Growth and biochemical responses of the benthic diatom Entomoneis paludosa (Bacillariophyceae) to dissolved inorganic and organic nitrogen in culture

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Résumé

Benthic diatoms are dominant primary producers in intertidal flats. This study investigated the effect of different nitrogen sources and concentrations on Entomoneis paludosa growth and photophysiological response. Six nitrogen sources, either inorganic (nitrate and ammonium) or organic (urea, arginine, glutamine and glycine) supplied at two concentrations (40 and 400 μM-N) induced significant effects on growth, carbon, nitrogen, pigment content and maximum PSII quantum efficiency (Fv/Fm). Entomoneis paludosa grew under all nitrogen sources albeit showing differences in lag phase, growth rate and cell yield. Inorganic nitrogen, urea and arginine induced higher growth; whereas, glycine did not support high biomass. Fv/Fm showed variability dependent on nitrogen source and C/N ratio. Fv/Fm varied between 0.55 and 0.65 at 400 mM-N with the highest values observed in glycine, glutamine and urea; whereas, nitrate, ammonium and arginine induced lower Fv/Fm. All cellular components decreased in the 40 μM-N treatments, with nitrogen and pigments being lower than carbon content. Light-harvesting pigment ratios Chl c/Chl a and photoprotective pigment ratios (diatoxanthin + diadinoxanthin)/ Chl a increased, while fucoxanthin/Chl a ratios were unaffected by N-limitations. Entomoneis paludosa was capable of quickly adapting and use a wide variety of nitrogen sources. This adaptability may contribute to microphytobenthos diatom ecological success in mudflat ecosystems.

Mots-Clés: Microphytobenthos, pigments, amino acids, nitrate, urea, ammonium, fluorescence, PAM

*Intervenant