

Florida Integrated Science Center

Publication Brief for Resource Managers

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Inhibition of coral recruitment by macroalgae and cyanobacteria

Until the late 1970s, most coral reefs around the world were dominated by large stands of living coral, with relatively little macroalgae (commonly known as seaweed). In the 1980s, things started to change on Caribbean reefs. A keystone herbivore (the long-spined sea urchin *Diadema antillarum*) experienced widespread mortality, and corals started dying from diseases previously unknown to science. Add to that damage from hurricanes, over fishing of herbivorous fishes, and then in 1987, the first region-wide coral bleaching event, and many reefs were left with a lot less living coral and substantially more macroalgae. In fact many reefs are now dominated by macroalgae, with live corals forming only a minor component of the community.

Due to the appearance of reefs today, many people assume that macroalgae are superior competitors for space compared to corals. However, the usual sequence of events in reef degradation is that the corals die first, and are then overgrown by macroalgae. Past research has shown that adult corals are, in fact, very good at standing their ground. It is at the early life history stages, as larvae and new recruits, that corals are thought to be inferior competitors to macroalgae. In our study, we directly tested this hypothesis in controlled field experiments. We created special test chambers made out of clear plastic cylinders, capped with fine mesh on both ends, to keep the coral larvae in a small area. The larvae were then exposed to various algae and cyanobacteria attached to a clay tile where the coral larvae prefer to settle.

Our results are among the first empirical evidence that the continued dominance of today's reefs by macroalgae may be more complex than simple monopolization of space on the reef. Research is increasingly showing that coral larvae can sense the suitability of the substratum when they are looking for a good place to settle. This paper

Management Implications:

- A state of dominance by macroalgae on coral reefs is hard to reverse, and this study shows that this may be because coral larvae are competitively inferior to some common species of macroalgae at early life history stages.
- The importance of herbivores (fish and urchins) on coral reefs is further supported by this study. Restoring herbivore populations through protection from fishing or direct restoration may encourage the settlement and survival of coral larvae.

demonstrates that certain macroalgae may discourage coral larvae from settling nearby. Our results also show that, once settled, recruits that are in contact with several different species of macroalgae have higher mortality rates than those in contact with an inert plastic flagging tape (our control treatment). This suggests that something other than physical abrasion or shading is having a negative effect on the recruits, and we propose that it could be "chemical warfare," known to ecologists as allelopathy. Our continuing studies now focus on investigating the role of this mechanism in the interactions between macroalgae and coral at all life history stages.

Kuffner, I.B., L.J. Walters, M.A. Becerro, V.J. Paul, R. Ritson-Williams, and K.S. Beach. 2006. Inhibition of coral recruitment by macroalgae and cyanobacteria. Marine Ecology Progress Series. 323:107-117.

The full report is available for free on the publisher's website: <http://www.int-res.com/abstracts/meps/v323/p107-117/>