Heterologous expression and characterization of plant lipase LIP2 from Elaeis guineensis Jacq. oil palm Mesocarp in Escherichia coli

ABSTRACT

In order to determine the potential of biochemical and structural features of Elaeis guineensis Jacq. oil palm mesocarp lipases, the LIP2 gene was isolated, expressed, purified and characterized through the Escherichia coli microbial recombinant system. Gene analysis of LIP2 revealed that it is composed of 1584 base pairs which are encoded in 528 amino acid residues with a molecular weight of around 57 kDa. LIP2 has distinctive lipolytic properties in terms of α/β fold and the catalytic triad for lipase. The LIP2 lipase was successfully expressed and purified from E. coli Rosetta (DE3) via affinity chromatography. The optimal temperature and pH for the lipase activity was 30 °C and a pH of 9, respectively. Stability was profoundly increased with the addition of metal ions (Ca2+, Mg2+, Mn+, and Ni+), along with organic solvents (ethanol and octanol). pNP myristate was the most suitable among all pNP esters. In biophysical characterization analysis, LIP2 has a thermal denaturing point at 66 °C, which mostly consists of random patterns (39.8%) followed by α-helix (30.3%), turns (23.8%) and β-sheet (6.2%). From the successful purification and characterization, the potential of oil palm mesocarp lipase was able to be further explored.

Keyword: Lipase; Oil palm mesocarp; Purification; Characterization