

Supplementary Material

Sunlight and red to far-red ratio impact germination of tropical montane cloud forest species

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Introduction

In the above titled paper, we investigated the germination niche of six previously unstudied Australian tropical mountain cloud forest (TMCF) species in relation to absolute light requirement (light/dark) and light quality (R:FR). We created a gradient of seven R:FR ratios using sunlight and coated polyester filters (Lee Filters, Media Vision, Sydney, Australia): 0.11 (filter #242), 0.2 (filter #121), 0.38 (filter #088), 0.54 (filter #244) 0.74 (filter #245), 0.91 (filter #246) and 1.14 (no filter). Here, we provide data to supplement the *Experimental light gradient* section of our Materials and Methods. All light readings were taken using a hand-held spectrometer (SpectraPen, Photon Systems Instruments, www.psi.cz). Light quality (R:FR) was calculated using the mean red wavelengths (657 – 664 nm) and the mean far red wavelengths (726 – 734 nm). Light quantity (total irradiance) was

the sum of all wavelengths (324 – 734 nm). Interpretation of this data can be found in the paper.

***In situ* light**

Light quality and quantity were recorded in various TMCF locations in the Wet Tropics bioregion (Table 1).

Location	Weather	R:FR	Mean total irradiance ($\mu\text{mol m}^{-2} \text{s}^{-1}$)
Edge of canopy Direct sunlight	Sunny	1.0 ± 0.004	298 ± 3.1
Below canopy Above leaf litter	Sunny	0.4 ± 0.09	12 ± 3.1
Below canopy Above leaf litter	Overcast	0.7 ± 0.04	9 ± 1.3
Below canopy Below leaf litter	Sunny	0.3 ± 0.04	2 ± 0.4

Table S1. Light quantity (total irradiance) and quality (R:FR) were recorded in various TMCF locations in the Wet Tropics bioregion (Mt Fisher (1282 m), Mt Lewis (1220 m) and Mt Edith (1100 m)), 5 – 10th May 2021.

Experimental light gradient

In the month prior to the experiment starting, light quality and quantity were recorded at approx. midday, inside and outside the glasshouse, across the entire R:FR gradient (Fig. S1). A piece of each filter was held over the SpectraPen sensor (or not, in the case of unfiltered sunlight).

