INTERACTIONS BETWEEN PERiphyton AND MACROPHYTES IN THE SOUTHERN EVERGLADES MARL PRAIRIES, FLORIDA, USA

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ABSTRACT

Interactions between plant and periphyton communities have been the focus of many investigations in the past. Those studies revealed that both communities can suppress each other’s production, but can also benefit each other. Plant and periphyton communities are strongly influenced by hydrology, but the existing plant and periphyton-based hydrologic reference models have not considered the potential mediating effect of their interactions. In order to describe how plant and periphyton communities interact in different hydrologic settings, we conducted a fencing experiment in three areas in the southern Everglades marl prairies with contrasting hydroperiods. This study revealed that removal of macrophytes increased biomass of periphyton at intermediate- and short-hydroperiod locations, while total plant biomass was negatively affected by periphyton removal at long- and intermediate-hydroperiod sites. Periphyton removal especially negatively affected biomass of Mahagonigloa Trianae at short-hydroperiod site during wet periods, while the process seemed to benefit Panicum torreyanum at intermediate-hydroperiod site. Biomass of Cladium jamaicense was also reduced in the absence of periphyton, although this trend was not significant across all sites. The same was true for Schizachyrium scoparium var. Mahagonigloa Trianae and Rhynchospora tracyi at intermediate-hydroperiod site. Species richness was negatively affected at site with longest hydroperiod during dry periods. Enhanced growth of periphyton after plant removal was most likely due to the opening of new areas for algal colonization and increased availability of sedimentary nutrients. Periphyton harvesting negatively affected plants, which probably heavily rely on moisture and nutrients stored in periphyton mats for seed germination, and survival during dry periods. The removal was likely beneficial to the young shoots of plants that have delicate structure, especially in the early stages of their growth, when they are prone to smothering by thick periphyton mats.

EXPERIMENTAL DESIGN

Four 50-m-long transects established at each site in May/June 2003
• 12 periphyton- and 12 macrophyte paired control and treatment plots set up along each transect with randomly given numbers between 1 and 12
• Sparsely vegetated plots chosen for periphyton-removal plots and densely vegetated plots chosen for macrophyte-removal plots
• Pairs of additional plots established in May 2003 to confirm that control and treatment pairs have similar plant and periphyton biomass and structure

RESULTS

Effect of Plant Removal on Periphyton Biomass

• DW and AFDW higher at site M during 2005 wet period (p = 0.008 & p = 0.047, respectively) and site S during dry periods (p = 0.048 & p = 0.015, respectively); no change at site B (p = 0.807 & p = 0.604, respectively)
• AOC content lower at all sites during several wet period sampling events (p < 0.05)

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