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Modified filters with *Penicillium chrysogenum* culture enhance removal of copper and iron contaminants in water

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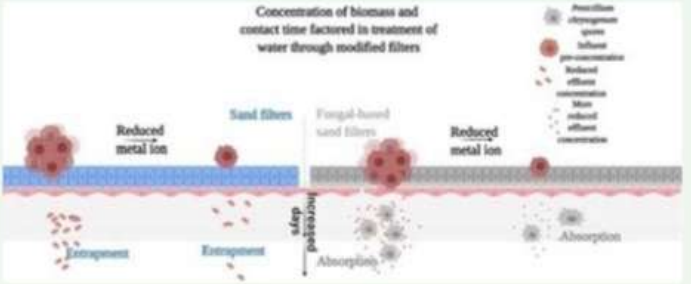
ABSTRACT

Development of a cost-effective and broad-based practical approach to wastewater treatment is of utmost importance, especially in developing countries. In this study, we investigated the efficacy of using *Penicillium chrysogenum* cells with sand filters for removal of heavy metals from contaminated water. This was done by designing three fungal-based sand filters (FSF) containing 30, 40, 50 spores/mL and sand filter (SF) without the fungus. These preparations were used to treat deionized water simulated with two concentrations of copper and iron (5 and 10 mg L^{-1} respectively). These simulations were prepared to create commonly observed contamination levels in many water sources. Effluent reductions relative to treatments effects were analysed using the standard protocol for eight days under aseptic conditions. On the eighth day, it was observed that the copper concentration (10 mg L^{-1}) was reduced to 0.106 mg L^{-1} in the 30 spores/mL treatment as compared to 0.198 mg L^{-1} observed in SF. It was also observed that copper concentrations were significantly reduced ($p \leq 0.05$) between FSF and the SF. There was also a significant reduction while comparing the metal removal in treatments after the second and eighth days. The general affinity range for iron in the four treatments was 30 > 40 > SF > 50, in that order has 94.26, 91.66, 87.98 and 85.48 as removal efficiency for iron (5 mg L^{-1}) on the eighth day. *P. chrysogenum* is therefore a valuable biosorbent that can help improve the quality of wastewater by biosand filter treatment.



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