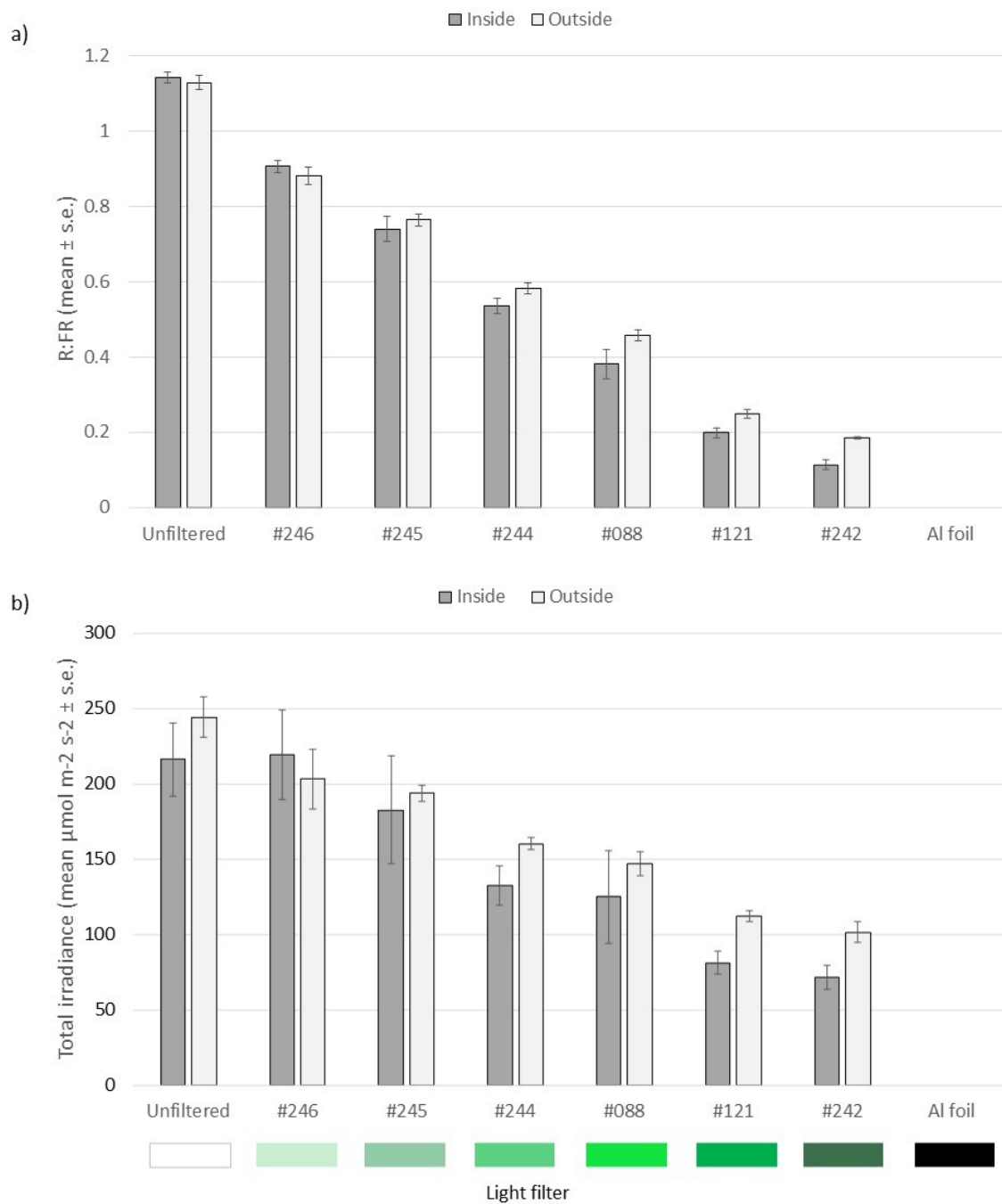


Figure S1. Light filters used (Lee Filters, Media Vision, Sydney, Australia: 0.11 (filter #242), 0.2 (filter #121), 0.38 (filter #088), 0.54 (filter #244) 0.74 (filter #245), 0.91 (filter #246) and 1.14 (no filter)), and the corresponding a) R:FR and b) total irradiance recorded inside and outside the temperature controlled glasshouse (Jan 2021).

Experimental light quality from sunrise to sunset

During a pilot study in September 2020, light quality was recorded hourly between 6am and 6pm beneath five filters and no filter (Fig. S2).

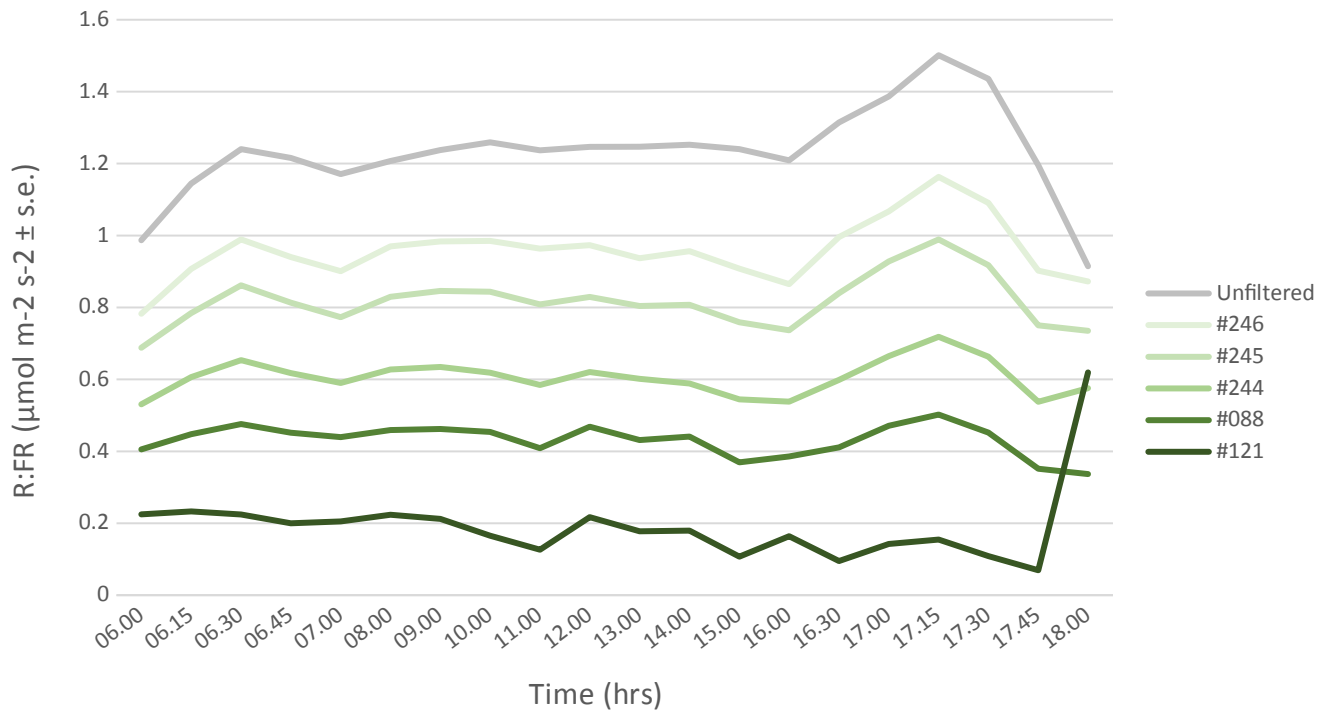


Figure S2. R:FR (\pm s.e.) of unfiltered and filtered light treatments, 6am - 6pm (1 Sept 2020).

