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Valorisation of wastes for single cell oil production by *Yarrowia lipolytica*

Marlene Lopes, João Melo, Isabel Belo
IBB - Institute for Biotechnology and Bioengineering, Portugal

Various strains of oleaginous microorganisms, mainly fungi and yeast, have been widely used for the production of single cell oil (SCO) rich in polyunsaturated fatty acids or having an exceptional triacylglycerol structure. Difficulties for industrial scale production are related to the high cost of fermentation and oil extraction. The quantity of oil accumulated per unit of dry cellular mass is a critical factor that influences the final cost of SCO. The economics of these bioprocess become more favourable when zero or negative value waste substrates are utilized as carbon or nitrogen sources. Although utilisation of crude glycerol in the fermentation medium without prior purification offers a remarkable advantage against the traditional use of pure glycerol as substrate only few reports have appeared in the literature on the use of this substrate as sole carbon sources. The aim of current investigation was to assess the potentialities of valorisation of crude glycerol and lard, residues used as a carbon source by *Yarrowia lipolytica* strain in order to the production of SCO. Batch fermentations in 1-L Erlenmeyer flasks were performed using pure glycerol, crude glycerol and lard as carbon sources, with different concentrations (20 g/L, 50 g/L and 80 g/L). *Y. lipolytica* W29 was pre-grown overnight in YPD medium, centrifuged and resuspended in each carbon source medium, supplemented with yeast extract (0.5 g/L). The production of SCO was carried out during 168 h at 27 ºC and 185 rpm. Yeast cells were able to grown on all carbon sources, although a slight inhibition with 80 g/L of pure and crude glycerol was observed. No significant differences on final cell dry weight were noted between the carbon sources, reaching approximately 5 g/L. The increase in carbon source concentration leads to an improvement in lipid accumulation inside the cells. The highest amount of reserve lipid was observed in medium with lard 80 g/L (21.3 % of cell dry weight). The strain showed the tendency to degrade its storage lipids when grown on 20 g/L of each carbon sources, probably due to the early consumption of substrate. Crude glycerol batch fermentation at 50 g/L in a 2-L bioreactor led to an accumulation of lipid content inside the cells of 37 % cell dry weight.The results of this study suggest that SCO could be produced by *Y. lipolytica* W29 using low-cost substrates, such as crude glycerol and lard.