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Full Length Article

Growth rate and light-based non-cryogenic preservation method for *Symbiodinium* sp. Clade A isolated from *Platygyra daedalea* in the Arabian gulf

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ABSTRACT

Coral reefs in the Arabian Gulf are exposed to extreme temperatures and salinities, resulting in some of the highest coral bleaching and mortality rates worldwide. Preserving heat-tolerant Symbiodiniaceae is therefore an urgent priority to sustain coral resilience and support emerging restoration and assisted-evolution strategies. Existing cryopreservation protocols for Symbiodinium are technically demanding, costly, and may compromise long-term cell viability, limiting their applicability in resource-constrained settings. This study reports the molecular taxonomic identification, growth characteristics, and long-term performance of a *Symbiodinium sp.* Clade A strain isolated from the brain coral *Platygyra daedalea* under a simple, non-cryogenic preservation regime. Under controlled laboratory conditions (40 psμ, 26 °C, 130 μmol photons m^{-2} s^{-1}, 12:12 h light:dark), the strain exhibited a high maximum growth rate of 0.50 ± 0.03 day^{-1}, indicating strong physiological performance in the Arabian (Persian) Gulf conditions. To evaluate a non-cryogenic preservation approach, cultures were stored under continuous light or complete darkness for 1, 3, and 6 months. Light-based storage consistently supported

1. Introduction

Global climate change is accelerating coral reef degradation through more frequent and severe thermal anomalies, mass bleaching events, and associated biodiversity loss (Hughes et al., 2017; Sully et al., 2019). In contrast to other regions where bleaching is often associated with acute thermal events, Arabian Gulf corals experience long-term physiological exposure to extreme baselines, making this region suitable for identifying highly resilient coral-symbiont partnerships (Hume et al., 2018; Paparella et al., 2019). Reefs in this region survive under elevated summer sea surface temperatures exceeding 34-36 °C and salinities frequently above 40 psμ, conditions that surpass those typically

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