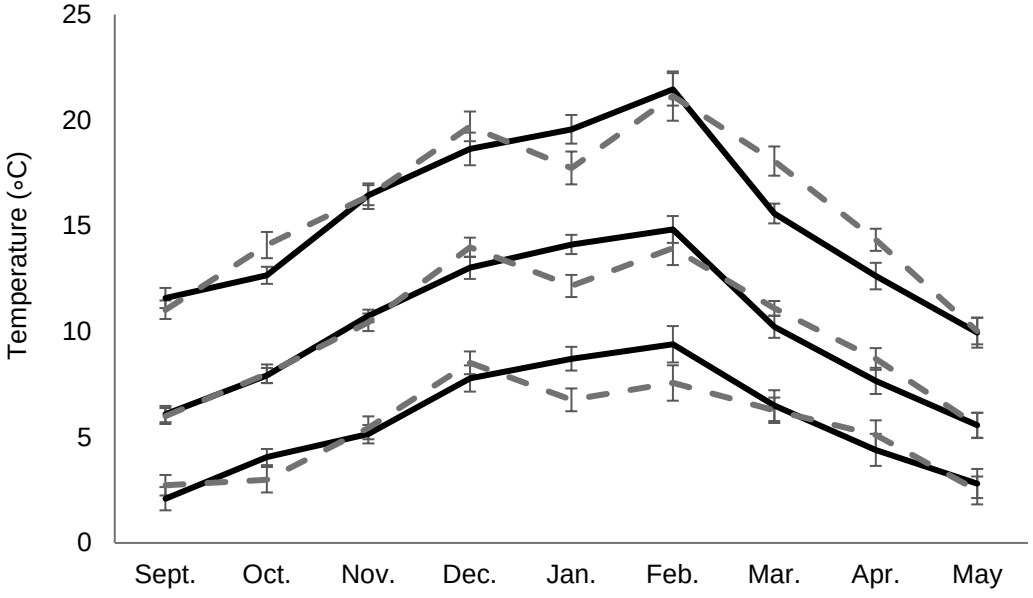

Fig. S2. Monthly averages for daily maximum, mean, and minimum temperatures (°C) in the city of Coyhaique, Chile, for the 2017–2018 and 2018–2019 growing seasons, represented by solid and dashed lines respectively. Error bars represent one standard error of the mean.

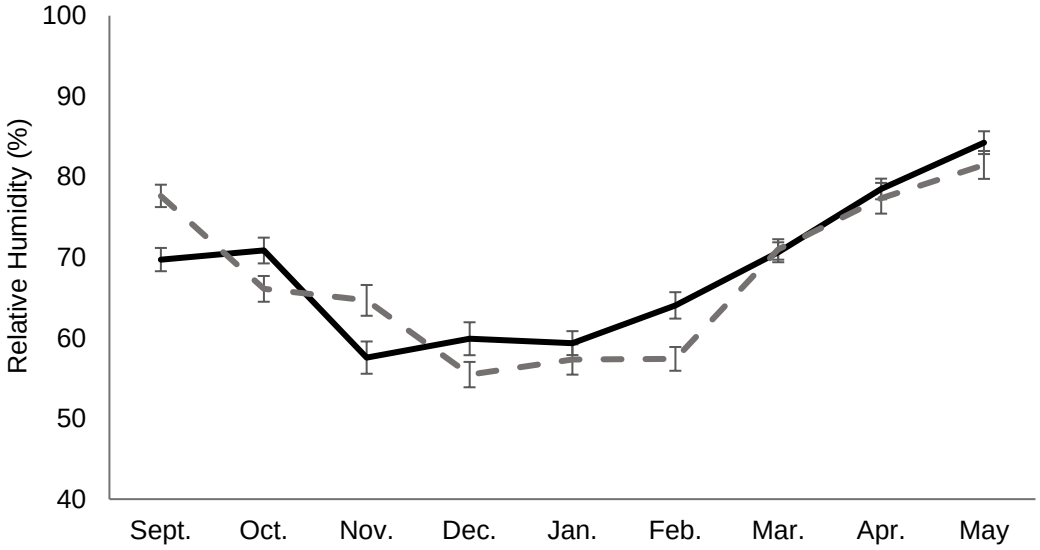

Fig. S3. Monthly averages for daily relative humidity (%) values, in the city of Coyhaique, Chile, for the 2017–2018 and 2018–2019 growing seasons represented by solid and dashed lines respectively. Error bars represent one standard error of the mean.

Fig. S4 Photos demonstrating drought senescence taken in December 2018 (summer) of the second experimental year. (*a*) *Nothofagus betuloides* sapling under drought conditions (left) and a well-watered sapling (right). (*b*) *Nothofagus antarctica* under drought conditions.