# A Comparative Study Between Enzyme - Assisted Extraction Methods Of Rice Bran Oil And Their Effect On Oil Yield As Well As Oil And Protein Qualities

**A Thesis**
By

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## Abstract

Stabilization of rice bran was accomplished by two methods namely, microwave heating and direct hexane extraction. Microwave heating proved to be very efficient. To increase the extracted quantity of the oil from the stabilized rice bran, it was subjected to enzymatic hydrolysis, which breaks the cell walls and facilitates oil release. Three enzymes were used: Protease (P), Macerozyme (M), and α-Amylase. All enzymes resulted in improved oil yield reaching 32, 32,and 31% extracted oils for enzymes P, M, and A, respectively, compared to 24-25% extracted oil by no enzyme treated rice bran under same conditions (control). Treatment with enzyme A resulted in oils with very high free fatty acid contents between 16-19%. Thus the use of A enzyme was excluded. Mixtures of P&M at different enzyme ratios(1:1, 1:2, 2:1v/w) and different enzyme concentrations(1, 1.5, 2 w/w) of rice bran), different bran: water ratios(1:5, 1:7, 1:10 w/v), and different time of hydrolysis (1, 3, 6 h) were investigated. Experiments with mixed enzymes at the different conditions proved that highest %increase in oil extractability ca.38%, over the control were achieved under the following conditions of hydrolysis: 2% enzyme concentration (1:1 and 2:1 **M:P** ratio) at 1:10 bran :water ratio and 3 and 6h hydrolysis, and 1.5% enzyme concentration (1:1 **M:P** ratio) at 1:10 bran: water ratio for 6h hydrolysis. This was followed by ca. 37% increase in oil extractability for treatments 1.5% enzyme concentration (1:1 **M:P** ratio), and 1:10 bran: water ratio for 1 and 3 h, and 2% enzyme concentration (2:1 **M:P** ratio), 1: 10 bran: water ratio, and hydrolysis for 1 hour. The effect of the mode of oil extraction after the enzymatic treatment on the oil and meal quality was investigated. Results did not show much difference but hydraulic pressing and miscella extraction gave slightly better oil and meal qualities.



**Key words**: Rice bran, enzymatic hydrolysis, stabilization, oil extraction, oil quality, meal quality.

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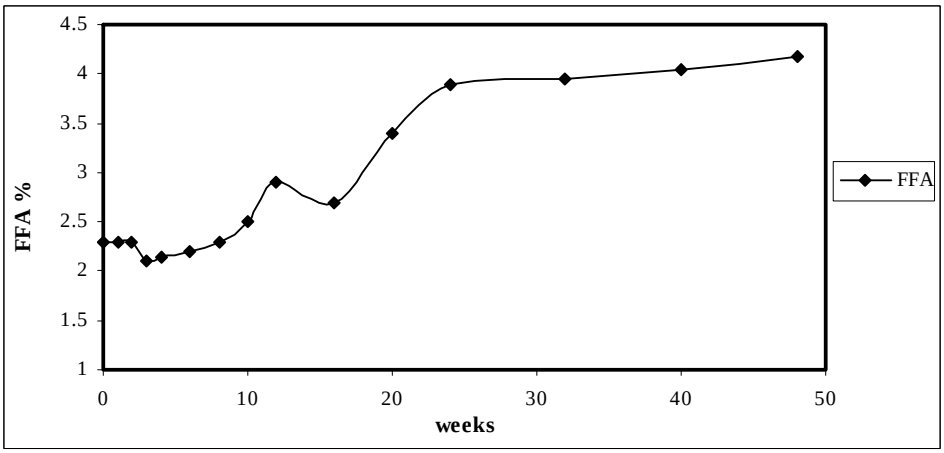


Figure 3:Storage stability of microwave stabilized rice bran oil as indicated by the FFA content of oil

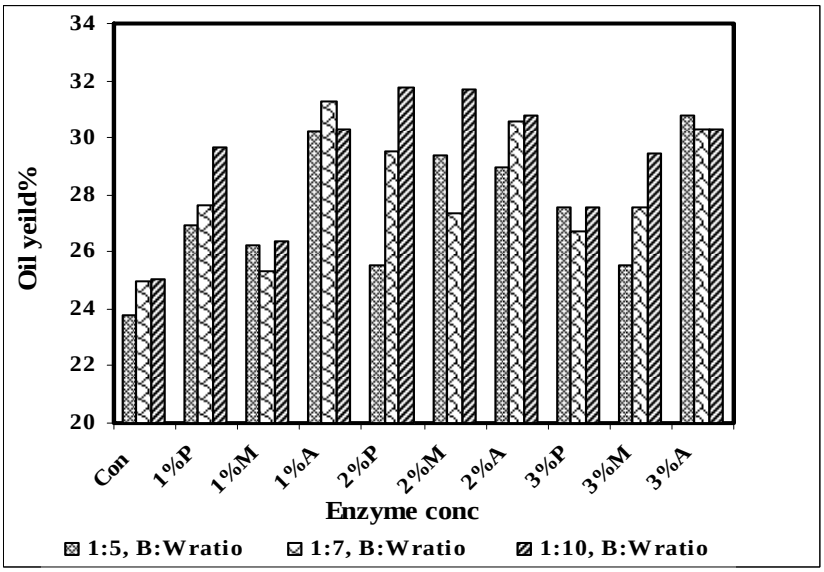


Figure 4: Effect of enzymatic treatment of microwave stabilized rice bran on extracted oil at 1h