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Photosynthesis, Respiration, and Growth of Five Benthic Diatom Strains as a Function of Intermixing Processes of Coastal Peatlands with the Baltic Sea

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Abstract:

In light of climate change, renaturation of peatlands has become increasingly important, due to their function as carbon sinks. Renaturation processes in the Baltic Sea include removal of coastal protection measures thereby facilitating exchange processes between peatland and Baltic Sea water masses with inhabiting aquatic organisms, which suddenly face new environmental conditions. In this study, two Baltic Sea and three peatland benthic diatom strains were investigated for their ecophysiological response patterns as a function of numerous growth media, light, and temperature conditions. Results clearly showed growth stimulation for all five diatom strains when cultivated in peatland water-based media, with growth dependency on salinity for the Baltic Sea diatomisolates. Nutrient availability in the peatland water resulted in higher growth rates, and growth was further stimulated by the carbon-rich peatlandwater probably facilitating heterotrophic growth in *Melosira nummuloides* and two *Planorhynchium* sp. isolates. Photosynthesis parameters for all five diatomstrains indicated low light requirements with light saturated photosynthesis at $<70 \mu\text{mol photons m}^{-2} \text{s}^{-1}$ in combination with only minor photoinhibition as well as eurythermal traits with slightly higher temperature width for the peatland strains. Growth media composition did not affect photosynthetic rates.

Keywords: growth rate, flooding, ecocline, climate change, temperature, heterotrophy