

Effect of iron plaques on rare earth element uptake during rice growth

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This study quantified the effects of iron plaques on rare earth elements mobility, uptake and growth of *Oryza sativa* rice, the absorption and further partitioning of these elements among plant roots, grains and shoots, as well as the role of iron oxide plaques, generated in the presence of iron(II) chloride or sulfate, in impeding rare earth element uptake by the rice plant root. In the absence of dissolved iron (II) or root iron oxide plaques, rare earth element concentrations of 0.5 mg/L and 1 mg/L decreased the root and shoot biomass, indicating plant growth inhibition. Upon addition of iron sulfate, a root and shoot biomass increase was observed at the lowest rare earth element concentration of 0.5 mg/L, and an inhibition of biomass production was obtained at the highest REE concentration of 1 mg/L. In the presence of iron (II) chloride, root and shoot biomass increased by 13% and 50% for REE concentrations of 0.5 mg/L and 1 mg/L, respectively. These results suggest a double role of iron(II) sulfate in plant protection by the formation of iron oxide root plaques but also in facilitating absorption of complexed REE-sulfate species. Iron-REE interactions in soil and growth medium should be considered to understand plant biomass productivity and REE cycling