SCCWRP Annual Report 2001-02

Equal loads of nutrients administered to macroalgae via pulses of differing frequency and concentration affect growth and tissue nutrients of *Enteromorpha intestinalis* and *Ulva expansa*

Krista Kamer, Rachel Kennison1, Peggy Fong1, and Kenneth Schiff

[1]*University of California, Department of Organismic Biology, Ecology, and Evolution, Los Angeles, CA*

ABSTRACT

Nutrient inputs to estuaries vary over temporal scales from hours to months, and macroalgae can store nutrients and use reserves for growth when external nutrient supplies are low for periods of up to 2 months. We investigated the effect of frequency and concentration of nutrient (nitrogen [N] and phosphorus [P]) supply on algal growth and tissue nutrient dynamics of *Enteromorpha intestinalis* and *Ulva expansa*, two bloom-forming green macroalgae. Over a 28-d period, *E. intestinalis* and *U. expansa* were each given equal supplies of NO_3-N (28 mg) and PO_4-P (6.2 mg) via pulses of different frequencies and therefore different concentrations. The NO_3-N doses given to 10 g wet weight (wet wt) of algae in 1 L seawater were: 1 mg (daily), 7 mg (weekly), 14 mg (biweekly), or 28 mg (monthly). Phosphorus was also added in a 10:1 (molar) ratio. *E. intestinalis* and *U. expansa* responded to all nutrient doses used in this study. Growth increased most with daily doses of N; however, positive growth was seen in both algae for all frequencies of N doses. Algae were able to store enough nutrients from the large, monthly pulse to continue growing in a low N environment for up to 28 d. Tissue nutrient content was also related to frequency and concentration of N doses. Total mass of N and P in algal tissue (mg unit-1) increased as frequency of N doses increased. Overall, tissue N concentrations were greater in *U. expansa*, and tissue P concentrations were greater in *E. intestinalis*. *E. intestinalis* and *U. expansa* removed substantial portions of the nutrient doses. Twenty-nine percent to ninety-six percent of added nutrients were removed from the water by algae within 24 h. The frequency of nutrient inputs to coastal systems may be critical in determining macroalgal biomass, and temporal scales should be taken into account when regulating nutrient loads in order to minimize macroalgal biomass.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2001_02AnnualReport/15_ar07-krista.pdf