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IDENTIFICATION OF A LIPOLYTIC *Trichoderma* sp. AND CHARACTERISATION OF ITS EXTRACELLULAR LIPASE

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Fungal lipases are used in many industries due to their low production cost, catalytic activity, ability to tolerate polar organic solvents and stability at high temperatures. The demand for lipases has kept researchers exploring new lipolytic fungi. However, the success of such studies lies in the optimisation of the growth conditions to maximise lipase secretion and characterisation of the enzyme activity. Therefore, the current study aims to characterise the crude enzyme extracted from a lipolytic *Trichoderma* sp. and identify the fungus to species level. The *Trichoderma* sp. was isolated from soil, and the lipolytic activity was determined qualitatively and quantitatively. The growth medium of the lipolytic *Trichoderma* sp. was optimised for carbon source, nitrogen source, and pH. The effect of pH, temperature, cations, and anions for the crude lipase activity was analysed. Total genomic DNA was extracted for species-level identification, and Internal Transcribed Spacer (ITS) region was amplified using ITS 1 and ITS 4 primers and sequenced. The results of the study revealed the dependence of extracellular lipase production on growth conditions. Maximum lipase secretion was observed with olive oil as the carbon source and ammonium sulfate as the nitrogen source at a pH of 7.0. The crude lipase activity was high at a pH of 6.0 and 40 °C. The significant lipase activity at high temperatures revealed the potential applications in industries. Moreover, Ca^{2+} and NO_3^- enhanced the crude lipase activity. Database analysis of the sequenced DNA region revealed the fungus as *Trichoderma longibrachiatum*. The study showed that the lipolytic *T. longibrachiatum* could be improved for industrial applications. Furthermore, the enzyme characterisation revealed the industrially important properties of the crude lipase extracted from the lipolytic *Trichoderma* sp.

Keywords: Fungal lipase, ITS, Lipase activity, *Trichoderma longibrachiatum*