

## ABSTRACT

The present research work deal with lipase catalyzed production of biodiesel. Lipase producing, 23 different fungal strains were isolated from different soil samples, fermented foods and dry fruits (collected from different localities of Lahore) using selective medium (% w/v): 10 soil extract, 0.02 urea, 0.1 oil emulsion, 1.5 agar and 50 mg/ml chloramphenicol & 50 mg/ml streptomycin. These isolates, selected on the basis of larger zone of oil hydrolysis and subjected to identification on the basis of microscopic studies of morphological characters. The fungal strains were further screened for lipase production using solid state fermentation. *Rhizopus oryzae* RO-1 produced maximum lipase and was selected for improvement in lipase production. The maximum lipase activity was obtained when wheat bran was used as solid substrate. Among seven different diluents tested, D7 (10 ml) containing (g/L: glucose 0.15,  $\text{KH}_2\text{PO}_4$  0.03,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  0.0045,  $\text{NaH}_2\text{PO}_4$  0.18,  $\text{CaCl}_2$  0.0037,  $\text{NH}_4(\text{SO}_4)_2$  0.075,  $\text{NH}_2\text{CONH}_2$  0.034, pH 7) was found to be optimal for the production of lipase. The optimum growth conditions such as incubation period (72 h), temperature (30°C) and inoculum size (1.5 ml) were optimized. The production of lipase by *R. oryzae* RO-1 improved when diluent D7 was supplemented with 2 % olive oil. After, partial purification (with 50 % ammonium sulphate precipitation) the enzyme was immobilized on four different support i.e. Amberlite, Lewatite, Doulite & Sodium alginate. The maximum lipase activity was observed with Amberlite-immobilized lipase (757.76 U/ml/min) with pH 7 at 40°C. For the production of biodiesel, Amberlite-immobilized lipase was used for the transesterification of vegetable oils (olive, canola, sunflower & soybean) and algal oil (from *cladophora* sp.) with alcohols (C1-C4). The methanol (shortest chain alcohol) exhibited maximum percentage yield of biodiesel with olive oil (78 %). Canola oil, soybean oil, sunflower oil and *cladophora* sp.oil showed percentage yield of biodiesel 66, 54, 33 and 60, respectively.