In situ community N_2 fixation rates of the Mediterranean seagrass *Posidonia oceanica*: temporal and spatial variability

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ABSTRACT

First estimates of N_2 fixation activities associated with the phyllosphere of *P. oceanica* in the Mediterranean Sea were as high as 15.2 mg N m^{-2} d^{-1}, which is higher than most rates reported in the phyllosphere of tropical seagrasses. These rates can potentially supply the total N demand of *P. oceanica* and can contribute significantly to the N budget in the Mediterranean Sea. To support these important ecological importance of N_2 fixation in *P. oceanica* beds, wider spatial and temporal scope are needed. Here we show through wider spatial and temporal studies that the rates vary interannualy, seasonally and spatially. In a specific site in Mallorcan waters (Alcanada, Alcudia Bay), the above-ground whole community *in situ* N_2-fixation rates of *P. oceanica* ranged from 59-1515 µg N m^{-2} d^{-1} and based on correlative analyses, showed a significant ($p< 0.05$) exponential fit with temperature (r^2=0.99), positively linearly correlated with epiphytic biomass on the leaves (r^2=0.89) and water column total N concentration (r^2=0.93), but negatively correlated with water column chlorophyll concentration (r^2=0.89). We also calculated here how much can N_2 fixation contribute to the total N demand of *P. oceanica* along the year.

Molecular characterization of a scytonemin-producing microbial mat from Canary Islands

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ABSTRACT

Microbial mats are multilayered microbial communities usually growing in environments with extreme conditions, such as intertidal flats, hypersaline ponds or hot springs. Cyanobacteria form the top layer of microbial mats where they produce and accumulate the extracellular pigment, scytonemin, to protect themselves from UV irradiation. To date, the intertidal microbial mat community, particularly the scytonemin-producing cyanobacteria, from Canary Islands, has not been studied. In this work, we study the scytonemin-producing cyanobacterial community from the intertidal zone at a site in Las Palmas de Gran Canaria, by PCR amplification of *scyC* gene (encoding a protein involved in the biosynthesis of scytonemin) and phylogenetic analysis using 16S rDNA gene cloning and sequencing. The *scyC* gene was amplified from all samples. The phylogenetic analysis of a clone library of 16S amplicons from two samples revealed that pseudanabaenacean cyanobacteria related to the genus *Phormidesmis* were more abundant. The presence of these pseudanabaenacean cyanobacteria along with other Nostocales and Chroococcales was confirmed through both optical and electron microscope observations. Also, pure scytonemin and reduced scytonemin were isolated from these samples and both compounds were identified by ^{1}H-NMR and MS.