Feasibility of Visible Near-Infrared Hyperspectral Imaging in Detection of Calcium Hypochlorite in Sago Flour

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Abstract. The general public perspective on sago flour quality is based on the perceived colour appearances. This contributed to the potential of food fraud by excessive usage of bleaching agents such as calcium hypochlorite (CHC) to alter the product's colour. Conventional methods to detect and quantify CHC such as titration and chromatography are time-consuming, expensive and limited to laboratory setups only. In this research, visible near-infrared hyperspectral imaging (Vis-NIR HSI) was combined with partial least squares regression (PLSR) model to quantify CHC in pure sago flour accurately and rapidly. Hyperspectral images with the spectral region of 400 nm to 1000 nm were captured for CHC-pure sago mixture samples with CHC concentration ranging from 0.005 w/w% to 2 w/w%. Mean reflectance spectral data was extracted from the hyperspectral images, and was used as inputs to develop the PLSR model to predict the CHC concentration. The PLSR model achieved the commendable predictive results in this study, with Rp = 0.9509, RMSEP = 0.1655 and MAPEP of 3.801%, proving that Vis-NIR HSI can effectively predict the concentration of CHC in sago flour.

1. Introduction

Food integrity has been one of the concerning issues in the food industry in recent years. Due to the scandalous incidents of food fraud, such as melamine adulteration in baby milk powder, usage of gutter oil in the food and beverage industry and horse meat adulteration in beef patties, public awareness of the authenticity and safety of their food product has increased over the years [1]–[3]. Authorities also played their roles by monitoring and ensuring food safety was achieved. For the sago industry, Malaysia