

Supporting Information

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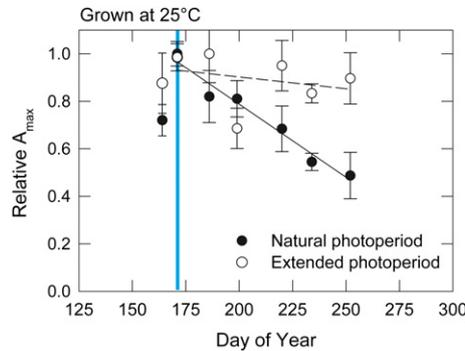


Fig. S1. Seasonal changes in light-saturated net photosynthesis (A_{max}) normalized by maximum measured values for each individual and set at 1.0 for the maximum value of the date means in saplings exposed to either naturally changing photoperiod (black circles, solid line) or a constant extended photoperiod of 16 h (empty circles, dashed line) (means \pm SE, $n = 2-4$). Growth temperature was controlled at 25 °C during the study. Cyan bar indicates summer solstice. Data were collected with a portable steady-state gas exchange system (CIRAS-II, PP Systems) on the same leaves as maximum Rubisco carboxylation rate (V_{cmax}) measurements; cuvette conditions were 25 °C air temperature, 1.3 kPa vapor pressure deficit, saturating light ($1,200 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) and ambient CO_2 . Results postsolstice were analyzed with a general linear model with time, replicate and treatment, nesting replicate within treatment: regression for natural photoperiod, $r^2 = 0.50$, $P = 0.0001$; extended photoperiod, $r^2 = 0.04$, $P = 0.38$.

Table S1. Model estimates of annual cycle of atmospheric CO_2 , with and without photoperiod controls on V_{cmax} , evaluated against means (SDs) of Globalview observations

Latitude	No. of stations	GV seasonal amplitude (ppm)	Model without photoperiod correction			Model with photoperiod correction		
			Correlation with GV (r)	Amplitude ratio (model/GV)	Mean absolute error (ppm)	Correlation with GV (r)	Amplitude ratio (model/GV)	Mean absolute error (ppm)
All	60	9.3 (6.1)	0.91	0.74 (0.18)	2.8 (2.3)	0.92	0.87 (0.21)	1.9 (1.5)
60–90°N	7	14.6 (0.5)	0.90	0.64 (0.05)	5.2 (0.6)	0.91	0.80 (0.05)	2.9 (0.7)
30–60°N	28	12.9 (4.9)	0.91	0.73 (0.20)	3.7 (2.3)	0.92	0.88 (0.20)	2.6 (1.6)
0–30°N	11	7.0 (1.5)	0.95	0.69 (0.05)	2.2 (0.6)	0.95	0.81 (0.05)	1.3 (0.5)
0–90°S	14	1.3 (0.5)	0.63	0.82 (0.34)	0.4 (0.4)	0.68	0.92 (0.34)	0.3 (0.4)

Based on detrended and demeaned seasonal cycles for the period 1988–2004. GV, Globalview.