

Abstract

Contamination of water resources due to heavy metals is a global environmental challenge because of their toxicity, persistence and non-biodegradability. Conventional wastewater treatment methods, although effective, are costly and frequently produce harmful by-products, create the need for effective and sustainable alternatives. Seed mucilage is a plant derived biopolymer, and has obtained great attention as biodegradable adsorbent, cost effective and eco-friendly. *Salvia hispanica* seed mucilage for the removal of metals from wastewater was used as natural biosorbent. Mucilage was studied through UV-Visible, FTIR, SEM, EDX and XRD techniques to explore surface morphology, functional groups, crystallinity and interaction with metal ions. Characterization confirmed that presence of hydroxyl and carboxyl groups responsible for metal binding with mucilage through adsorption mechanisms. Gel forming and hydrophilic properties of CSM increase its capability to immobilize as well as capture the pollutants from aqueous system. For wastewater purification chia seed mucilage acts as biodegradable, renewable and low-cost effective material. Due to its eco-friendly and non-toxic nature, it is a fruitful substitute for sustainable water purification.