Development of an Edible Film Using Coconut Protein Isolate

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Most of food products are covered by a packaging to separate it from the surrounding environment. There are several investigations on food packaging have shown that film forming ability of different plant proteins such as soy protein, mung bean protein, cowpea protein etc. This research was conducted to develop an edible film using coconut protein (CP) isolate from defatted coconut flour as an alternative for petroleum-based packaging materials. Coconut protein was isolated from the defatted coconut flour by alkaline extraction method. Extracted protein was dried using freeze drying and sieved through 800 µm mesh. Percentage of protein of the extracted powder was analyzed by Kjeldahl digestion method. Four different combinations of corn starch (3%, 2%, 1% and 0%) and coconut protein (0%, 1%, 2% and 3%) were used for film fabrication with two levels of pH (8.5 and 9.5) and two levels (2% and 0%) of polyethylene glycol (PEG) plasticizer. Casting technique was used for film preparation with 2% (w/v) glycerol and distilled water. The experiment was arranged as a three-factor factorial design with three replicates. Physical, chemical and optical quality characteristics (moisture %, swelling index, solubility, thickness, light transmission %) of edible films were evaluated. Data was analyzed by ANOVA ($p<0.05$) using MINITAB 16 software package. Results showed that, extracted CP has 78.43% of protein content. Combination of corn starch and CP were showed weaker film characteristics than pure treatments. CP films with 2.5% of PEG showed significantly ($p<0.05$) high moisture content (49.20% ± 0.43), swelling index (483.96% ± 13.79) in 8.5 pH and significantly high solubility (76. 0% ± 1.4) and thickness (0.33 ± 0.01 mm) in 9.5 pH. The pure corn starch film (pH 8.5 and 0% PEG) was showed significantly higher percentage of light transmission at 200 to 800 nm. In conclusion, coconut protein isolate can be effectively utilized as an edible food packaging material.

Keywords: Coconut protein isolate, Corn starch, Edible film, Polyethylene glycol