

Culturing *Porphyridium purpureum* (ALG_App005)

Background to *P. purpureum*

P. purpureum is a unicellular red microalga which is found in most terrestrial areas including on submerged river banks and saltmarshes; it is even found within brickwork. Commercial relevance of *P. purpureum* stems from its high protein content and presence of value-added products including high value polysaccharides, arachidonic acid (ARA) and phycoerythrin (Juin *et al.*, 2015; Su *et al.*, 2016). Its genome was sequenced in 2013 (Bhattacharya *et al.*, 2013). Growth rates and levels of polysaccharides have been found to correlate with light intensity (Valea *et al.*, 2011); however, the effect of light colour on *P. purpureum* growth is yet to be reported.

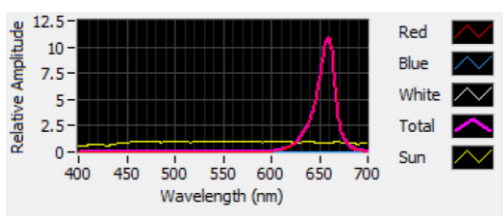
Aim

To determine the impact of light colour on *P. purpureum* growth.

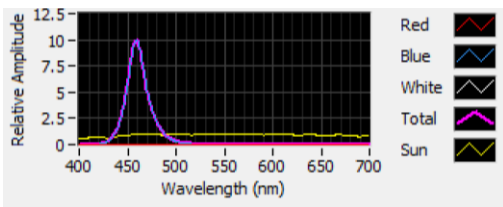
Experimental Design

An exponentially growing culture of *P. purpureum* in late-log phase was inoculated at 1×10^5 cells/ml into 400 ml DM04 medium (in-house phototrophic marine medium). Cultures were grown in the Algem at 22°C under 240 $\mu\text{mol photons/m}^2/\text{s}$ continuous light consisting of either red (660nm), blue (465nm), or simulated sunlight (a 85:15 white/red mix). Cultures were mixed at 120 rpm with 5 cm^3/min aeration of 5 % CO_2 in air. Experiments were conducted in duplicate, with growth assessed by in-flask optical density (OD) measurements at 740nm.

Red



Blue



“Sunlight”

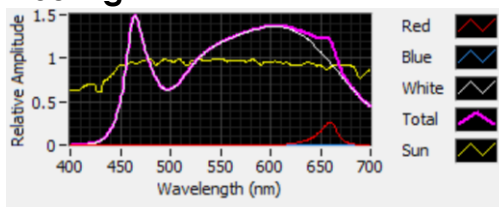


Figure 1 – Spectra of light under investigation

Results

P. purpureum, Light Colour Experiment

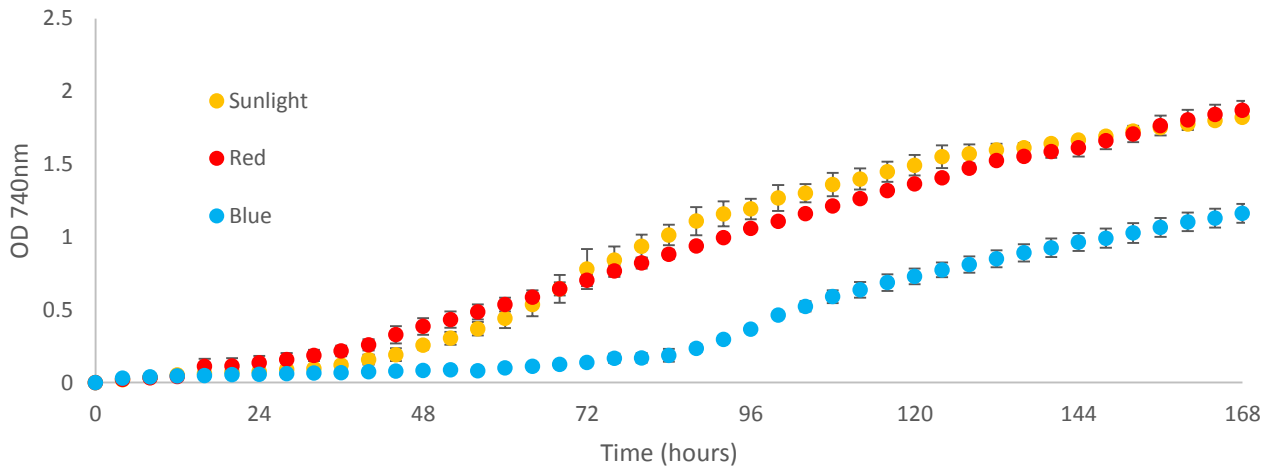


Figure 2 - Growth profiles of *P. purpureum* cultured photoautotrophically in DM04 medium under different light colours (sunlight, red, and blue) (n = 2)



Figure 3 - Culture health after 7 days in the Algem; from left to right sunlight, red, and blue

Discussion

P. purpureum was observed to grow significantly better under simulated sun- and red light compared to blue light as measured by OD 740nm accumulation (Figure 2). A dense, homogenous culture without clumping was observed for all conditions with noticeably lower biomass for blue light illuminated flasks. Further experiments should be conducted in the Algem to further optimise light intensity and temperature for optimal growth.

References

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