

Reproductive seasonality and early life temperature sensitivity of the seaweed *Scytothalia dorycarpa* (Phaeophyceae, Fucales)

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Abstract

Temperature is a major determinant of the geographical ranges of marine species. Changes in temperature can therefore result in localised mortality and shifts in species distributions. Despite potentially holding valuable indicator value for ecosystem change in response to ocean warming, little is known about the phenology and temperature sensitivity of the widespread endemic seaweed, *Scytothalia dorycarpa*. Through field observations and culture growth experiments, this study was the first to investigate reproductive timing, early post settlement sensitivity and recruitment success and of *S. dorycarpa*. Adult reproductive development observations were consistent with a response to decreasing photoperiod and gamete release occurred in synchronous pulses throughout winter months. In culture, the highest settlement densities and lowest mortality rates were achieved at 15°C, optimal temperatures for germling fertilisation occurred at 18°C and temperatures greater than 20°C were found to delay germling settlement and significantly increase mortality rates. Field studies of the latitudinal distribution and abundance of recruits found significantly lower *S. dorycarpa* recruit densities in northern reefs at which average winter temperatures exceed 19°C compared to much higher recruit densities in southern reefs where average winter temperatures do not exceed 17°C. In response to a recent marine heat wave off the south west coast of Western Australia, several canopy forming seaweed species rapidly altered their distributions including *S. dorycarpa*, which retreated over 100km from its previous northern latitudinal limit. The latitudinal distribution of recruits in this study reflected culture temperature optimums and experimentally supports previous suggestions of the vulnerability of this key foundation species to changing ocean climate.

Key Words: Thermal tolerance, Macroalgae, Reproduction, Germling, Distribution, Range contraction, Western Australia.