

Environmental Technology

Internalisation of *Salmonella* spp. by *Typha latifolia* and *Cyperus papyrus* *in vitro* and implications for pathogen removal in Constructed Wetlands

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Abstract:

Freshwater contamination by enteric pathogens is implicated in the high frequency of diarrhoeal diseases in low to middle income countries, typically due to poor wastewater management. Constructed Wetlands are a cost-effective and sustainable alternative to conventional/mechanical treatment technologies, but the pathogen removal mechanisms in Constructed Wetlands are not fully understood. This study investigated for the first time the internalisation of *Salmonella* spp. by *Typha latifolia* and *Cyperus papyrus* in hydroponic microcosms. Presence of *Salmonella* spp. within roots, rhizomes and shoots was assayed using agar-based methods over a period of 12 days. Concentration of *Salmonella* spp. in growth media showed 2.7 and 4.8 log unit reduction with *T. latifolia* and *C. papyrus*, respectively, and 1.8 and 6.0 log unit in unplanted units. *Salmonella* spp. was recovered from root and rhizome tissues of *T. latifolia* (up to 4.4 logCFU/g) and *C. papyrus* (up to 3.4 logCFU/g), and the bacteria were highly concentrated in the epidermis and cortex. However, *Salmonella* spp. was not detected in the stems and leaves of the two plant species. The present study demonstrates for the first time that these macrophytes internalise cells of *Salmonella* spp., which could be one pathogen removal mechanism employed by wetland plants.