MANGROVE COMMUNITY MORPHOTYPE COMPARISON OF TWO SITES

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Abstract. Diverse assemblages of organisms grow on mangrove roots. We surveyed morphotypes growing on the top 30 cm of mangrove roots on a mainland site and an island site on the NW coast of Jamaica. Brown filamentous algae was the most common morphotype on the mainland in contrast to the island site where the orange sponge was the most common morphotype. We also found a more even distrubution of morphotypes at the mainland site than at the island site. This suggests that in environments such as the mainland mangroves, where there is more sunlight and less wave disturbance, there will be a higher number of common morphotypes.

Key Words: Sponge, algae, island, mainland.

INTRODUCTION

Mangrove forests, located at land-sea boundaries, are marginal ecosystems, with high salinity, and nutrient poor anoxic soils. Despite these environmental stresses, mangrove communities are extremely productive with net primary productivity 300% greater than tropical rainforest ecosystems. The mangrove trees themselves grow in homogenous, monoculture-like stands, yet their prop roots provide habitats for diverse epiphytic communities, including algae, sponge, tunicates, and anemones.

Previous studies have found that there are three times as many epiphytic species on the prop roots of red mangrove trees (*Rhizophora mangle*) than there are macrophytic species in the ecosystem. A large difference in species composition exists among roots, due to a variety of abiotic factors and biotic interactions (Sutherland 1980). One study found a decrease in epiphyte diversity on roots with increasing disturbance from wave action (Keyser et. al.). Our objective was to survey prop root community richness on red mangroves in two sites where several factors including exposure, circulation, temperature and light intensity may differ.

We hypothesized that algae would be the most common morphotype on the roots exposed to higher levels of light. We predicted (1) that at the mainland site, there would be many morphotypes being equally abundant at intermediate frequencies because of favorable growing conditions, such as abundant light, warm water, and low levels of disturbance. In the shaded, cooler island mangrove roots, where water circulation is greater, (2) we expected to see more morphotypes with very low frequencies for two reasons. First, in this area of greater disturbance where conditions are less favorable for algae growth, species that are outcompeted by algae in some environments should be able to establish themselves. In addition, in areas of greater water circulation, more species could potentially be distributed for recruitment to the mangrove roots. In these conditions, there would be less of an opportunity for any particular species to dominate.

METHODS

On March 6, 1997 at Salt Marsh, west of Falmouth on the Northern coast of Jamaica, we sampled two regions of mangrove growth, one on the mainland and one on an island on the other side of the channel (~75m apart). The mainland site faced south and received more light than the island site which faced north and west and was located in a shady inlet. Both sites were relatively sheltered from severe wave action, however the island was subject to stronger winds and offshore currents.

The group of students divided into pairs, creating eight sampling teams which spread out (~10m apart) along the mangrove edge. Each team arbitrarily chose three roots which penetrated at least half way down the water column at each of the two sites for a total of 24 roots sampled at each site. We measured the diameter of each root as well as the depth of the water at that point. We estimated species richness by counting the number of morphotypes present on the first 30 cm of the root (measured from the top of the water column down along the length of the root). Sponge morphotypes were distinguished solely by color and not by form, while the algal morphotypes were described and later most were keyed out to genus and often to species level. Some of the algal morphotypes were not present in the identification books, and so were grouped by qualitative description when possible. There were very few morphotypes of tunicates, anemones, and worms, and all were keyed out to species level. Morphotypes were classified as an algae, sponge, or other, which included anemones, tunicates, mollusks, and polycheates.

RESULTS

We found 37 different morphotypes in the mainland site and 37 morphotypes in the island site with a total of 47 morphotypes in both sites (Table 1.). There was no difference in the relative abundance of algae, sponge, and other invertebrate morphotypes between the two sites (ChiSquare, df=236, Pearson ratio=0.1, Table 1.).

We found that the water depth was greater (78.54+9.09) at the mainland site than at the island site (56.0+3.85; t-test, t=2.28, df=46, P=0.024).

At the mainland site 83.7% of the morphotypes were found on less than 7 roots (Fig 1.). At the island site 97.3% were found on less than 7 roots (Fig 2). The most frequently observed morphotype was a brown filamentous algae, *Cladosiphon occidentales*, (on 12 different roots out of 24 studied) at the mainland site. The most frequently observed morphotype at the island site was an orange sponge (on 13 different roots out of 24 studied). The orange sponge was also the most frequently observed on all the roots (seen 21 times out of 48 roots studied).

DISCUSSION

Although we only sampled the top 30 cm of the mangrove roots, a relatively tiny fraction of the total amount of mangrove root surface area, the abundance and diversity of species found at both sites was remarkable. As we predicted, the mangrove roots at the mainland site were dominated by a brown filamentous algae *C. occidentales*. The relatively high levels of light at the mainland site allow these slender, cylindrical, and sparsely branched plants to thrive on mangrove roots and sea grasses in shallow, quiet waters (Littler et al. 1989). The most frequently observed morphotype at the island site was an orange sponge. The orange sponge may be well-suited for life in a low-light, moderately disturbed environment such as the island site.

