Trophic associations between *Macrocystis pyrifera, Chlorostoma brunnea* and marine fungi

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Introduction

The importance of grazers in facilitating fungal infection in marine plants was only recently discovered in salt marsh systems where gastropods were found to facilitate fungal invasion through grazer-induced wounds. These fungal infections led to drastic decreases in plant biomass and were recognized as important controlling mechanisms to salt marsh populations where this interaction occurred (Silliman and Newell 2003).

In contrast, studies of trophic interactions in kelp forests have traditionally focused on macroscopic organisms (Graham 2004, Pace et. al 1999). However, we have recently observed fungal epibionts growing on the blades of the giant kelp, *Macrocystis pyrifera,* primarily in association with grazing wounds created by subtidal turban snails. The goal of this project was to explore potential interactions between *Macrocystis pyrifera*, turban snails and fungal pathogens.

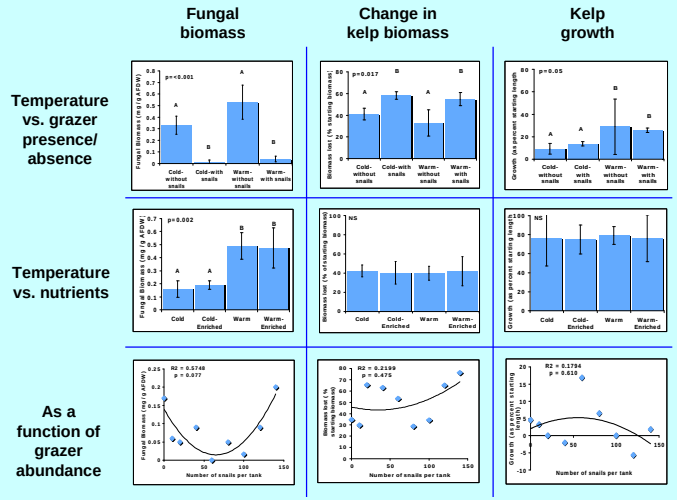
Methods

To investigate if snail grazing facilitates fungal growth on *Macrocystis pyrifera*, and how that may vary with temperature and densities of *Chlorostoma brunnea* (an abundant marine snail), we conducted mesocosm experiments manipulating these variables over a 6-month period. Sixteen 55-gallon tanks, plumbed with flowing seawater, were used to examine differences in *M. pyrifera* biomass, growth rates, and fungal biomass between treatments of:

- Warm/summer (12-14ºC) and cold/winter (10-12ºC) temperatures
- Snail presence and absence
- High and ambient nutrients
- Low to high snail densities

Fungal biomass was estimated from ergosterol content of kelp material as described in Gulis and Suberkropp (2006).

Results



Conclusions

In the presence of moderate densities of *Chlorostoma brunnea*, fungal biomass and *Macrocystis pyrifera* biomass were significantly reduced although the kelp remained intact. The biomass that was lost in the absence of snails was due to senescence of the fronds, suggesting that removal of fungi reduced frond decay. Also, *M. pyrifera* growth rates were higher in tanks with moderate grazer numbers and significantly higher in tanks with snails and warmer water. However, at higher densities of *C. brunnea*, we observed the snails grazing directly on *M. pyrifera* causing the degradation of the alga, corresponding with a subsequent increase in fungal biomass.

The relationship between *C. brunnea* and the unidentified marine fungi resembles the associations previously reported for salt marsh systems at high, yet naturally occurring, snail densities. At moderate densities, the snail is a consumer of the fungi, and the *M. pyrifera* acts as fungal substrate.

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