Chenges in Physico-chemical Characteristics of Rice Bran Oil during Extraction, Refining, Deep Fat Frying and Storage

ABSTRACT

Studies were conducted to optimize the conditions of extraction and refining of rice bran oil with a view to make it of edible grade. The physico-chemical changes in rice bran oil during extraction, refining, deep fat frying and storage were monitored. The refined oil was also evaluated for its cooking quality and storage stability. The extraction of oil from stabilized rice bran (at 120°C for 45 minutes) by n-hexane at 60°C in 6 hours yielded 82 per cent oil.

The dewaxing of crude oil from 60 per cent miscella concentration at 5°C in 10 hours gave maximum recoveries of oil (90.8%) and wax (97.1%) with minimum oil in wax. The wax content of oil was reduced to 0.6 per cent. The phosphoric acid and water (0.75% - 3%) mixture was most effective degumming agent and reduced phospholipids from 3.9 to 0.61 per cent. The miscella neutralization of oil by 20 ml of 16 per cent lye gave 65 per cent oil recovery with 0.22 per cent free fatty acids. The bleaching of neutralized oil with 2 per cent bleaching earth-charcoal (5:1) gave best quality oil with 94 per cent transmittance of 20 per cent oil in acetone at 570 nm. The bleached oil was deodourized at 240°C with an absolute pressure of 4 mm mercury in 10 minutes by passing steam. The oil thus obtained meets the ISI specifications for edible grade of rice bran oil. The most efficient interesterification of miscella refined oil was carried out by 2 per cent sodium methoxide as catalyst at 30°C.

The maximum content of myristic acid (2.69%) and palmitic acid (24.32%) were in alkali refined oil, palmitoleic acid (0.3%) in physically refined, stearic acid (2.34%) in interesterified oil, oleic acid (40.26%), linoleic (0.63%) and arachidonic acid (2.92) in miscella refined oil and linolenic acid (33.87) physically refined oil.

The absorption of rice bran oil during frying by potato chips ranged between 28.2 to 30.5 per cent as compared to 37.5 to 38.5 per cent absorption of groundnut and Dhara oils. Therefore, rice bran oil fried 25 per cent more chips, the sensory evaluation of potato chips on 9 point Hedonic scale revealed that the sensory scores for all the attributed were higher for chips fried in groundnut and Dhara oils. The chips fried in rice bran oil had sensory scores for colour and appearance, and mouthfeel between 5.08 to 6.53 (neither liked nor disliked to liked slightly) and for taste and flavour and overall acceptability between 6.25 to 6.72 (liked slightly to liked moderately). The highest scores were awarded to chips fried in miscella refined rice bran oil.

During storage at 60°C for 120 hours, the physico-chemical characteristics of rice bran oils namely thiobarbituric acid value, peroxide values, colour intensity and rancidity increased significantly. The miscella refined rice bran oil had highest storage stability.
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