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Differences in rhizome aeration of *Phragmites australis* in a constructed wetland

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Abstract:

Waterlogged soils are a challenging environment for plants due to anoxic conditions and enrichment of phytotoxic substances in the rhizosphere. High contents of organic matter in the substrate as present in constructed wetlands (CW) may amplify these effects. The influence of substrate organic matter on the rhizome aeration of *Phragmites australis* (common reed) was investigated in a CW for sewage treatment on two sites with different organic concentrations: (a) inflow part of the bed with high organic charge (high organic site) and (b) outflow of the bed with a lower organic charge (low-organic site). Several diurnal oxygen (O₂) courses were recorded inside the rhizomes using micro-optodes. Maximum O₂ values were lower in the low-organic site than in the high-organic site, leading to higher amplitudes at the low-organic site. The results suggest that oxygen release from the roots is hampered under high-organic compared to low-organic conditions. This observation might be explained by changes in gas conductivity of the roots, but also by alterations in microbial oxygen demand, under different organic burden.

Key-words: Oxygen demand, ROL, Organic matter, Eutrophication