Light quality during the experiment

To determine whether light quality changed over the duration of the experiment, R:FR was recorded in the glasshouse, hourly, between 9.00 and 15.00 in week 1, week 6 and week 13 of the experiment (Fig. S3). Variations in readings between 9am and 3pm are likely explained by changes in cloud cover, although this was not recorded.

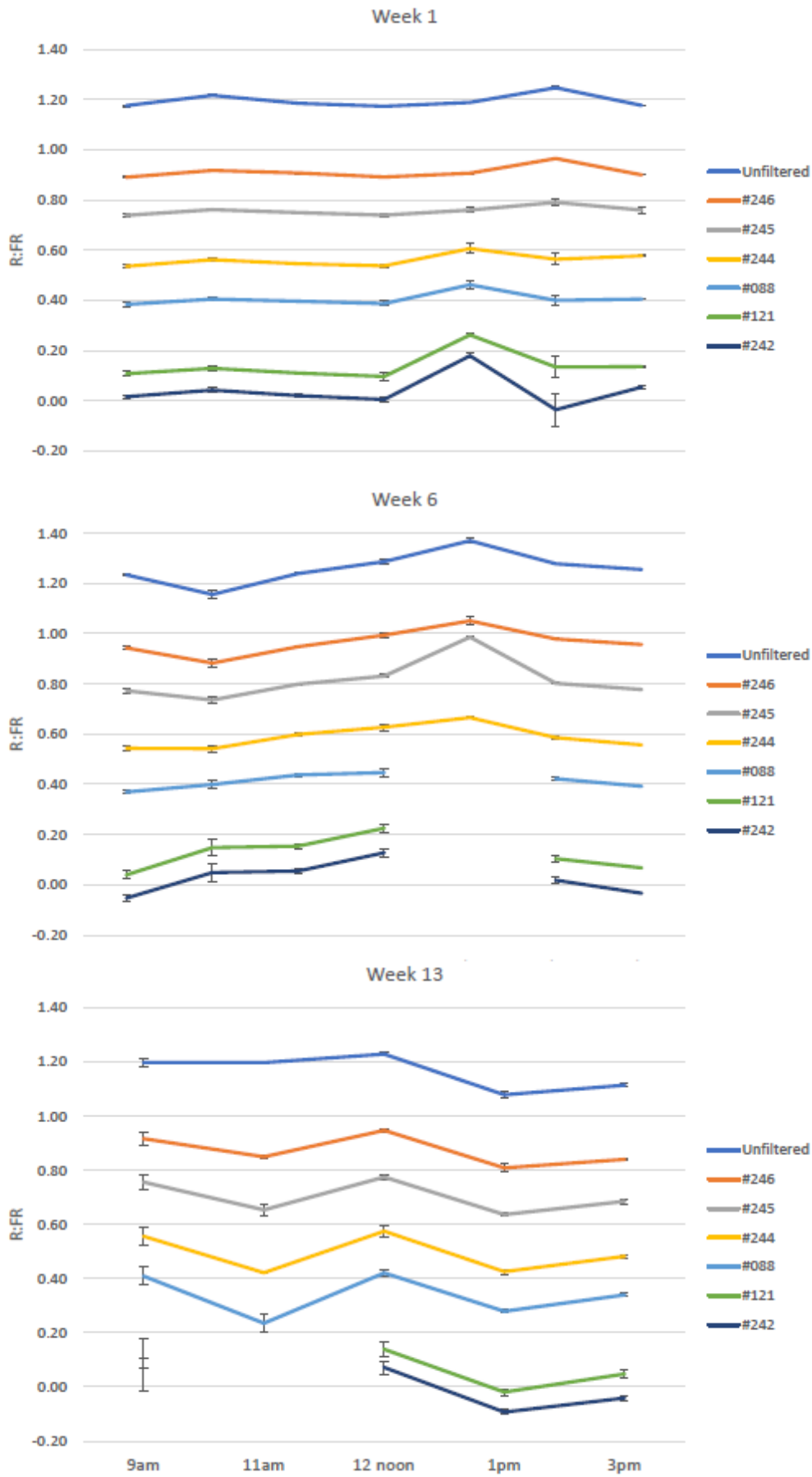


Figure S3. R:FR (\pm s.e.) of unfiltered and filtered light treatments in the glasshouse in week 1, 6 and 13 of the experiment. Missing data points due to overcast weather and low light levels.