

MICROBIAL CELLULASES: THE POTENTIAL APPLICATION IN DYE REMOVAL FROM DENIM

SK Jayasekara¹, GDIS Karunarathna², CL Abayasekara³,
KLW Kumara² and RR Ratnayake^{1#}

¹National Institute of Fundamental Studies,
Hantana Road, Kandy, Sri Lanka

²Department of Agricultural Biology, Faculty of Agriculture,
University of Ruhuna, Sri Lanka

³Department of Botany, Faculty of Science,
University of Peradeniya, Sri Lanka

#renukar@ifs.ac.lk

Cellulases are enzymes that hydrolyze β -1, 4 linkages in cellulose. Their applications in industries such as paper, pulp, textile processing and food are gradually increasing. Especially, textile processing includes dye removal from denim to give a faded look to the cotton fabric. Replacement of conventional chemical dye removal methods with microbial cellulases is found economically as well as environmentally feasible. The objective of this study was to investigate the dye removal potential of crude cellulase enzyme extracts obtained from soil fungi. Cellulase production from each isolate was carried out in defined medium described by Mandels and Weber with incubation at 30^o C for 7 days at 120 rpm shaking. The culture filtrate in citrate buffer (pH = 4.8) was used as the crude enzyme extract to perform filter paper assay and to treat 5x5 cm denim swatch. The final absorbance

of the treated solution was measured at 600 nm by UV-visible spectrophotometer. The isolates with significantly higher total cellulase activities were morphologically identified. The highest total cellulase activity was observed in *Trichoderma* as 0.583 FPU/ml, followed by *Aspergillus* and *Penicillium* which showed total cellulase activities above 0.1 FPU/ml. The highest final absorbance was given as 0.937 by the enzyme extract from the same *Trichoderma* isolate while most of the other isolates gave an absorbance above 0.3. The dye removal potential of each isolate was directly proportional to their enzyme activities. The isolates with higher cellulase activities have the potential to be used in commercial level denim dye removal.

Keywords: Cellulase, Textile processing, *Trichoderma*