

***In situ* Oxidation and Accumulation of Manganese By the Causal Agent of the Take-all Disease on Wheat (*Gaeumannomyces graminis*)**

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Micro-XANES (x-ray absorption near edge structure) and XRF (x-ray fluorescence) spectroscopy techniques were used to analyze living, darkly pigmented, hyphal networks of a soil-inhabiting fungus in a contained saturated soil. All analyzed hyphae were found accumulating Mn<sup>+4</sup> at levels higher than the surrounding soil. Koch's postulates with hyphal isolations from Mn oxidizing networks confirmed the identification of the fungus as *Gaeumannomyces graminis* var. *tritici*, a serious soil-borne pathogen of wheat. Given the integral nature of Mn in the development of this disease, and our ability to detect Mn dynamics over very small spatial scales and concentrations using micro-Xanes and XRF spectroscopy, further research will examine the role of Mn dynamics in the early stages of infection of wheat infected with *Gaeumannomyces graminis* var. *tritici*.