

Relating leaf photosynthetic rate to whole-plant growth: drought and shade effects on seedlings of four *Quercus* species

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Table S1

Mean \pm s.e. values of variables analysed for *Quercus* seedlings in different irradiance and water treatments. (Irradiance treatments were HI: high irradiance, MI: medium irradiance, and LI: low irradiance. Water treatments were LW: low water, and HW: high water.) For complete names of variables, see text. Sample size (N) per irradiance and water treatment is also indicated

Unit	<i>Quercus suber</i> (evergreen)						
	HI		MI		LI		
	LW	HW	LW	HW	LW	HW	
N	15	12	13	15	14	16	
Seed mass	g	4.2 \pm 0.8	4.2 \pm 0.8	4.7 \pm 1.0	4.2 \pm 0.8	4.5 \pm 0.7	4.1 \pm 1.2
Seedling biomass	g	9.2 \pm 0.4	14.7 \pm 1.9	6.6 \pm 0.4	7.8 \pm 0.7	1.9 \pm 0.1	1.7 \pm 0.1
RGR	mg g ⁻¹ day ⁻¹	8.6 \pm 3.9	13.4 \pm 6.6	9.9 \pm 4.0	11.7 \pm 5.0	3.7 \pm 6.0	1.8 \pm 6.8
NAR	g cm ⁻² day ⁻¹	4.2 \pm 1.9	4.8 \pm 2.6	2.5 \pm 1.1	2.8 \pm 1.4	0.7 \pm 0.9	0.2 \pm 1.0
LAR	m ² kg ⁻¹	2.3 \pm 0.4	2.7 \pm 0.6	4.1 \pm 0.9	4.3 \pm 1.0	6.7 \pm 1.8	7.3 \pm 2.1
SLA	m ² kg ⁻¹	11.7 \pm 1.5	11.2 \pm 1.9	14.8 \pm 3.0	14.7 \pm 2.2	26.1 \pm 5.5	25.7 \pm 5.2
LMF	g g ⁻¹	0.21 \pm 0.04	0.25 \pm 0.07	0.28 \pm 0.05	0.30 \pm 0.06	0.26 \pm 0.07	0.29 \pm 0.08
SMF	g g ⁻¹	0.14 \pm 0.04	0.17 \pm 0.06	0.15 \pm 0.04	0.18 \pm 0.06	0.22 \pm 0.05	0.24 \pm 0.07
RMF	g g ⁻¹	0.66 \pm 0.07	0.59 \pm 0.10	0.57 \pm 0.08	0.53 \pm 0.12	0.52 \pm 0.09	0.49 \pm 0.11

Unit	<i>Quercus ilex</i> (evergreen)						
	HI		MI		LI		
	LW	HW	LW	HW	LW	HW	
N	15	12	13	16	15	13	
Seed mass	g	2.5 \pm 0.7	2.9 \pm 0.9	2.5 \pm 0.6	2.6 \pm 0.7	3.1 \pm 0.8	2.6 \pm 0.6
Seedling biomass	g	4.6 \pm 0.4	7.2 \pm 0.8	2.4 \pm 0.3	2.6 \pm 0.3	0.8 \pm 0.1	0.7 \pm 0.1
RGR	mg g ⁻¹ day ⁻¹	14.4 \pm 7.4	19.9 \pm 7.6	9.1 \pm 8.1	10.3 \pm 8.1	2.6 \pm 7.2	0.9 \pm 6.7
NAR	g cm ⁻² day ⁻¹	7.2 \pm 3.8	8.0 \pm 3.7	2.1 \pm 1.7	2.2 \pm 1.7	0.5 \pm 1.4	-0.1 \pm 1.5
LAR	m ² kg ⁻¹	2.6 \pm 0.8	3.0 \pm 0.9	4.0 \pm 1.2	4.3 \pm 1.3	4.9 \pm 1.6	4.9 \pm 1.2
SLA	m ² kg ⁻¹	8.0 \pm 1.8	8.0 \pm 2.4	10.7 \pm 2.8	10.4 \pm 2.2	15.3 \pm 3.8	15.4 \pm 3.5
LMF	g g ⁻¹	0.32 \pm 0.18	0.38 \pm 0.09	0.39 \pm 0.10	0.42 \pm 0.09	0.33 \pm 0.11	0.32 \pm 0.08
SMF	g g ⁻¹	0.17 \pm 0.05	0.20 \pm 0.06	0.17 \pm 0.05	0.20 \pm 0.05	0.25 \pm 0.08	0.23 \pm 0.06
RMF	g g ⁻¹	0.52 \pm 0.11	0.43 \pm 0.10	0.44 \pm 0.12	0.40 \pm 0.10	0.44 \pm 0.11	0.46 \pm 0.09

