

Optimization of medium components for enhancing lipid content in tropical marine yeast *Yarrowia lipolytica* NCIM 3589 grown on waste cooking oil

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- **Background:** *Yarrowia lipolytica* NCIM3589, an oleaginous yeast, is emerging as feedstock for biodiesel [1]. Accumulation of lipids in yeast can be improved by optimization of production medium and physical parameters. The present work aims at enhancing intracellular lipid levels when grown on waste cooking oil (WCO) using statistical based Response Surface Methodology (RSM) studies.
- **Methods:** Lipid accumulation medium (LAM) [1] components were chosen for the first level of statistical optimization by Plackett-Burman design (PBD) of experiments followed by Box-Behnenken design (BBD). Yeasts (2×10^9 cells ml⁻¹) were inoculated into LAM as per the design. A modified protocol of Yu et al. [2] was used for lipid extraction from biomass which was then transesterified to FAME. The fatty acid profiles and biodiesel properties were then ascertained [1].
- **Results:** Studies suggested that Na₂HPO₄, NH₄Cl and yeast extract were the most significant factors. Response surface analysis and ANOVA used to obtain the best-fit quadratic model brought out the nonlinear nature of the three variable interactions (Fig 1). Validation of model (Fig.2) showed that lipid content increased upto 64.5% as compared to 45.1% of control, i.e., a 1.43 fold increase in lipid content in optimized media. Preliminary metabolomic profiling for the yeast biomass showed higher levels of fattyacids, glycerol, 1,2 benzenediol and phosphoric acid on optimized media. The fatty acid profile and fuel properties, viz, density, saponification number, Iodine value, free fattyacid content, Kinematic Viscosity and Higher Heating Value were evaluated and found to be comparable with ASTM, EN and Indian Standards .

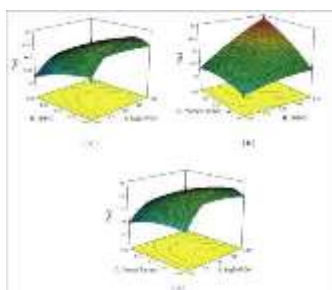


Fig.1

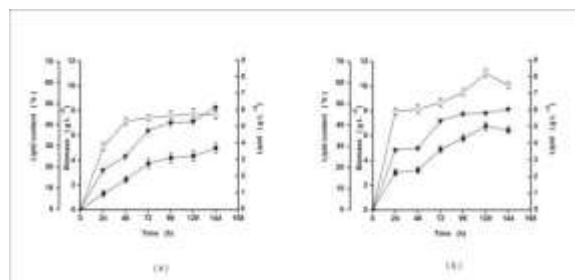


Fig.2

- **Conclusions:** Medium optimization using *Y.lipolytica* holds promise for biodiesel production as WCO used is a renewable substrate which not only is abundantly available and cheap, but also addresses the problem of its waste disposal. Additionally preliminary information obtained on metabolites may facilitate designing advanced cell factories for production of lipids in *Yarrowia*.

Biography:

Ameeta Ravikumar is the professor at Savitribai Phule Pune University