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Title: Biodiesel production from microalgae oil by lipase from *Pseudomonas aeruginosa* displayed on yeast cell surface

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Title:**Biodiesel production from microalgae oil by lipase from *Pseudomonas aeruginosa* displayed on yeast cell surface****Zeinab Raoufi^a, Seyed Latif Mousavi Gargari^a**^a*Department of Biology, Shahed University, Tehran, Iran*

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Highlights

- Lipase A from *P. aeruginosa* was displayed on *P. pastoris* cells.
- Biochemical characterization and stability of the LipA was investigated.
- Esterification was used to biodiesel production from algae oil by the biocatalyst.
- Operational stability of enzyme was tested in 10 repeated batch cycles.

Abstract

Yeast surface display has become a powerful technology in recent decades and one of the promising areas in this field is the biodiesel synthesis by microbial lipases. Hence, in this study the optimized lipase A (Lip A) gene from *Pseudomonas aeruginosa* was fused to GPI-anchored protein Gcw61 and successfully displayed on the surface of *Pichia pastoris* X33. A lipase activity of 85.2 U/mg dry cell weight was obtained from recombinant *P. pastoris*. The copy numbers of inserted lipase gene were determined 2.09±0.06 by real time PCR absolute quantification method. The enzyme showed the best stability in pH 7.0-10.0 and at temperature 37 °C-40 °C and was also stable in hydrophilic organic solvents. Ca²⁺, Mg²⁺, Mn²⁺ and Cu²⁺ ions enhanced enzyme activity, whereas Fe²⁺ and Zn²⁺ ions and some detergents like SDS, CTAB, Tween 20 and 80 dramatically decreased the activity of the enzyme. The results demonstrate that our whole cell biocatalyst exhibited a good potential for biodiesel production from microalgae oil in 10 repeated batch cycles.

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