DIFFERENTIAL GRAZING ON THALASSIA TESTUDINUM IN AND OUT OF STEGASTES PLANIFRONS TERRITORIES

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ABSTRACT (JJR)

The exclusion of other fish from damselfish territories often results in higher macroalgae productivity (Kaplan, 1982). We predicted that turtle grass, Thalassia testudinum would experience less herbivory in three-spot damselfish, Stegastes planifrons territories. Experiments involved the placement of bunches of T. testudinum leaves in and out of territories revealing our expected trend, but not to a statistically significant degree. Factors including S. planifrons' inability to completely protect a territory and limitations of our methods may have confounded our data.

Key Words: Thalassia testudinum , Stegastes planifrons , herbivory

INTRODUCTION (AEL)

The three-spot damselfish (Stegastes planifrons) defends territories of algae covered coral roughly a meter in diameter, which they protect by threatening and attacking invading fishes (Kaplan, 1982; Itzkavitz, 1979). Klumpp et al. (1987) found that the productivity of algal communities in damselfish territories was 1.6-3.4 times higher than that of algae outside territories. Thalassia testudinum is a highly palatable turtle grass eater by sea urchins, parrotfish, and other herbivores. We tested the effectiveness of three-spot damselfish defense to decide herbivory by experimentally placing T. testudinum within their territories. We predicted that grass inside territories would be eaten less than grass in similar areas not protected by the damselfish.

METHODS (JJR)

This study was conducted on 22-23 February, 1994, on the back reef of Discovery Bay Marine Laboratory, Jamaica. We collected 240 virtually ungrazed T. testudinum leaves. The tips were cut off those that had a few bites, so none showed any effects of herbivory. The leaves were then haphazardly grouped into bunches of 12, held together by clothespins. With metal bolts as weights and floating scintillation vials as markers, 10 bunches were placed in separate S. planifrons territories on the reef crest and 10 were placed in similar habitats that did not appear to be S. planifrons territories. All leaf bunches were collected the following morning, approximately 24 hours later. Upon examination each bunch was placed in one of two categories: 1) those with little or no grazing and 2) those with heavy grazing, almost down to the clothespins.

A G-test was used to compare proportions of bunches in each of these grazing categories for the territory and control groups.

RESULTS (AEL)

We found that 44% of the Thalassia bundles in damselfish territories had high herbivory compared to 70% with high herbivory in control areas. Overall, there was more herbivory on Thalassia in the control areas than in the damselfish territories (Figure 1); however, this difference was not statistically significant (G-test, $p > 0.05$).

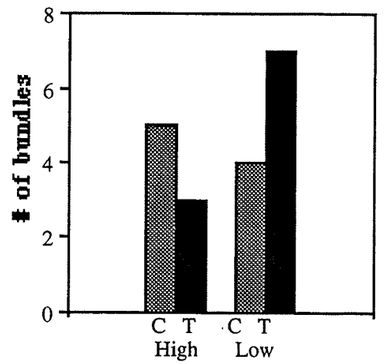

Figure 1. Herbivory on Thalassia bundles in control (C) and damselfish territories (T).

DISCUSSION (EHA)

We feel this study reflects a biological trend; herbivory on Thalassia is lower within S. planifrons territories than on the surrounding non-defended substrata. However, other factors may be helping to determine the extent of herbivory on the reef. Foster (1985) found that blue tang and surgeonfish that are excluded from feeding on damselfish territories when solitary, can overwhelm the defender when they forage in groups. Mixed species schools are present on the reef, and one of these schools may have encountered our Thalassia treatments in territories, accounting for those we found highly grazed. Furthermore, the three-spot damselfish is a diurnal species; they do not defend territories 100% of the time. There may be herbivores on the reef which either do some of their foraging nocturnally, such as the urchin Diadema, or forage earlier in the morning or later in the day than S. planifrons, thus exploiting these territories as food resources.

In general, it appears that S. planifrons effectively excludes other herbivores from its territory, resulting in areas of lower herbivory and perhaps higher productivity then the surrounding substrata. Perhaps a larger sample size and greater accuracy in the placement of Thalassia bundles wou give one more robust results in future studies.

LITERATURE CITED

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