Siderophore production by Mn-oxidizing fungi

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Siderophores are small organic molecules with a strong affinity for Fe(III) and other metals, including Mn(III), that are produced by microbes as a way to acquire these nutrionally necessary metals. Over 500 known siderophore structures exist, making investigation of their production and function in the environment challenging, as well as indicating the potential for a wide range of molecules to be produced by organisms in response to different environmental circumstances. In this study, we investigated the production of siderophores by Mn(II)-oxidizing fungi isolated from coal mine drainage remediation systems (Santelli *et al*. 2010). To further our understanding of the role siderophores may play in the acquisition and cycling of metals, we assessed whether these fungi produce different quantities or structures of siderophores in the presence and absence of manganese.

The fungal isolates were first screened for their ability to produce siderophores using a modified version of the CAS (Chrome Azurol S) Assay on agar plates. All fungi thus tested produced siderophores. However, the intensity and pattern of siderophore production during fungal growth varied for different isolates and did not directly correspond to growth rate. Additionally, a subset were tested for siderophore production while simultaneously oxidizing manganese on the CAS plates with positive results.

To identifiy the siderophores produced and further explore the potential effects of Mn on exudation, the fungal isolates were grown in defined liquid media with and without Mn. Qualitative and quantitative assessment of the siderophores extracted indicate that there was generally higher production of siderophores, as well as the enhanced production of specific siderophores, in the presence of Mn. The results suggest that siderophores may play as yet uncharacterized roles in the biogeochemical cycling of Mn.

[1] Santelli *et al* (2010), *Appl Environ Microbiol*. **76** (14): 4871–4875