

GROWTH OF *STIGEOCLONIUM* AND *OEDOGONIUM* SPECIES IN ARTIFICIAL AMMONIUM-N AND PHOSPHATE-P GRADIENTS

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ABSTRACT

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Four benthic filamentous Chlorophycean species (three *Stigeoclonium* species and one *Oedogonium* species) were obtained from two ditches, influenced, respectively, by the point discharges of pig farm and sewage treatment plant effluents. The ditches showed a gradual change in water chemistry, particularly with regard to ammonium-N and phosphate-P. The growth of the algae was studied in artificial ammonium-N (concentration range of 1–100 mg l⁻¹) and phosphate-P gradients (concentration range of 0.1–15 mg l⁻¹), which were based on concentrations of these nutrients in the ditches. Maximum growth in ammonium-N was attained for *S. aestivale* Hazen Z1 and *S. helveticum* Vischer P4 at 50 mg l⁻¹, for *S. aestivale* Z4 and *Oedogonium* sp. Z4 at 10 mg l⁻¹, and for *S. amoenum* Kützing P2 at 5 mg l⁻¹. Maximum growth in phosphate-P was attained for *S. helveticum* P4 at 15 mg l⁻¹, for *S. aestivale* Z1 and *S. amoenum* P2 at 1.5 mg l⁻¹, and for *S. aestivale* Z4 and *Oedogonium* sp. Z4 at 1 mg l⁻¹.

It is concluded that the ammonium-N and phosphate-P levels of ditches determined the distribution of the algae along the ditches, and therefore influenced the species composition of the periphyton communities.

The study revealed a population differentiation with regard to ammonium-N in two closely adjacent populations of *S. aestivale*.

INTRODUCTION

The relationships between water chemistry and species composition of periphyton communities have gained considerable attention (Arthur and Horning, 1969; Cooper and Wilhm, 1975; Eminson, 1978; Collins and Weber, 1978). However, experimental evidence for differences in the nutritional demands of benthic algae from various habitats is lacking.

Klapwijk (1976, 1978) studied the periphyton assemblages of two Dutch polder ditches, influenced, respectively, by the point discharges of pig farm and sewage treatment plant effluents. In both ditches a gradual change in chemical parameters, particularly ammonium-N and phosphate-P, and in

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