Unit		<i>Quercus canariensis</i> (deciduous)					
		HI		MI		LI	
		LW	HW	LW	HW	LW	HW
N		12	14	13	13	12	14
Seed mass	g	2.5 ± 0.8	2.0 ± 0.8	2.2 ± 0.9	2.3 ± 1.3	2.6 ± 0.7	2.5 ± 0.9
Seedling biomass	g	3.1 ± 0.3	3.2 ± 0.2	2.3 ± 0.3	2.1 ± 0.3	0.7 ± 0.1	0.6 ± 0.1
RGR	mg g ⁻¹ day ⁻¹	15.9 ± 12.2	15.4 ± 13.3	17.4 ± 15.6	16.3 ± 15.3	8.1 ± 9.8	4.9 ± 12.4
NAR	g cm ⁻² day ⁻¹	5.8 ± 4.0	4.0 ± 2.9	4.3 ± 2.9	3.3 ± 2.4	0.9 ± 1.1	0.7 ± 1.5
LAR	m ² kg ⁻¹	3.6 ± 1.5	4.4 ± 1.7	5.8 ± 3.3	6.0 ± 3.3	9.3 ± 3.0	8.9 ± 3.7
SLA	m ² kg ⁻¹	14.4 ± 4.1	15.4 ± 4.5	18.6 ± 6.9	18.3 ± 6.9	27.0 ± 8.2	24.4 ± 7.6
LMF	g g ⁻¹	0.26 ± 0.08	0.29 ± 0.09	0.31 ± 0.14	0.34 ± 0.15	0.36 ± 0.12	0.37 ± 0.14
SMF	g g ⁻¹	0.16 ± 0.06	0.17 ± 0.06	0.19 ± 0.08	0.20 ± 0.09	0.23 ± 0.06	0.21 ± 0.11
RMF	g g ⁻¹	0.61 ± 0.17	0.57 ± 0.18	0.54 ± 0.21	0.51 ± 0.21	0.43 ± 0.11	0.45 ± 0.15

Unit		<i>Quercus pyrenaica</i> (deciduous)					
		HI		MI		LI	
		LW	HW	LW	HW	LW	HW
N		16	14	16	14	14	16
Seed mass	g	4.6 ± 1.0	4.7 ± 1.2	4.0 ± 0.9	4.6 ± 1.0	4.6 ± 1.1	4.9 ± 1.1
Seedling biomass	g	9.0 ± 0.8	13.1 ± 1.5	5.1 ± 0.3	7.4 ± 0.8	1.8 ± 0.1	2.2 ± 0.2
RGR	mg g ⁻¹ day ⁻¹	11.2 ± 6.0	15.4 ± 6.4	6.6 ± 4.8	10.9 ± 6.5	-0.9 ± 4.8	0.9 ± 6.3
NAR	g cm ⁻² day ⁻¹	5.7 ± 3.2	8.3 ± 3.8	2.5 ± 1.4	3.4 ± 2.4	0.4 ± 0.8	0.3 ± 1.2
LAR	m ² kg ⁻¹	2.2 ± 0.8	2.0 ± 0.7	3.3 ± 1.6	3.1 ± 1.6	4.1 ± 1.9	4.2 ± 1.7
SLA	m ² kg ⁻¹	14.9 ± 3.5	13.8 ± 3.2	19.0 ± 4.3	18.5 ± 4.4	29.7 ± 7.3	29.1 ± 6.8
LMF	g g ⁻¹	0.15 ± 0.05	0.14 ± 0.04	0.17 ± 0.07	0.16 ± 0.07	0.14 ± 0.05	0.15 ± 0.06
SMF	g g ⁻¹	0.11 ± 0.03	0.11 ± 0.04	0.12 ± 0.04	0.12 ± 0.05	0.21 ± 0.06	0.22 ± 0.06
RMF	g g ⁻¹	0.75 ± 0.11	0.76 ± 0.11	0.71 ± 0.11	0.73 ± 0.14	0.66 ± 0.11	0.65 ± 0.11

