

Supercritical Ethanolic Transesterification of Residual Oil of Palm Pressed-Fibers (*Elaeis guineensis* Jacq.)

Fernanda Wariss Figueiredo Bezerra; Wanessa Almeida da Costa; Mozaniel Santana de Oliveira; Eloisa Helena de Aguiar Andrade; Raul Nunes de Carvalho Junior

Federal University of Pará, PA 66075-900, Brazil

1. INTRODUCTION AND ANALYSES

The present study aimed the utilization of the resulting fibers from the industrial pressing of palm oil. The palm-pressed fibers (PPF) were physio-chemically characterized and were determined the overall yields of CO₂ supercritical extraction at temperatures of 40 and 60 °C and pressures of 150, 300 and 450 bar. The oily extracts of palm-pressed fibers were analyzed by gas chromatography and carotenoids content; the oily extract obtained in the best condition was characterized by acid, peroxide, saponification, refractive indexes and relative density. Afterwards, transesterification reactions were carried out using ethanol and supercritical CO₂ as co solvent and the following conditions: molar ratios of 20:1 and 40:1 (ethanol:oil); CO₂ mass of 5.31×10^{-7} g; temperatures of 150, 250, and 350 °C; periods of 10, 20, 30, 40, and 60 minutes; pressure of 200 bar and stirring at 600 rpm. The product obtained in the transesterification was analyzed for its content of fatty acid esters.

2. RESULTS AND DISCUSSION

The operational condition of the highest overall yield of the oily extract (6.09%) was obtained at 40 °C and 450 bar (Fig. 1). The oily extracts of palm-pressed fibers presented low carotenoids content (5.32 – 26.11 µg/g oil). They also presented more than 80% of saturated fatty acids and their physio-chemical characteristics met or were close to those determined by the *Codex Alimentarius*. Supercritical transesterification showed maximum yield of esters of 99.33%, in the operational condition with molar ratio of 40:1, 150 °C and 60 minutes (Fig. 2.).

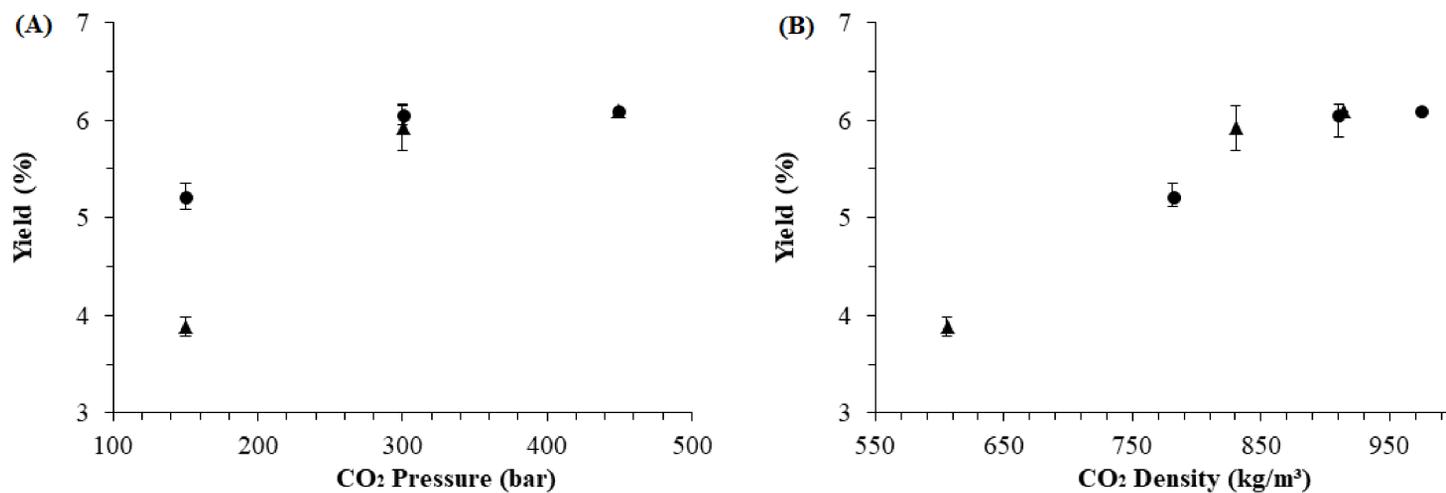


Fig. 1. Global yield isotherms of PPF (*Elaeis guineensis* Jacq.) oil, (●) 40 °C and (▲) 60 °C.

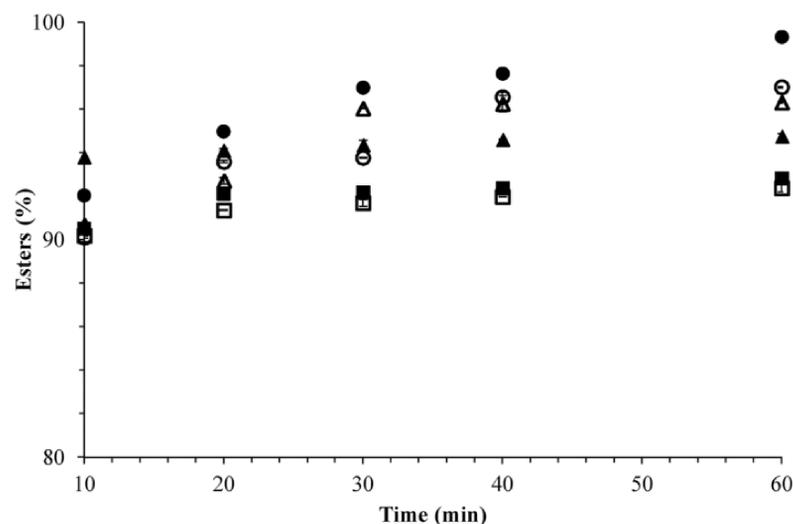


Fig. 2. Conversion rate of ethyl esters in different molar ratios and combinations of temperature and reaction times (○) 20:1 – 150 °C, (△) 20:1 – 250 °C, (□) 20:1 – 350 °C, (●) 40:1 – 150 °C, (▲) 40:1 – 250 °C, (■) 40:1 – 350 °C.