pH affects growth, physiology and agar properties of agarophyte *Gracilaria changii* (Rhodophyta) under low light intensity from Morib, Malaysia

ABSTRACT

Changes in coastal water pH alter inorganic carbon chemistry and impose abiotic stress on photosynthetic marine organisms. The red algal cell wall contains sulfated agar which protects them against environmental stresses. In this study, we investigated the effects of three different pHs (6.61, 8.04 and 9.30) on Gracilaria changii cultured in artificial seawater for 3 and 6 days, respectively. The growth rate of G. changii was the highest and the lowest at pH 6.61 and pH 9.30, respectively. Partial thallus degradation was observed in seaweeds treated at pH 9.30. Upon a 3-day treatment, the levels of allophycocyanin, total phycobilins in G. changii cultured at pH 6.61, and all photosynthetic pigments in G. changii cultured at pH 9.30, were significantly lower than those cultured at pH 8.04. G. changii exposed to pH 9.30 for 6 days also had significantly lower levels of chlorophyll a and allophycocyanin than those treated at pH 8.04. A six-day treatment at pH 6.61 caused a decline in the content of chlorophyll a and carotenoids, but an increase in the levels of phycoerythrin, phycocyanin, and total phycobilins, compared to those treated at pH 8.04. G. changii samples treated at pH 6.61 and pH 9.30 have a higher agar content compared to those cultured at 8.04. Gel strength was significantly lower in seaweed cultured at pH 9.30, compared to those cultured at pH 8.04. Gelling temperature and 3,6-anhydrogalactose content of agar were significantly affected by different pHs, but no significant changes were found in the melting temperature, gel syneresis and sulfate content of agar upon treatments. These information enhance our knowledge on physiological response and agar production in G. changii at different pHs, and useful for optimization of seaweed cultivation system in future.

Keyword: Agarophyte; Agar yield; Gel strength; *Gracilaria changii;* pH; Physiology