

Sustainable utilization of crude rice bran wax for the development of lipid-based edible coatings

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Abstract

Rice bran wax is a byproduct of rice bran oil refining process in Sri Lanka, which is also used as a feed of cattle and as a raw material for candle production although it has many nutrients for known health benefits. Present study used two treatments for purification of crude rice bran wax. First treatment was a two steps process. The First step of it was the removal of residual oil from crude wax with hexane. After that it was subjected to further defatting with Isopropyl Alcohol which yielded a light-yellow color powder. AOAC method 965.33, AOAC method 920.157 and SLS 313 methods were adopted for the analysis of peroxide value, melting point, Free Fatty Acid (FFA) and acid values respectively. The results are as follows; melting point of the sample is 78 °C, moisture content 1.25 ± 0.00 %, FFA content 4.9981 ± 0.00 %, acid value 7.8702 ± 0.00 ml NaOH/g and peroxide value 17.036 ± 0.00 mEq/Kg. The second step of the treatment followed by bleaching with 10% sodium borohydride in IPA which yielded a light-yellow dry powder with melting point of 80 °C, moisture 1.02 ± 0.00 %, FFA 0.7664 ± 0.00 %, acid value 1.0852 ± 0.00 mL NaOH/g, peroxide value 13.6034 ± 0.00 mEq/Kg. The Second treatment was a single step process where crude rice bran wax refluxed with 99% ethanol which yielded a light-yellow color powder with a melting point of 79 °C, moisture 1.56 ± 0.00 %, FFA 0.8123 ± 0.00 %, acid value 1.1502 ± 0.00 mL NaOH/g, peroxide value 13.65 ± 0.00 mEq/Kg. Fourier Transform Infrared Spectroscopy analysis of refined rice bran waxes from both treatment procedures indicated that those samples contained following functional groups such as; aliphatic primary amine, esters, α and β unsaturated esters, alcohol group, alkane group and aldehyde group. There is no significant difference between the two refined samples obtained from the two treatments with regards to peroxide value, FFA, melting point and acid value, except moisture. Finally, it can be concluded that the second method is comparatively cost effective and easy method to refine the rice bran wax for further utilizing processes such as developing edible fruit and vegetable coating waxes.

Keywords: Crude rice bran wax, Purification, Refined rice bran wax, Rice bran oil

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