In vitro regeneration of small colony fragments of *Pocillopora damicornis* produces clones to examine the effect of monochromatic lights on coral tissue growth and the density of symbiotic zooxanthellae

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Abstract

Scleractinian corals predominantly reproduce by means of fragmentation thus experimental infliction of tissue lesion is the prominent approach to investigate coral growth. However, most of the early investigations were performed from the field, sometimes done hard and inaccessible. In this study, clones of *P. damicornis* produced from inducing tissue regeneration through simple *in vitro* system was used to examine the effect of various monochromatic lights on the growth of its tissues and density of *in situ* symbiotic zooxanthellae, using light microscope. To induce coral regeneration, small apical colony fragments (c.a. = 8-10 cm) were excised then fixed separately on the cover slip with a drop of silica gel inside the glass dish containing raw seawater. After 1-2 weeks, new tissue layers tend to extend towards the glass surfaces. Healthy clones were exposed independently to intermittent light treatment (14h light: 10h dark) every 48h for 10 days at irradiance levels 1.0, 1.5 and 2.0 W/m^2, respectively. The length of tissue extension and density of *in situ* zooxanthellae cells from light treated and control samples were calculated by examining the serial micrographs. Coral tissue growth and population of zooxanthellae cells changed significantly depending on light coral and intensity. Among monochromatic lights, blue rays (470 nm) further enhanced the tissue regeneration for up to 159.7 μm/day or 5.34% growth rate and increase in zooxanthellae density to 35.8 cell/μm^2/day or 4.42%. In contrast, the red 62 (620 nm), far red (737 nm) and UV-A (375 nm) radiations inhibited the proliferation rates of both host and symbiont cells. This study contribute knowledge to further understand coral reproducibility and its viability for clone production that could be utilized as feasible source of explants for various coral examinations, transplantation, husbandry, biotechnology and number of microscale analyses.

Keywords: *Pocillopora damicornis*, *in vitro* regeneration, monochromatic lights, tissue extension, zooxanthellae density

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