The Effect of Processing on the Composition and Heat Stability of Rice Bran Oil

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The final quality of vegetable oil is of great interest and importance from nutritional point of view, and a determining factor for its use and optimal performance and stability at room and elevated temperature. Because of its nutritional aspects, crude rice bran oil is generally processed by degumming, alkali refining, bleaching and deodorization to eliminate the undesirable materials with the least possible loss of oil and desirable components. Refining should produce edible oil with characteristics acceptable to the consumers such as bland flavour and odour, clear appearance, light colour, as well as be rich in natural antioxidants for better stability to oxidation and suitability for frying.

The aim of this study was to investigate the effects of chemical refining technique carried out in lab scale on the fatty acid composition, natural antioxidants and triacylglycerol structure of rice bran oil, and on its heat stability at frying conditions.

Samples of crude and refined rice bran oil were heated at 180 °C for 8h. After very 30min, samples were taken and analysed. The effect of refining process on the composition and heat stability of rice bran oil was determined and correlated with the changes occurred in triacylglycerol composition and structure, fatty acid composition, and with the loss of tocopherols, sterols, sterol esters, squalene, and gamma-oryzanol. In addition the oxidative status was measured by conjugated diene value, the concentration of polar compounds, and the polymer contents.

The analytical results showed that the loss of total tocopherols was higher in refined oil than that observed in crude rice bran oil. After 8h of heating at 180°C, about 50% and only 30% of total tocopherols remained in crude and refined rice bran oil respectively. The individual tocopherols were differently affected by the refining and heating process. A similar tendency was observed for sterols.
The heating process led to 3.85%, and 10.1 % increase in polymer contents in crude and refined rice bran oil respectively. The refining process had no significant changes in fatty acid composition of the samples, whereas the heating had affected the refined rice bran oil sample in which a change was noticed in the percentage of C18:2 and its distribution at sn-2 position. Although refined rice bran oil showed good heat stability, but when compared to crude oil its stability was decreased to some extent.