

Physiological responses to ocean acidification in the habitat former macroalgae *Gongolaria barbata*

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Human activities exert a profound impact on Earth’s ecosystems, particularly in the marine environment. Anthropogenic stressors such as ocean warming, acidification (OA), pollution, and overexploitation are significantly diminishing the biodiversity and functionality of marine ecosystems, with far-reaching consequences for ecosystem services and human well-being. In temperate coastal habitats, fucoids (Fucales) play a crucial role as large canopy-forming algae with a complex three-dimensional structure, offering food, shelter, and nursery functions for a diverse array of species. These habitats provide services comparable to terrestrial forests. Among environmental stressors, OA poses a threat in transitional environments where freshwater, more acidic than seawater, may exacerbate the detrimental effects of OA. This study explores the effects of OA on the brown macroalgae *Gongolaria barbata*, considering both physiological responses and phenology. One-year-old individuals were exposed to two different pH conditions: 8.1 (current ambient value) and 7.7 (predicted to occur in a 'business as usual' scenario of anthropogenic CO₂ emissions). Although some individuals exhibited an increase in oxygen consumption as pH decreased, results suggest that prolonged exposure to ocean acidification does not significantly impact the respiration rate in *G. barbata*, indicating a potential resistance to this stress. Thus far, *G. barbata* from the Lagoon of Venice (Chioggia, Italy) appears to be a promising candidate as a donor population for habitat restoration to mitigate the effects of climate change.

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