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Rhizosphere dynamics of two riparian plant species from the water fluctuation zone of Three Gorges Reservoir, P.R. China - pH, oxygen and LMWOA monitoring during short flooding events

Christina M. Schreiber (1), Ulrich Schurr (1), Bo Zeng (2), Agnes Höltkemeier (1), and Arnd J. Kuhn (1)

(1) Institute of Chemistry and Dynamics of the Geosphere, ICG-3: Phytosphere, Research Centre Juelich, D-52425 Juelich, Germany, (2) Key Laboratory of Eco-Environments in Three Gorges Reservoir Region (Ministry of Education), School of Life Sciences, Southwest China University, Chongqing 400715, P.R. China

Since the construction of the Three Gorges Dam at the Yangtze River in China, the reservoir management created a new 30m water fluctuation zone 45-75m above the original water level. Only species well adapted to long-time flooding (up to several months) will be able to vegetate the river banks and replace the original vegetation.
To investigate how common species of the riverbanks cope with submergence, *Alternanthera philoxeroides* Mart. and *Arundinella anomala* Steud., two flooding resistant riparian species, have been examined in a rhizotron environment. Short-time (2 days waterlogging, 2 days flooding, 2 days recovery) flooding cycles in the original substrate and long time (14 days waterlogging, flooding, recovery) flooding cycles, in original substrate and sterile glass bead substrate, have been simulated in floodable two-way access rhizotrons. Oxygen- and pH-sensitive foils (planar optodes, PreSens) automatically monitored root reaction in a confined space ($2cm^2$ each) on the backside of the rhizotron, while soil solution samples were taken 2 times a day from the other side of the rhizotron at the corresponding area through filter and steel capillaries. The samples were analyzed by capillary electrophoresis for low molecular weight organic acids (LMWOA, i.e. oxalic, formic, succinic, malic, acetic, glyoxylic, lactic and citric acid).
Results show diurnal rhythms of rhizospheric acidification for both species in high resolution, combined with oxygen entry into the root surrounding during waterlogged state. Flooding caused stronger acidification in the rhizosphere, that were however not accompanied by increased occurrence of LMWOA except for acetic and glyoxylic acid. First results from longer flooding periods show stable diurnal rhythms during waterlogging, but no strongly increased activity during the flooding event.
Performance of the two species is not hampered by being waterlogged, and they follow a silencing strategy during a longer phase of anoxia without strong root turnover activity. *A. anomala* with its strong root system and ability to survive flooding is considered suitable for re-vegetating the riverbanks to help prevent further erosion, while *A. philoxeroides*, which discards its weaker roots during prolonged flooding and produces new roots afterwards, does not contribute much to soil stabilization.