Antioxidant activity of γ-oryzanol from rice bran

Rice bran oil contains γ-oryzanol which is a mixture of sterols and ferulic acid esters and it is reported to lower serum cholesterol. Cycloartenyl ferulate, 24-methylene cycloartenyl ferulate, and campasteryl ferulate are the three major components and account for *c.* 80% of γ-oryzanol in rice bran. The nutritional function of γ-oryzanol components may be related to their antioxidant properties because of the ferulic acid structure. Xu and Godber from Louisiana, USA studied the antioxidant property of γ-oryzanol. The antioxidant activity of the three major components of γ-oryzanol was investigated and compared with that of α-tocopherol and ferulic acid under identical experimental conditions.

The antioxidant activities of γ-oryzanol components are lower than that of α-tocopherol in protecting against linoleic acid oxidation. The quantity of these components is 10 times greater than α-tocopherol in rice bran [Xu & Godber, *J Amer Oil Chem Soc*, 2001, **78**(6), 645-649].

Extraction of **Rice bran oil**

Refined rice bran oil is a high-quality cooking oil, whereas crude bran oil has been used for soap manufacturing and for the production of industrial fatty acids. In humans, rice bran oil is reported to improve plasma lipid and lipoprotein profiles. The occurrence of γ-oryzanol and tocotrienols is presumed to be responsible for its hypocholesterolemic effect.

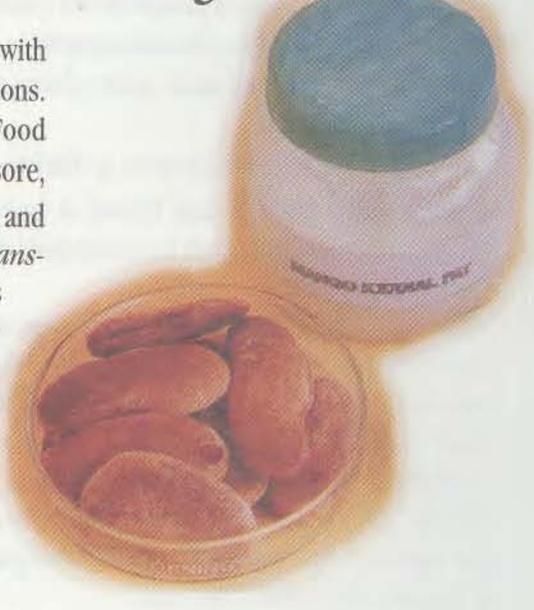
Oil extraction from rice bran is conveniently done by solvent extraction. Enzyme-assisted aqueous oil extraction has emerged as an eco-friendly process for oil extraction. The addition of specific enzymes during extraction enhances the oil recovery by breaking the cell wall and lipid bodies. Amylase has been employed to facilitate the extraction of rice bran oil. However, use of amylase has yielded only a 5% increase in oil recovery. Sharma and others from Indian Institute of Technology, New Delhi have showed that appropriate choice of enzyme(s) and optimization of extraction conditions make it possible to improve the oil recovery from rice bran by enzyme-assisted oil extraction.

Rice bran oil was extracted by enzyme-assisted aqueous extraction conditions using mixture of Protizyme™ (protease), Palkodex™ (α-amylase) and cellulase (crude cellulase). The optimal conditions used were: mixtures of amylase (80U), protease (368 U), and cellulase (380 U), with 10g of rice bran in 40 ml distilled water, pH 7.0, temperature 65°C, extraction time 18 hr with constant shaking at 80 rpm. Centrifugation of the mixture at 10,000xg for 20 min yielded a 77% recovery of oil [Sharma *et al*, *J Amer Oil Chem Soc*, 2001, **78**(9), 949-951].

Essential oil of garland Chrysanthemum can control agricultural fungi

A search for natural sources of antifungal agents for crops is being done due to toxic effects of chemicals. It is well established that essential oils have fungicidal properties. Therefore, the essential oil of commonly grown garland **Chrysanthemum** flower head was taken to test its activity against agricultural fungal pathogens. The oil has been found active both in contact and headspace and inhibited hyphal growth of tested, fungi viz. ***Alternaria brassicola, Aspergillus flavus, Botrytis cinerea, Fusarium moniliforme, Fusarium solani, Penicillium digitatum, Rhizoctonia solani, Sclerotina sclerotiorum*** etc. (Alvarez-Castellanos *et al*, *Phytochemistry*, 2001, **57**, 99-102).

Mango and Butter Tree kernels fat shortenings for bakery industry



Shortenings are plastic fats consisting of a mixture of solid fat crystals and liquid oil. The solid fat components form a three-dimensional crystal matrix that holds the liquid portion of fat and imparts plasticity and rigidity to the system. Satisfactory performance of shortening depends mainly on consistency and crystal structure. The consistency depends on the solid to liquid ratio present at different temperatures. Shortenings are commonly used in the baking industry to impart desirable texture and mouth feel to the products. Shortenings designed for cakes must produce an emulsion stable enough to withstand the heat of baking.

Currently, hydrogenated fats consisting of large quantities (~20-40%) of *trans*-fatty acids are being used in the baking industry. The *trans*-fatty acids are considered to be risk factors for cardiovascular disease. This has raised the need to replace hydrogenated fats with natural fats in food product formulations. Reddy and Jeyarani from Central Food Technological Research Institute, Mysore, India have reported the preparation and evaluation of shortenings free from *trans*-fatty acids from vegetable fats such as Mango kernel (***Mangifera indica* Linn.**) and Butter Tree (***Madhuca indica* J. F. Gmel**. syn. *Madhuca latifolia* Macbr.) fats. Preparation of value-added products like bakery shortenings and confectionery fats from these under utilized vegetable fats promotes economy in addition to nutritional benefits.

Three types of bakery shortenings for cakes, biscuits and puff pastry were prepared by blending the fractions of mango and mahua fats. The proposed formulations did not contain any *trans* acid. It is possible to prepare bakery shortenings with no-*trans*-fatty acids by using mango and mahua fats. Although hydrogenated shortenings are cheaper than fractionated and blended shortenings the latter could be preferred because of their health benefits [Reddy & Jeyarani, *J Amer Oil Chem Soc*, 2001, **78**(6), 635-640].

Bleaching of edible oil by rice hull ash

Rice hull is a by-product of cereal industry. It is normally disposed of by burning in the field, thus resulting in environmental pollution. Activated clay has been widely used in the refining oil industry to remove colour bodies and other impurities in edible oil. In recent years, rice hull adsorbents have been evaluated to replace activated clay as an adsorbent. Chang and others from Taiwan further investigated the bleaching performance produced by rice hull ash. Heating in an inert gas produces a charred rice hull rich in carbon. However, if rice hulls are heated in an oxidizing environment, only a trace amount of carbon is found. Ash thus produced is amorphous silica in the form of opal CT and is usually designated as rice hull ash or rice hull silica.

The relationship between the bleaching efficiency and structure, surface area, pore size, and bleaching performance of rice hull ash produced in the range of 300-1000°C for 6-120 min were extensively studied. The bleaching efficiency increased with the increase in temperature from 300 to 500°C. It reached maximum at 500°C. Further increase in temperature decreased the bleaching efficiency. Thus 500°C was the optimal temperature for the production of rice hull ash. Bleaching efficiency increased with ashing time up to the critical time of 30 min. When the ashing time was longer than 60 min, bleaching efficiency reached a plateau. Therefore, the optimal ashing time was between 30 and 60 min [Chang *et al*, *J Amer Oil Chem Soc*, 2001, **78**(6), 657-660].