Table S2

Probabilities under the null hypothesis that the data accord with each of the six proposed models, using the d-sep method. Model G shown in bold, is the only model that can not be rejected with our dataset, after controlling the False Discovery Rate (FDR) at the 5% level, following the Ventura *et al.* (2004) criteria

Model type	χ^2	d.f.	<i>P</i>
A	54.46	18	0.00002
B	66.22	18	0.00000
C	92.72	28	0.00000
D	72.92	24	0.00000
E	34.65	18	0.01046
F	28.19	12	0.00519
G	15.62	12	0.20928

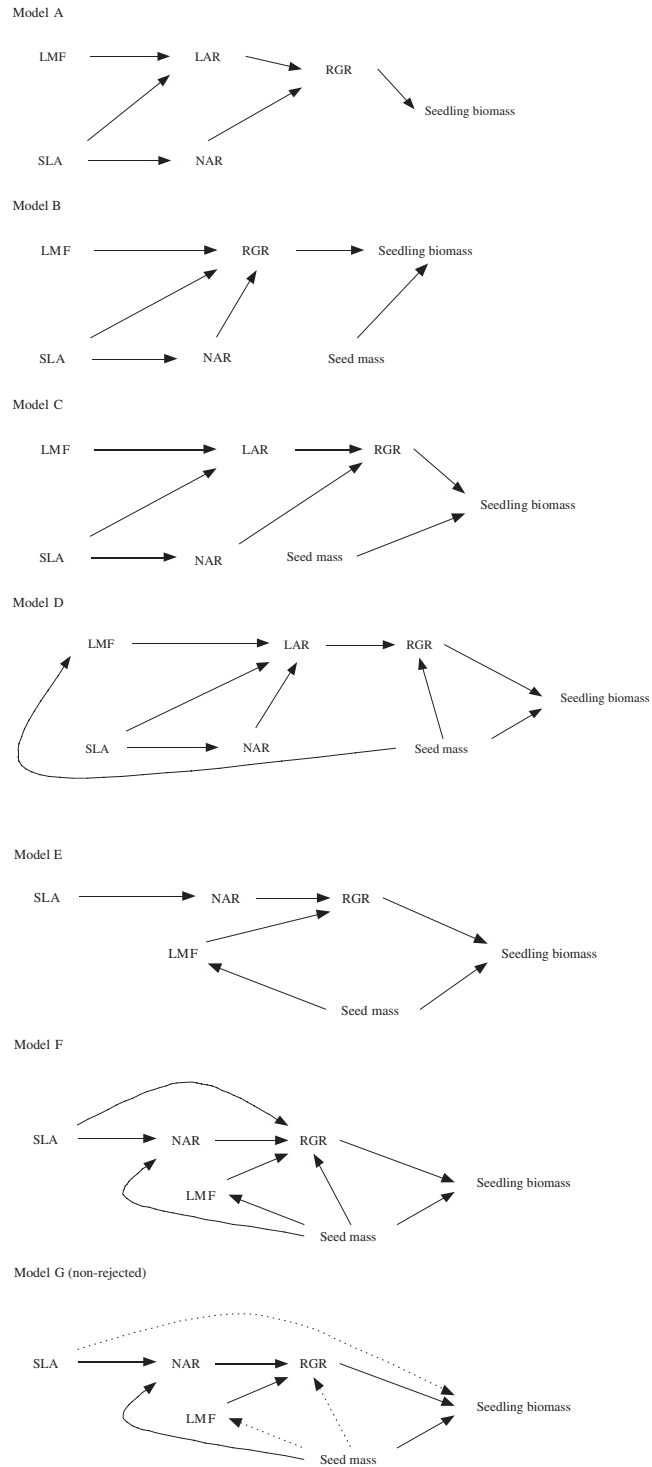


Fig. S1. Alternative multivariate models linking the Seed mass , specific leaf area (SLA), leaf mass ratio (LMF), leaf area ratio (LAR), net assimilation rate (NAR), relative growth rate (RGR) and Seedling biomass. Model G was the best fitted to the dataset of *Quercus* seedling responses to water and irradiance treatments.