

Growth responses of mixotrophic giant clams on nearshore turbid coral reefs

ABSTRACT

Increasing evidence suggests that nearshore turbid coral reefs may mitigate bleaching of reef building calcifiers and play a critical role in the future of marine biodiversity in coastal areas. However, biomineralization processes on turbid reefs are relatively understudied compared to clear water counterparts and most published work focuses on corals. Here, we investigate how the mixotrophic giant clam *Tridacna squamosa*, a bivalve with ecological, cultural and economic significance, grows across a mosaic of less turbid to turbid reefs in the Coral Triangle. We construct growth chronologies from live and dead collected shells by measuring daily growth increments with petrography and scanning electron microscopy (SEM) to gain insight into growth rate on daily, seasonal and annual scales. We find annual growth is not significantly different across a turbidity gradient when scaled to ontogeny, while seasonal growth highly varies. $K_d(490)$ (a measurement positively correlated with turbidity) and chlorophyll-a are likely important factors driving seasonal growth on a turbid reef near a river, compared to sea surface temperature (SST), cloud cover and rainfall on a less turbid reef. On a daily scale, we investigate increment microstructure and spectral characteristics of chronologies, finding a relationship between tidal range and daily increments. Overall, our results indicate that light enhanced calcification is likely most important in the less turbid reef, compared to heterotrophic feeding in the turbid reef. The trophic plasticity of *T. squamosa* may allow for its sustained growth in marginal conditions, supporting evidence that these habitats serve as important conservation hotspots for diverse reef building taxa.