ABSTRACT

Hexavalent chromium released from industrial effluents causes pollution of natural water resources and severe problems to human health. Toxic Cr (VI) is reduced to less toxic Cr (III) by bacteria, so chromate bioremediation is of significant interest. In this study, naturally occurring bacteria capable of removing and detoxifying hexavalent chromium were isolated from waste water and tanneries effluents. All the isolates were capable of removing chromium from aqueous solutions at different levels. Three isolates out of 18 were selected and analyzed for their potential to remove chromium in planktonic and biofilm mode. Most efficient chromium removing bacterium among the isolates was isolate T which was identified as *Bacillus cereus,* on basis of the morphological, biochemical characterization and 16S rRNA gene sequencing. *Bacillus cereus* tolerated Cr^{+6} up to 900 µg/mL. It also showed resistance to the other heavy metals such as Ni^{+2} and Cu^{+2} up to 400 and 500 µg/mL, respectively. But it was sensitive to Hg^{+} and Cd^{+2}. It removed 85% chromium from solution containing 100 µg/mL chromium by using 0.5 g of biomass within 3 hrs of incubation. It showed maximum biomass production at 37°C temperature, pH of 7.0, with glucose (0.5%) and ammonium sulfate (0.2%) as carbon and nitrogen sources, respectively after 48 hrs of incubation. *Bacillus cereus* showed maximum chromium removal at 35°C temperature, pH 7, 50 rpm agitation, with 0.5 g of biomass dose within 180 minutes of contact time. The data fitted best to Langmuir, Freundlich and Temkin isotherms which showed chromium biosorption is multilayered. *Bacillus cereus* is a potential local bioremediation agent and can be used for detoxification of chromium.