

# EFFECTS OF CORAL REEF HERBIVORES ON ALGAL TURF BIOMASS, SPECIES COMPOSITION, AND PRIMARY PRODUCTION

ROBERT C. CARPENTER

Marine Systems Laboratory,  
Smithsonian Institution,  
W-310 NHB,  
Washington, D.C. 20650

Algal turf communities are responsible for the majority of primary production on many coral reefs. Using natural turf communities on natural substrata (coral settling plates), the effects of different herbivore grazing regimes were determined in St. Croix, U.S. Virgin Islands. Algal turf biomass was lowest in treatments subjected to grazing by the echinoid Diadema antillarum, with algal biomass 2-5 times higher in treatments protected from such grazing. Ungrazed (minimally grazed) algal turf communities only achieved biomass values 5 times higher than those on grazed substrata after 12 months, suggesting an upper limit to the biomass level attained by these algal species. Algal species composition varied between grazing treatments with D. antillarum-grazed communities dominated by small filamentous and crustose species. Fish-grazed communities became dominated by one species of brown algae while micro-herbivore-grazed and ungrazed treatments were comprised of several macroalgal species. D.

antillarum-grazed algal communities, despite lower algal biomass, were as productive per unit area as fish-grazed and ungrazed turfs and were 3-5 times more productive per unit algal biomass than turfs in other treatments. This suggests that there are stimulatory effects of grazing by D. antillarum on algal turf production. D. antillarum is the major herbivore in terms of algal biomass removal in this locality, and exerts a strong controlling influence on reef algal community structure and metabolism.