

Effect of industrial waste on early growth and phytoremediation potential of *Avicennia marina* (Forssk.) Vierh.

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Abstract

Discharge of industrial waste in streams, river and coastal areas may alter the physical and chemical properties of water, which may affect the growth of mangrove. Therefore, it was anticipated that if these wastes used as organic substitute on mangrove species *A. marina*, what will be the response of this species against particular industrial waste. For this purpose a greenhouse study was conducted to measure the effect of industrial waste on seed germination and growth rate of dominant mangrove species *Avicennia marina*. This study also evaluates the potential of *Avicennia marina* for Phytoremediation. Four types of industrial wastes were used to prepare polluted sea water. The results of the final germination revealed 90% germination in all treatment except ash and marble wastes. It was observed that Converter slag showed overall better results while chemical industrial sludge-ash showed most deleterious effect on all growth parameters among treatments. The results declared significant increase in shoot length ($P<0.001$), root length, fresh weight of shoot and dry weight of shoot and root ($P<0.01$) and fresh root weight ($P<0.05$). The concentrations of heavy metal varied significantly, depending upon the type of waste however, minimum values of all metals were obtained in marble waste. In contrast to marble waste Zn, Co, Mn and Pb were found maximum in prepared polluted sea water, soil, shoot and root in chemical industry sludge-ash while Fe was higher in converter slag treatment. The calculated values of Biological Accumulation Coefficient (BAC), Biological Transfer Coefficient (BTC) and Bio-concentration Factor (BCF) showed that *Avicennia marina* can efficiently act as a Phytoremediation species for selected heavy metals in Pakistan mangrove ecosystem. However, there should be a limit to add chemical pollutant in this ecosystem.

Keywords

phytoremediation, *Avicennia marina*, industrial waste, heavy metals