Resumen

The marine angiosperm Posidonia oceanica is a mediterranean endemism of great ecological significance. As other marine plants, P. oceanica has adapted secondarily to the marine environment and develop anew different mechanisms to colonize it. Among others, this plant has developed a plasma membrane system for the direct uptake of bicarbonate. In this work we have developed both NO$_3^-$ and Cl$^-$ selective microelectrodes for the continuous monitoring of the intracellular (cytosolic) NO$_3^-$ and Cl$^-$. In the light, leaf mesophyll cells show a cytosolic NO$_3^-$ concentration of 5.7±0.2 mM (n=10), while in the dark cytosolic NO$_3^-$ raises up to 8.7±1.1 mM; these values are in the range of concentrations quoted for Arabidopsis thaliana (Cookson et al., 2005). The enrichment of natural seawater (NSW) with 3 mM NaHCO$_3$ caused a decrease of the cytosolic NO$_3^-$ concentration of 1 mM and a decrease of the cytosolic concentration of Cl$^-$ of 3.5 mM. The saturation of NSW with 1000 µL CO$_2$ L$^{-1}$ produced a lower diminution of the cytosolic NO$_3^-$ (0.3 mM). In the presence of 0.1 mM of the plasma membrane permeable inhibitor of the carbonic anhydrase (EZ) the diminution of cytosolic NO$_3^-$ caused by the same concentration of CO$_2$ was much lower, 0.1 mM. The addition of inorganic carbon, either HCO$_3^-$ or CO$_2$, has an effect on the cytosolic mechanisms for anionic homeostasis, one of which is the opening of the slow anion channels. These channels are permeable to NO$_3^-$ and Cl$^-$ and could elicit the efflux of these ions. In P. oceanica, the response in the presence of EZ points out that the inorganic carbon species that cause the NO$_3^}$/Cl$^-$ efflux is HCO$_3^-$. This effect could contribute to plant biomass N dilution observed in elevated CO$_2$.

References:


Fundings: