

Naritchaya Potes 2009: Using Carbohydrate Based Microcapsules Encapsulated Flavor from Herbs by Spray Drying Technique to Improve Shelf Life of Pre-Germinated Brown Rice Cracker. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Professor Onanong Naivikul, Ph.D. 153 pages.

Herbs (cinnamon, licorice, and spearmint) with high antioxidant activity substances (total phenols and DPPH assays) were chosen for this study. Cinnamon exhibited the highest total phenol contents (81.76 mg GAE/ 1 g of dried herb) and DPPH radical scavenging activity (301.66 mg VCEAC/ 1 g of dried herb). Ground cinnamon was chosen to be core in carbohydrate-based microcapsules (a modified tapioca starch (octenyl succinic anhydride), maltodextrins with D.E.8-12, and 16-20). Each encapsulant solution was prepared at three solid contents, i.e., 10%, 20%, and 30% (w/w). Ground cinnamon was suspended in carrier solutions at a constant ratio of cinnamon (1 g) and encapsulant solutions (100 mL). Carbohydrate-based microcapsules were compared encapsulation efficiency, its was the highest antioxidant activity substances and flavor of cinnamon. The effective microcapsules were chosen to coat on pre-germinated brown rice cracker (ratio of normal rice : waxy rice was 1 : 1) for comparison quality of cracker uncoated, coated with ground cinnamon, and coated with encapsulated cinnamon powder. Then all samples of pre-germinated brown rice cracker were determined shelf life study. The 10% modified-starch exhibited the lowest viscosity (2.50 mPa·s). Encapsulated cinnamon microcapsules had produced by spray drying technique. The 10% modified-starch microcapsules gave similar yields (70.35%) with other spray dried powders at the same concentration and the 10% modified-starch solution gave the highest cinnamon solids content (5.90%) in the encapsulated cinnamon microcapsule. Increased solution concentrations of carbohydrate-based microcapsules gave higher yields of the spray dried powders, however, the amount of the encapsulated cinnamon decreased. For antioxidant activity substances and cinnamaldehyde in encapsulated cinnamon carbohydrate-based microcapsule showed that the 10% modified-starch exhibited the highest total phenol contents (1,424.59 mg GAE/yield of spray dried powder) DPPH radical scavenging activity (1,899.63 mg VCEAC/yield of spray dried powder) and cinnamaldehyde (1,989.49 ppm). Then pre-germinated brown rice crackers were coated with 10% modified starch microcapsule. This was found to be 0.15% in modified-starch microcapsule by a sensory test using a consumer panel. In shelf life studies, all pre-germinated brown rice crackers were stored at 30°C for 6 weeks. Crackers coated with 0.15% of cinnamon powder encapsulated in 10% modified-starch had the highest conjugated dienes and trienes (6 weeks of storage) slower than other samples (4 weeks of storage). The conclusion of this study was using the 10% modified-starch microcapsule encapsulated cinnamon powder 1 g and 100 mL to coat pre-germinated brown rice crackers (ratio of normal rice : waxy rice was 1 : 1). Crackers can be stored in at least 6 weeks.

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Thesis Advisor's signature