Analysis and optimization of process parameters for production of Polyhydroxyalkanoates along with wastewater treatment by *Serratia* sp. ISTVKR1

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Abstract

A previously reported biodegrading bacterial strain *Serratia* sp. ISTVKR1 was studied for polyhydroxyalkanoate (PHA) production along with wastewater contaminant removal. Nile red fluorescence, GC-MS, FT-IR, NMR and TEM confirmed the accumulation of homopolymer poly-3-hydroxyvalerate (PHV) within the bacterial cells. Analysis of culture after 72 h of bacterial treatment showed maximum COD removal (8.4 fold), non-detection of organic contaminants such as 1H-Cyclopropa [a] naphthalene (R.T.= 10.12) using GC-MS and increased proportion of elements like Cr, Mn, Fe, Ni, Cu, Cd and Pb in the bacterial cell pellets by SEM-EDX analysis. Optimization of process parameters for enhanced PHA production along with wastewater treatment done using Response Surface Methodology (RSM) showed 5 % and 0.74 % increase in the PHA production (0.3368 ±0.13 g L-1) and % COD reduction (88.93 ± 2.41) of wastewater, respectively. The study, thus established the production of PHA along with wastewater contaminant removal by *Serratia* sp. ISTVKR1.

Keywords: polyhydroxyalkanoate, *Serratia*, wastewater, RSM, hydroxyvalerate