# Comparative transcriptome profiling of kappaphycus alvarezii (rhodophyta, solieriaceae) in response to light of different wavelengths and carbon dioxide enrichment


## ABSTRACT

Rhodophyta (red algae) comprises over 6000 species, however, there have only been a few comparative transcriptomic studies due to their under-representation in genomic databases. Kappaphycus alvarezii, a Gigartinales algae, is a valuable source of carrageenan and is extensively cultivated in many countries. The majority of seaweed farming in Southeast Asia is done in intertidal zones under varying light (i.e., spectra and irradiance) and carbon dioxide (CO2 ) conditions, which affects the rate of photosynthesis. This study conducted transcriptome profiling to investigate the photosynthetic mechanisms in K. alvarezii exposed to different wavelengths of light (i.e., blue, green, and red light, in comparison to white light) and CO2 availability. We analyzed the responses of photosynthetic protein complexes to light and observed that light of different wavelengths regulates a similar set of photosynthetic apparatuses. Under CO2 enrichment, genes encoding C3 and C4 enzymes were found to be actively transcribed, suggesting the likely shift in the carbon metabolism pathway or the involvement of these genes in adaptive physiological processes. This study contributes to the understanding of the regulatory mechanisms of photosynthetic carbon metabolism in red algae and has implications for the culture and commercial production of these economically valuable macroalgae.