Abstract

The different domestic heating methods-hot air, roasting, steaming and microwaving-were applied for stabilization of rice bran in the cold pressing process. The highest extraction yield was found in hot air heating with 5.53 g/100g bran, followed by microwave heating (4.81 g/100g bran), roasting (4.77 g/100g bran) and steaming (3.41 g/100g bran). Hot air and microwave heating were the most effective methods for stabilization of rice bran ($P < 0.05$), which provided a low content of acid value (AV) 6.30-6.38 mg KOH/g oil, free fatty acid (FFA) 3.51-3.17 % and peroxide value (PV) 11.72-12.13 mg Eqv/kg oil. Microwave and hot air heating stabilized RBO contained a higher content of total phenolic compounds than that of roasting and steaming stabilized RBO ($P < 0.05$). Hot air heating stabilized RBO had the highest content of gamma oryzanol but these were not significantly different in microwave and roasting stabilized RBO ($P > 0.05$).

The extraction yield and chemical properties of solvent extracted and cold-pressed Sangyod rice bran oil (SRBO) were studied. Solvent extraction had higher extraction yields than that of the cold pressing method ($P < 0.05$). But cold-pressed SRBO had lower values in acid, peroxide and free fatty acid but higher iodine numbers than that of solvent extracted SRBO. Cold-pressed SRBO had higher amounts of monounsaturated fatty acid, vitamins and phytochemical contents than that of solvent extracted SRBO ($P < 0.05$). It contained vitamin E, gamma oryzanol, total phenolic and total flavonoid contents with 0.80-0.93 mg/g oil, 17.4-19.0 mg/g oil, 11.39-14.70 mg FAE/g oil and 6.90-7.54 mg CE/g oil, respectively. The higher element contents were found in cold-pressed SRBO ($P < 0.05$).

The emulsion properties of cold-pressed rice bran oil (CPRBO) nanoemulsion stabilized by glyceryl monostearate (GMS) were studied. We found that the mean droplet diameter, lightness (L*) and yellowness (b*) of CPRBO emulsion tended to decrease as GMS concentration was increased ($P < 0.05$). However, the increasing of the GMS concentration had no impact on antioxidant activity, gamma oryzanol and total phenolic compound content of CPRBO emulsion. The storage of CPRBO emulsion at room temperature for 90 days showed that lipid oxidation was gradually increased after 30 days of storage as gamma oryzanol and antioxidant activity was decreased ($P < 0.05$). The nanoemulsions were unstable at low pH (pH 6-2), high salt concentration (75-400 mM) and high temperature (60-90 ^{0}C). Increase of yellowness (b*) and viscosity were found when increase of salt concentration and decreases of pH ($P < 0.05$). However, the thermal processing had no influence on the yellowness and viscosity of nanoemulsion ($P > 0.05$). These results have important implications for the formulation and production of CPRBO emulsion-based products using GMS as an emulsifier.

Keywords: rice bran oil, cold-pressed, antioxidant activity, emulsions