

# 14<sup>th</sup> World Bioenergy Congress and Expo

June 06-07, 2019 | London, UK

## One-step enzymatic ethanolsis of high free fatty acid *Jatropha* oil for biodiesel production. Improvement of cold flow properties

Abderrahim Bouaid, Hassan Acherki, Mercedes Martinez and Jose Aracil

University of Complutense, Spain

Enzymatic catalysis for biodiesel production using low-cost, high free fatty acid oils has attracted much attention recently due mainly to economic issues, renewability, and sustainable benefits. The performance of a commercial, low-cost lipase (Eversa<sup>®</sup>, Novozymes) was investigated in the transesterification reaction for fatty acid ethyl esters (FAEE) production. In order to reduce the costs of industrial enzymatic biodiesel production, enzyme was used in its soluble, free form. The proposed approach, consisting in the transesterification of a low cost and sustainable *Jatropha* oil, using (Eversa<sup>®</sup>, Novozymes) as catalyst with ethanol as alcohol to realize a completely green bio-process. The proposed approach uses an integrated process for the production of the FAEE ethyl esters which can be used as a promising substitute for conventional fuels, since it matches the European Biodiesel Standard EN 14214. The influence of variables such as temperature, catalyst concentration and alcohol/oil molar ratio on the production of both fractions has been studied and optimized by means of factorial design and response surface methodology (RSM). The obtained models are useful to determine the optimum operating conditions for an up-scaled industrial process, using a minimum number of experiments, with the consequent benefits from an economical point of view. However from a technical point of view, the highest possible yield for FAEE fraction should be targeted, consequently a catalyst concentration of 9.8% an alcohol/oil molar ratio of 6:1 and an operation temperature of 35°C should be chosen. According to these conditions, conversion rates of 98% for FAEE could be obtained. The preparation of the products is a green engineering process, clean, solvent-free, with a very selective catalyst that minimizes water and energy consumption and the downstream processing of the integrated process.

babderra@quim.ucm.es

### Notes: