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Extraction, characterization, and application of ash gourd peel wax in an edible coating of spicy cube

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Ash gourd (*Benincasa hispida cogn*) has been cultivated as a vegetable and it is used as a filling material in the food industry for manufacturing jam. Ash gourd peel removed as waste of the food industry constitutes 15% of the fruit, which contains high amount of edible waxy materials. Waxes are important edible material, which act as moisture and gas barriers, provide mechanical and microbial protection, and prolong the shelf life of various products without changing the original ingredients or processing methods. Spicy cube is a novel product, which has the potential of being commercialized as a Ready To Use (RTU) condiment cube, but the shelf life of 'spicy cube' is inadequate. The present study aims at extraction, characterization, and utilization of ash gourd peel wax in a water based edible coating for spicy cube. Ash gourd peel powder was treated with 70% ethanol and dried at 60°C using dehydrator. Peel wax was extracted with Soxhlet apparatus using petroleum ether for 8-10 hours. The solvent was evaporated at 60°C to obtain the crude wax. The physiochemical testing was carried out for characterization of Ash gourd peel wax. AOAC (2000) methods were used for determination of saponification, acid, and iodine values of crude wax. A water based wax emulsion was prepared by adding 0.5% w/w and 1.0% w/w of melted peel wax and sodium benzoate 2% (144 ppm) (v/v) with Tween 80 emulsifier. Spicy cubes were brushed with respective emulsions and packed in aluminum foil. Shelf life of coated Spicy cubes was studied at room temperature by physiochemical and sensory analysis.

The yield of crude wax was 2.2% and its color was brownish green. The melting point of crude wax was 77 °C. The viscosity of the ash gourd peel wax is higher than bees' wax due to its high melting point. The acid value, saponification value, and iodine values were 21.40 ± 7.42 g/g, 36.6± 15.9 mg/g, and 7.49 ± 2.55 mg/g respectively. Ash gourd wax has a distinctive odor due to its acid value and its saponification value indicates the low amount of acid and ester groups in the wax. The saponification value of ash gourd peel wax is higher than Candelilla wax and lower than bees' wax. In addition, the iodine value indicates that ash gourd peel wax contains a moderate amount of unsaturated fatty acids. There is a significant effect of weight of wax and concentration of sodium benzoate in the coating on improving the shelf life of spicy cubes. In conclusion, highly edible waxy materials were successfully extracted from ash gourd and the wax incorporated water based coating significantly improved the shelf life of Spicy cubes.

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