

## ABSTRACT

The present study is concerned with the optimization of lipase production from the locally isolated *Aspergillus niger* and *Bacillus* sp and its application for the synthesis of biodiesel using low cost, non-conventional feedstock. Maximum activity of lipase was obtained, when *Aspergillus niger* and *Bacillus* sp. were cultured in a media containing 1% of olive oil as substrate. *Aspergillus niger* gave highest yield of lipase after 72 hrs of incubation at 30°C and 6.0 pH. On the other hand, maximum activity of lipase from *Bacillus* sp was obtained after 72 hrs of incubation at 37°C and 8.0 pH. 2% of glucose and 1% peptone were optimized to gain maximum activity of lipase from *Aspergillus niger*. In case of *Bacillus* sp, highest lipase activity was achieved when the culture medium was supplemented with 1% of glucose and 1.5% of peptone. The partial purification of microbial lipase was carried out by ammonium sulphate precipitation and the enzyme from *Aspergillus niger* and *Bacillus* sp. was purified to 0.740 and 2.77 folds, respectively. Calcium alginate beads were used for immobilization of lipase. The specific activity of immobilized lipase obtained from *Aspergillus niger* was 111.9 U/g. In case of *Bacillus* sp., the specific activity of immobilized lipase was 341.6 U/g. Microbial lipase was further applied on different types of oils to gain biodiesel. Cottonseed oil, waste cooking oil, oil extracted from *Spirogyra* and yeast cells were subjected to enzymatic and chemical transesterification reaction. The % age yield of biodiesel achieved by the activity of free lipase was higher as compared to the % age yield obtained by either chemical transesterification or immobilized enzyme transesterification. In the presence of lipase obtained from *Aspergillus niger*, the % age yield of biodiesel from waste cooking oil was 69.6% where as lipase from *Bacillus* sp. gave the % age yield of 67.2%.