

## FURFURAL REMOVAL FROM A POLLUTED EFFLUENT BY USING A FLUIDIZED BED REACTOR

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Furfural is a heterocyclic aromatic aldehyde and wastewaters derived from its production can contain around 800 mg l<sup>-1</sup>, which can cause toxic effects on living systems if released into the environment without proper treatment. In the present work, the furfural removal from a simulated effluent by a fluidized bed bioreactor filled with an actinobacteria biofilm on vegetable sponge (*Luffa aegyptiaca*) support was studied. For this, a suspension of a mixed culture of *Nocardiosis* sp. L9, *Streptomyces* sp. A12 and M7, in TSB medium (D.O<sub>540nm</sub>=1) was prepared. The luffa support was cut in cubes of approximately 0.1 g, which were washed and sterilized. The bacterial biofilm production on luffa cubes was carried out in 250 ml Erlenmeyer flasks, which contained 0.5 g of the support and 60 ml of the bacterial suspension. After 96 h of incubation at 30 °C and 100 rpm, the colonized sponge cubes were introduced into the reactor for the bioremediation treatment. A laboratory-scale fluidized bed reactor was used, which had an inlet for the effluent to be treated in the lower side and an outlet for the treated effluent in the upper part. The furfural residual concentration in the treated effluent was evaluated by HPLC, every 24 h for 4 days. Ecotoxicity tests were carried out using *Raphanus sativus* seeds (radish, Punta Blanca variety). Bacterial colonization on vegetal sponge was also evaluated by scanning electron microscopy, before and after treatment. The analysis by HPLC showed a complete depletion of furfural in the effluent after 24 h of treatment. Microphotographs by scanning electron microscopy showed an increase in the presence of possible polymeric substances in luffa cubes at the end of treatment regarding to the initial time, as result of biofilm production by

the actinobacterial consortium. The ecotoxicity tests with radish seeds showed significant increases ( $p < 0.05$ ) in the vegetable biomarkers of seedlings obtained in the treated effluent, indicating that the toxic effects caused by furfural were reversed, confirming the effectiveness of the bioremediation process.

Keywords: Furfural, Actinobacteria, Biofilm, Bioreactor