

Are seagrass growth and survival constrained by the reducing conditions of the sediment?



"A literature review of the effects of the reducing conditions of the sediment on seagrass metabolism, growth and survival, and of the morphological and physiological adaptations that seagrasses show to cope with sediment anoxia is presented and major gaps in knowledge are identified. The hypothesis that sediment anoxia controls the survival of seagrasses was tested experimentally by increasing the oxygen demand of the sediment with the addition of sucrose. Experiments were performed in a tropical (Southeast Asia) multispecific seagrass meadow, a Mediterranean *Cymodocea nodosa* meadow, and a temperate *Zostera marina* meadow. Sulfide levels in pore water and vertical redox profiles were used to characterise the effects of the sucrose additions on the sediment, while plant responses were quantified through the changes in shoot density and leaf growth. Sulfide levels in pore water increased and sediment redox potential decreased after the addition of sucrose to the sediment of different seagrass meadows. The effect of the addition of sucrose to the sediment of seagrasses was species-specific. Leaf growth was reduced and shoot mortality increased in some of the tropical species (e.g., *Thalassia*

hemprichii), but not in others. Neither mortality nor leaf growth of the Mediterranean species *C. nodosa* was affected by sucrose additions, and only leaf growth was reduced two months after the addition of sucrose in *Z. marina*. Our results suggest that increased sediment anoxia might be a factor promoting growth inhibition and mortality in seagrasses, although strong differences have been found among different species and environments."

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