Studies on lipase productivity of *Pseudomonas aeroginosa* and *Staphylococcus aereus* using cheap substrates

S. ARUNKUMAR, V. SIVAKUMARI, N.V. BASKAR AND S. SENTHILKUMAR

Asian Journal of Environmental Science (June to November, 2009) Vol. 4 No. 1 : 73-77

See end of the article for authors' affiliations

Correspondence to :
V. SIVAKUMARI
Department of Environmental and Herbal Sciences, Tamil University, THNJAVUR (T.N.) INDIA

SUMMARY

In the present study the lipase-producing organisms were isolated from the soil sample using olive oil containing medium. The isolates were identified based on the morphological and biochemical characteristics. The isolated *Pseudomonas aeroginosa* and *Staphylococcus aereus* were inoculated into inoculum medium and incubated at 37°C for 24hours used as the inoculum. The inoculums mixed with fermentative substrate like molasses and soybean, after incubation, the lipase was estimated. High lipase activity was observed in *Pseudomonas aeroginosa* inoculated medium. Maximum productivity was noted in pH 7 and temperature 35-40°C. Lipase productivity was maximum in the immobilized cell (0.49± 0.11µ/ml/min).

Key words : *Pseudomonas aeroginosa, Staphylococcus aereus*, Lipase

Accepted : ***April, 2009***

Lipase has become one of the prominent industrial enzymes for its specificity in hydrolysis and interesterification. It catalyzes both the hydrolysis of triglycerides and the synthesis of esters from glycerol and long chain fatty acids (Jager and Reetz, 1998). In addition, it also serve as biocatalyst for alcoholysis, acidolysis, esterification and aminoacids (Pandey *et al*., 1999). Lipase is produced by various microbes, such as bacteria, fungi, yeast, and also in the pancreas of mammals, like pigs and humans. It has also been reported in higher plants, such as castor bean (*Ricinus communis*) and rapeseed (*Brassica napus*) (Hellyer *et al*., 1999).

Numerous lipases have been characterized and efforts have been made to improve their stability in organic solvents for varied applications (Hung *et al*., 2003; Soumanou, and Bornscheuer, 2003). The most important commercial use of lipases are added to 13 billion tons of detergents produced every year (Jager and Reetz, 1998). Lipases are also emerging as important enzymes in the field of biopolymers. They are used in the synthesis of polymers (Gross *et al*., 2001). Immobilized *Pseudomonas fluorescence* lipase has been used for the production of bio diesel fuel from triglycerides and alcohols (Iso *et al*., 2001).

Transesterification of oils catalyzed by lipase have fuel (Fukuda *et al*., 2001). Use of organic solvents in transesterification reactions by lipase in producing methyl esters from sunflower oil showed improved conversion (Soumanou and Bornscheuer, 2003). Another major industrial application of lipases is in resolving racemixtures (Kamal *et al*., 2002; Paloma *et al*., 2003; Shibatani *et al*., 2000).

Optimization of the enantioselective resolution reactions in various bioreactors, like biphasic enzyme membrane reactors (Sakakai *et al*., 2001) and packed bed reactors (Sanchez *et al*., 2000) which favours large-scale production. Applications of lipases also extend to the field of waste management and improving tanning technique (Benjamin and Pandey, 1997) and in separation, which are difficult-to-separate mixtures of organic acids (Dai, 2000).

MATERIALS AND METHODS

Enrichment of lipase producing microorganism:

One gram of soil sample was suspended in 10ml sterile water. After shaking, 5ml suspension was added in 250ml Erlenmeyer flask containing 25ml of Enrichment medium. The medium was incubated at 30°C on a rotator shaker at 200 rev. /min for 3-5days, then aliquot was transferred to fresh medium and cultured again under the same condition. The above incubation and transfer operation were repeated for 5 to 6 times until microbial cells in the culture became nearly uniform (same were periodically observed under microbes). The enrichment cultivation on olive oil was carrier out on the assumption that microorganisms capable of growth on olive oil are capable of