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Physiological and morphological effects of a marine heatwave on the seagrass *Cymodocea nodosa*

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Abstract:

Marine heatwaves (MHWs) are increasing in frequency and intensity as part of climate change, yet their impact on seagrass is poorly known. The present work evaluated the physiological and morphological responses of *Cymodocea nodosa* to a MHW. *C. nodosa* shoots were transplanted into a mesocosm facility. To simulate a MHW, water temperature was raised from 20 to 28 °C, kept 7 days at 28 °C, cooled down back to 20 °C and then maintained at 20 °C during an 8-day recovery period. The potentially stressful effects of the simulated heatwave on the photosynthetic performance, antioxidative-stress level and area vs dry weight ratio of leaves were investigated. The maximum quantum yield of photosystem II (Φ PSII) increased during the heatwave, allowing the plants to maintain their photosynthetic activity at control level. Negative effects on the photosynthetic performance and leaf biomass of *C. nodosa* were observed during the recovery period. No significant oxidative stress was observed throughout the experiment. Overall, although *C. nodosa* showed a relative tolerance to MHWs compared to other species, its population in Ria Formosa is likely to be negatively affected by the forecasted climate change scenarios.

Keywords: marine heatwaves, climate change, *Cymodocea nodosa*, photosynthetic performance, leaf biomass, antioxidative-stress level