While there were no significant differences in the total number of morphotypes and the number of algae, sponges, and other invertebrates seen at the two sites, the trends suggest that individual morphotypes were found on more mangrove roots at the mainland site than at the island site (6 morphotypes occurred more than 6 times in the mainland site while only 1 morphotype occurred more than 6 times in the island site, Fig. 2.). The majority of island morphotypes were found on less than 2 roots. Whereas at the mainland site the morphotypes were equally abundant at intermediate frequencies. This suggests that in environments such as the mainland mangroves, where there is more sunlight and less wave disturbance, there will be a higher number of common morphotypes.

Future studies may wish to classify these mangrove root communities into species (not only color morphotypes) for more specific community structure, and survey the whole root (not just the top 30 cm) since communities may also vary with depth.

Table 1. The number of instances in which each morphotype occurred at each site.

Morphotype	Mainland site	Island site	Total
Green algae			
Bryopsis plumosa	1	3	4
Chaetomorfa linum	0	2	2
Acetabularia calyculus	3	1	4
Batophora aerstedii	0	1	1
Derbegia sp.	1	1	2
Cladophoropsis macromeres	1	0	1
Dasycladus vermicularis	1	3	4
Fernlike w/knobs	4	0	4
Red algae			
Wranglia argus	5	3	8
Acanthopoara spicifera	0	1	1
Galaxuzra subverticulata	4	1	5
Digenia simplex	4	6	10
Centroceras calvulatum	1	0	1
Jania adherens	1	0	1
Amphiroa fragilissima	2	2	4
Eupogodim antillarum	0	1	1
Hypnea musiciformis	0	1	1
calcareous algae	5	5	10
filamentous algae	1	1	2
Brown algae			
Cladosiphon occidentales	12	5	17
Rosenuingea sanctaecrucis	0	1	1
Dictyota divaricata	2	1	3
branching algae	0	2	2
encrusting algae	0	1	1
Algae total	53	46	99
Sponge			
green	8	3	11
pink	4	4	8
purple	5	6	11
gray	3	4	7
white	2	6	8
orange	8	13	21
lavender	2	2	4
yellow	6	2	8
black	5	4	9
turquoise	3	3	6
red	3	2	5
blue	8	1	9
brown	1	2	3
maroon	1	0	1
yellow & black	0	1	1
Sponge total	58	49	107
Other			
Pale anemone	9	1	10
Mangrove tunicate	9	3	12
Variegated tube worm	2	0	2
mollusk	1	0	1
green tunicate	1	0	1
polycheate	1	0	1
fan worm	1	1	2
Other total	25	9	34
Total	136	104	240

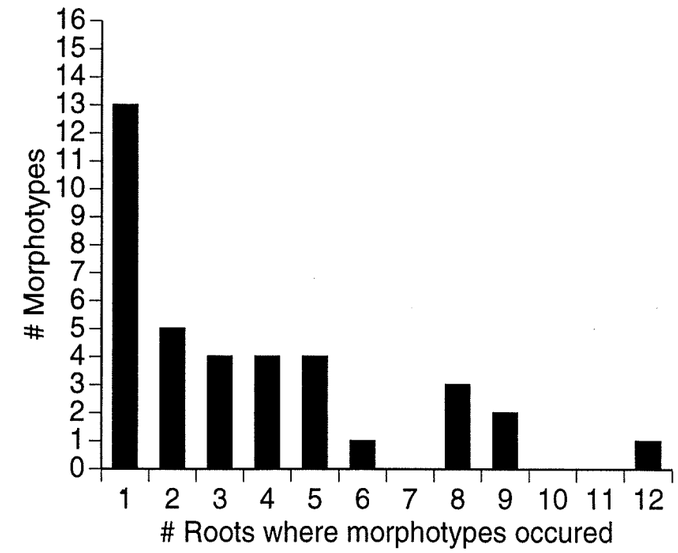

Fig. 1. Frequency distribution of number of morphotypes at the mainland mangrove site (n=24).

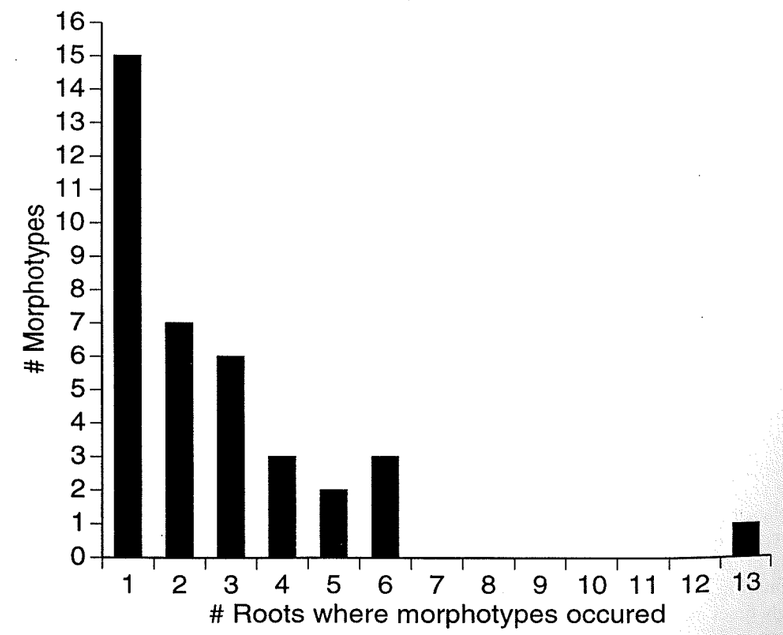

Fig. 2. Frequency distribution of number of morphotypes at the island mangrove site (n=24).