Abstract No: 122 ***Life Sciences***

IDENTIFICATION OF CELLULOLYTIC *Penicillium* sp. AND PRODUCTION AND CHARACTERISATION OF ITS ENZYME

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Cellulase is an enzyme complex consisting of exoglucanase, endoglucanase and β-glucosidase that acts synergistically to degrade cellulose matter. Fungal cellulases are widely used in industrial applications due to their high activity, availability and high stability. *Trichoderma*, *Penicillium* and *Aspergillus* are the most reviewed cellulolytic fungi, while *Trichoderma* is used in commercial level cellulase production. However, recently *Penicillium* sp. has gained attention as an efficient cellulase producer that might even outperform *Trichoderma* sp. Therefore, this study aimed to identify a soil cellulolytic *Penicillium* sp., characterise its extracellular cellulase, and optimise the growth media for the secretion of the enzyme. Pure fungal colonies were obtained, and initial screening for cellulolytic ability was carried out using Congo red and Gram's Iodine methods. Crude cellulase was characterised for optimum pH, temperature and effect of ions on cellulase activity. The fungal growth medium was optimised with respect to a carbon source, nitrogen source and pH, for cellulase production. Identification of the fungal species was carried out using morphological and molecular methods, where Internal Transcribed Spacer (ITS) based PCR amplification followed by sequencing was performed. Based on sequence similarity, the cellulolytic fungal species was identified as *Penicillium sumatraense*. The crude enzyme showed the highest activity at pH 4.0 and 60 °C, while the addition of Mn^{2+} ions increased the enzyme activity significantly. The fungus secreted high levels of enzyme when cellulose and $NaNO_3$ were used as carbon and nitrogen sources, respectively, and the pH of the medium was 6.0. Further studies related to the thermostability of *Penicillium sumatraense* cellulase and its efficiency compared to other cellulolytic fungi have to be performed.

Keywords: Filter paper assay, Fungal cellulase, Industrial cellulases, ITS based fungal identification, *Penicillium sumatraense*