Aspergillus niger-mediated bioremediation of Triton X-100-contaminated resources

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ABSTRACT

Water shortage, water pollution and climate changes are highly interrelated global issues. These have raised immense concerns about possible serious adverse effects on the quality, treatment and reuse of wastewater. This research aims to investigate the potential impact of Triton X-100 on the soilborne fungus Aspergillus niger (A. niger) as well as the ability of this organism to remove Triton X-100 from contaminated wastewater. We found that 2,250–6,000 mg/L Triton is toxic toward A. niger with irreversible effects, whereas 23–2,000 mg/L is inhibitory toward A. niger with reversible effects. These concentration ranges vary with initial concentrations of Triton and A. niger as well as with the contact time. At an initial concentration of 228 and 2,152 mg/L, A. niger can remove 20 and 28%, respectively, of Triton by day 1, which increase to 28 and 38%, respectively, by day 3. Another experiment showed that at an initial concentration of 50 and 100 mg/L, A. niger can biodegrade 29 and 15%, respectively, of Triton by day 1, which further increases to 87 and 34% by day 15. Adsorption and biodegradation are the mechanisms employed by the organism for Triton removal. Thus, A. niger can enhance biological treatment of wastewater.

Keywords: Triton X-100; Pollution; Water; Aspergillus niger; Toxicity; Biodegradability

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