HABITAT MATTERS FOR INORGANIC CARBON ACQUISITION IN 38 SPECIES OF RED MACROALGAE (RHODOPHYTA) FROM PUGET SOUND, WASHINGTON, USA

Maurizio Murru and Craig D. Sandgren

University of Wisconsin-Milwaukee, Department of Biological Sciences, P.O. Box 413, Milwaukee, WI 53211

ABSTRACT

Measurements of pH drift were used to measure the ability of 38 red algal seaweeds to utilize bicarbonate and to deplete the dissolved inorganic carbon pool (DIC) from seawater medium. Subtidal algae were typically restricted to the use of DIC in the formed of dissolved CO_2, reducing the initial DIC by only 9%. Intertidal species used both dissolved CO_2 and bicarbonate, and reduced initial DIC by as much as 70%. DIC reductions and pH compensation points for the intertidal species tested were strongly correlated with their vertical zonation on the rocky shoreline (ANOVA). DIC acquisition efficiency increased with tidal height, but species from the upper edge of the intertidal demonstrated a reversal of this trend. This general pattern associated with tidal height was observed, not only among intertidal red algae in general, but also among four species of the genus *Porphyra* (*P. torta* V. Krishnamurthy, *P. papenfussii* Krishnamurthy, *P. perforata* J. Agardh, *P. fucicola* Krishnamurthy) and among four populations of the broadly distributed species *Mastocarpus papillatus* (C. Agardh). The *Mastocarpus* observations suggest either that individuals of this species may be able to express alternate strategies for carbon acquisition, or that intertidal height may select for survivorship of genotypes with different carbon acquisition strategies. Taken together, these data suggest that the carbon acquisition strategy of intertidal red algae may be an important physiological set of adaptations that is under active evolutionary selection. These physiological differences were not related to phylogeny, tested as membership in red algal families and orders.

Key Index Words: Carbon Uptake; Dissolved Inorganic Carbon; Intertidal; pH Drift; Rhodophyta; Seaweed; Subtidal.

The original article was published in
Journal of Phycology, **40**: 837-45 (2004), © Phycological Society of America,

The permission to post the above abstract was kindly granted by the Publisher

Blackwell Publishing, Inc.
PO Box 805
9600 Garsington Road
Oxford
OX4 2ZG
United Kingdom
www.blackwell-synergy.com