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Settlement of Organisms on Debris in a Marine Community

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Abstract

Fouling organisms play an important role in the marine environment. These organisms will attach and settle to various things in the marine environment including many man-made items such as boat hulls and any debris that may carelessly be left behind. For this study, we wanted to observe what sort of impact debris has on the various types of fouling organisms found in Mosquito Lagoon, FL. We wanted to see what organisms would attach and settle to which substrates. The items used were: 1) water bottles, 2) soda cans, 3) monofilament line, and 4) miniature crab traps. The items were left in the water for 16 days and then identified and counted the various organisms that settled. Although a difference was observed between the different substrates, no statistically significant difference was found.

Introduction

Mosquito Lagoon, FL is a marine community full of diverse marine life including various species of algae, bryozoans, crustaceans, and many other invertebrates. Many of these organisms attach and settle to a specific site, whether natural or man-made. If the substrate that the organism settles on is not stationary, then the organism may be dispersed to other areas that are nearby or far away. A very common way this type of dispersal occurs is by organisms settling on debris left behind that may float away. The goal of our study was to determine what sort of impact debris left behind by people may have on this marine community, if any.

Materials and Methods

All research was conducted at Feller's House Field Station in Mosquito Lagoon (28° 54' N; 80° 49' W) from 24 March to 9 April, 2001. Four forms of human-related debris (treatments): 1) water bottles (591 mL), 2) soda cans (355 mL), 3) Vexar crab-traps (15.25 cm³), and 4) 100 lb. test monofilament line (1.5 m) were used to look at the impact of anthropogenic additions on the organisms likely to use this debris for settlement as well as a dispersal mechanism. Three replicates of each treatment were attached to a cement cinderblock, and submerged in the water column for 16 days. One randomly selected form of debris was attached to each of the two ends of the cinderblock with cable ties. Thus, six cinderblocks haphazardly placed into a shallow (1m) area of Mosquito Lagoon were used in this experiment. After 16 days, all debris were removed from the water and returned to the laboratory where all sessile organisms were quantified. Algae were recorded as percent cover and the total number of all other organisms were directly recorded. All data was statistically analyzed using a one-way ANOVA to determine any significant differences in the mean number of organisms settling on the debris.

Treatments



Treatment Set-Up



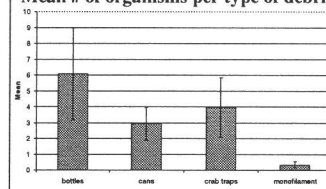
Submerged Treatments



Results

Several species of algae and sessile invertebrates were found on all four treatments after 16 days. There was no significant difference in the mean number of organisms settling on each treatment ($p=0.51$).

Mean # of organisms per type of debris



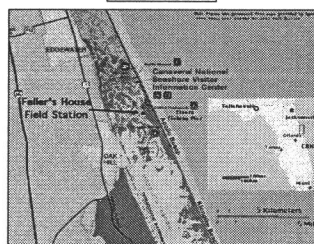
Percent Cover of Algae on Treatments

Algae	Bottles	Cans	Crab Traps	Monofilaments
<i>Cladophora</i>	61.67%	25.0%	31.67%	38.33%
<i>Chaetomorpha</i>	0	0	0	1.67%
<i>Enteromorpha</i>	0	0	0.67%	0
<i>Gracilaria</i>	0	0	1.67%	8.33%
<i>Dasya</i>	0	0	0	1.67%

Mean # of Individuals Found on Each Treatment

Organism	Bottles	Cans	Crab Traps	Monofilaments
Egg Sac	13.67	9.0	1.33	0
<i>Bugula neritina</i>	29.33	7.33	4.0	0
Cyprid	3.33	0.33	0	0
<i>Balanus eburneus</i>	0	0.67	0	0
Mud tube	4.33	1.33	29.0	3
<i>Crepidula</i>	0.67	0.33	0	0
<i>Botryllus</i>	3.33	2.0	0	0
Mollusc	0	0	1.33	0

Study Site



Discussion

Cladophora was the most abundant alga found on the substratums, mainly the crab traps and plastic bottles. Other algae found were *Enteromorpha*, *Gracilaria*, *Dasya*, and *Chaetomorpha*. The treatments did not significantly differ from one another. Settlement on the substrates was low in diversity and abundance. Some of the sessile invertebrates were bryozoans, gastropods, ascidians, and barnacles. The bryozoan settled on all treatments except the monofilament line. This could be attributed to the slipperiness of the line, which might make it difficult for the larvae to attach successfully. The crab traps also had limited settlement by the bryozoan and barnacle. Several variables may be responsible for the lack of settlement by invertebrates. First, a temporal factor may have played a role in which the larvae were not present in the lagoon during the 16-day interval the experiments were run. Secondly, it may be that the treatments did not have enough time to develop an adequate biofilm on their surface. Again, this may be due to the time of year, and biofilm was just not able to grow. This experiment shows what is able to settle on debris, even in poor recruiting conditions. Space for settlement is one of the most important limiting resources sessile invertebrates must combat. When debris finds its way into the water column, it offers new space that was not there before.

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