



Effect of light and feeding on the fatty acid and sterol composition of zooxanthellae and host tissue isolated from the scleractinian coral *Turbinaria reniformis*

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ABSTRACT: The fatty acid and sterol compositions of zooxanthellae and animal fractions of the scleractinian coral *Turbinaria reniformis* were investigated under different light and feeding conditions, to study the symbiont-host exchanges. Nubbins were maintained during 6 weeks under two light levels (100 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ and 300 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$) and two feeding levels (starved and fed with zooplankton) in a factorial experiment. There were greater proportions of some polyunsaturated fatty acids (PUFA; e.g., C18:4 n-3, C20:5 n-3, C22:6 n-3) in the zooxanthellae than in the host, suggesting that these PUFA were synthesized by the algae and transferred to the animal. Conversely, C20:4 n-6 exhibited a greater proportion in the host and might have been synthesized by the animal. Light affected the chlorophyll content, the rates of photosynthesis, and the lipid production of all coral samples. Corals maintained in high-light conditions had lower relative phytol content but higher concentrations of fatty acids (FA) and sterols than the shaded corals. Feeding also affected coral metabolism, but differently according to the light level and despite the fact that the host did not directly incorporate the zooplankton lipids (PUFA and cholesterol). In low light, feeding resulted in an increase of growth rates and storage lipid concentrations, mainly saturated fatty acids (SAFA) and membrane constituents (PUFA and sterols). In high light, the lipid energy from the food was directed toward an increase in calcification, as well as in chlorophyll content and protein content. This study highlights the importance of feeding in sustaining coral metabolism, especially when light, or stress events, is limiting photosynthesis.

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