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# Biofuels production from rubber seeds

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## Abstract

Worldwide biodiesel is being produced mainly from edible and non-edible vegetable oils. The choice of vegetable oils depends on primarily on availability, price, and the policy adopted by governing agencies. Currently, rubber seed getting attention for production of biofuels. In this study, the entire work was carried out in this research in into three major parts; (1) Parameter *optimization during rubber seed oil (RSO) extraction:* The effects of process parameters such as extraction time (3–12 h), kernel particle size range (0.5–3 mm), ratio of kernel to solvent (0.03–0.09 g/ml), and variety of solvents (polar and non-polar) on sox let extraction process were studied. Design of experiment (DOE) schemes was considered to prepare an experimental matrix using central composite design (CCD) approach. Response surface methodology (RSM) was applied to optimize the process parameters to achieve maximum oil yield. *(2) Ultrasonic-assisted chemical modification of RSO* for rubber oil methyl ester (ROME) *production:* Since RSO is high free fatty acid oil, a two-step procedure, esterification using homogeneous catalyst followed by transesterification with heterogeneous catalyst was followed for ROME synthesis. Further, the physico-chemical properties and rheological behavior of rubber seed oil (RSO) and its derivative methyl esters as well as their blends with diesel fuel were investigated. *(3) Solid by-product utilization for biofuel synthesis:* Solid wastes generated during biodiesel feedstock preparation process which comprise 40–48 wt. % rubber seed shell (RSS) and 25–30 wt% rubber seed cake (RSC) were utilized to produce liquid fuel and bio-char. Physico-chemical properties and thermo-gravimetric analysis (TGA) based non-isothermal decomposition (pyrolysis) kinetics of RSS and RSC were investigated. In depth analysis of physico-chemical-thermal properties of RSS and RSC obtained products (liquid and bio-char) using various analytical techniques suggested that both RSS and RSC can be considered as a suitable feedstock for the production of value added chemicals including fuel.

## Biography

Pankaj Tiwari has received PhD in Chemical Engineering from the University of Utah, USA in 2012 and joined the Department of Chemical Engineering at Indian Institute of Technology Guwahati (IIT-G), India in the same year as Assistant Professor. Since,2018. He is an Associate Professor in the same department. He is working in the area of enhanced oil recovery, pyrolysis of carbonaceous materials and biofuel production.

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