

## Critical Role of a Wetland Plant on Uranium Biogeochemistry in an Iron-rich Reducing Condition

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Natural plants from wetlands can influence the behavior of uranium by providing favorable conditions for iron/uranium reducing bacteria and promoting *in-situ* remediation through the formation of iron plaque on the root. This hypothesis was examined using a series of greenhouse microcosm studies with a native wetland plant (*Sparganium americanum*) sampled from the Savannah River Site. Prior to introduction of a U(VI)-containing nutrient solution, iron plaque was developed on the root by using an anoxic Fe(II)-rich nutrient solution. The resulting iron plaque successfully stimulated the growth of target iron reducing bacteria, *Geobacter spp.* Their population continuously increased after the introduction of the U(VI)-containing nutrient solution. The reduction of U(VI) by iron reducing bacteria was deduced based on the observed increase of Fe(II) concentration after the introduction of U(VI) at the rhizosphere along with the decrease of U(VI) concentration in the pore water. The Fe(II) metabolized by the iron reducing microbial activity was assumed to be reoxidized to Fe(III) by the oxygen released from the root. Meanwhile, the U(IV) reduced by the microbial co-metabolism deposited on the root along with P, which was confirmed by SEM-BES-EDS and XANES analysis. The results reveal the crucial role of plant roots in a long term *in-situ* uranium remediation.