

STUDY ON THE DEVELOPMENT OF EDIBLE FILM FROM MUNG BEAN (*VIGNA RADIATA*) PROTEIN ISOLATE AND IT'S EFFECT ON THE SHELF LIFE OF RED CHILLI (*CAPSICUM ANNUM*)

ABSTRACT

Mung bean protein isolate was prepared from mung bean (*Vigna radiata*) flour by extraction with 1N NaOH and precipitated at pH 4 with 1N HCl. Neutralization of the dispersed precipitation at pH 7 was carried out with subsequent freeze-drying. Glycerol (3%) was added to the mung bean protein isolate (5%) solution to form a transparent edible film. The films were then adjusted to pH 8, 10 and 12 with 2N NaOH and dried at 60°C for 12 hours. Protein films at pH 10 was then used to coat fresh red chilli. Physical, chemical and microbiology (bacteria, yeast and mold) tests were carried out for the protein films. Significant differences ($P<0.05$) were observed in the protein, ash and carbohydrate contents of mung bean flour and its isolate. The moisture sorption isotherm, moisture content, water vapour transmission rate, water vapour permeability and thickness of the protein films at pH 8 was higher than those at pH 10 and 12. Mung bean flour, mung bean protein isolate and protein films were noted to differ significantly ($P<0.05$) in 'L' (lightness) value. Mung bean flour and the protein films were significantly different ($P<0.05$) in 'hue' values than its isolate. At pH 10, the surface of film is homogenous exhibiting a rigid, dense morphology with no apparent crack-line and the presence of small pores observed on the condensed surface compared to other films at pH 8 and pH 12. Essential and non-essential amino acids increased significantly ($P<0.05$) in protein film at pH 10 but decreased significantly ($P<0.05$) at pH 12. Mung bean flour and its isolate is a good source of lysine. Weight loss and vitamin C was slower in coated chilli than in uncoated chilli when stored at two different temperatures, 30±3°C and 7±3°C. pH of uncoated chilli was found to increase more rapidly than coated chilli. Chilli stored at 7±3°C had a significantly ($P<0.05$) higher surface structure strength values than chilli stored at ambient, 30±3°C temperature.

There is a decreasing trend of the 'L' (lightness) and 'hue' values for both ambient and cold temperature storage. At both temperatures, bacteria, yeasts and mold content of uncoated chilli differ significantly than the coated chilli ($P<0.05$).

**KESAN PENGGUNAAN FILEM BOLEHMAKAN KEATAS SIFAT
FIZIKAL, KIMIA DAN ORGANOLEPTIK PELBAGAI PRODUK
PENGGORENGAN DALAM MINYAK**

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**EFFECTS OF EDIBLE COATING UTILIZATION ON THE PHYSICAL,
CHEMICAL AND ORGANOLEPTIC ATTRIBUTES ON VARIOUS DEEP FAT
FRYING PRODUCTS**

ABSTRACT

An edible coating formulation was developed by using mung bean (*Vigna radiata*) protein isolate with the inclusion of reducing sugar (glucose) to generate Maillard reaction. Antimicrobial agent; potassium sorbate and antioxidant agent; ascorbic acid were incorporated into the coating formulations. Glycerol was added as plasticizer to improve the integrity of the coating. The ability of the coating to sufficiently extend the shelflife of three fried products, namely samosa, donut and banana crisp were investigated. Electron micrographs from SEM (*Scanning Electron Microscopy*) revealed that a strong network structure was formed between the protein isolate and glucose due to Maillard reaction. Results showed that the edible coating is significantly effective in reducing moisture loss ($p < 0.05$) during the 8 days of storage. Coated samples portrayed significant reduction ($p < 0.05$) in mass loss and a higher reduction of oil uptake during deep-fat frying in comparison with the uncoated control. Peroxidase Value (PV) test indicated that the rancidity rate in coated samples was lower than the uncoated control. Texture Profile Analysis (TPA) revealed that all coated samples resulted in softer texture. A colorimetric analysis showed a decreased L^* value and higher intensity in coated samples in comparison to uncoated control. Sensory score for overall acceptability was higher for samosa and donut coated samples. However, coated banana crisps were not preferred by the panelists due to the increased in moisture content and decreased in hardness of samples. Results from the moisture, texture and colour were found to be correlated with the result of sensory evaluation.