

Thesis Title	Development of Active Film from Giant Catfish Skin Gelatin Incorporated with Antioxidant Extract from Some Tropical Fruit Seeds
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ABSTRACT

This study was aimed to investigate the extraction of gelatin and development the active gelatin film from giant catfish skin incorporated with fruit seeds antioxidant extracts. Gelatin was extracted from giant catfish (*Pangasianodon gigas*) skin using distilled water at 45°C for 12 h. The re-extraction process was also investigated to obtain a high gelatin recovery. The first extraction was done by incubating the pretreated acid-treated fish skin at 45 °C for 12 h. The remnant was re-extracted at temperatures of 60–90 °C for 1–12 h. The gelatin yield of the first extraction was 10.14%, while the re-extraction at 90 °C provided higher recovery (19.5%). Low band intensity of α_1 and α_2 chains of gelatin was observed after re-extraction at high temperature for a longer time. The absorption bands of amide I (1,653 cm^{-1}) and II (1,542 cm^{-1}) from both extracted gelatins were similar. The obtained results suggested that the gelatin re-extraction process could be applied for other skin sources to obtain high gelatin recovery with the desired properties.

Solid–liquid extraction and response surface methodology (RSM) were used to optimise conditions for the extraction of phenolic compounds from longan (*Dimocarpus longan* Lour.),

lychee (*Litchi chinensis* Sonn.), passion fruit (*Passiflora edulis*), and rambutan (*Nephelium lappaceum*) seeds. The independent processing variables were ethanol concentration, temperature and time. Ethanol concentration and temperature significantly affected extraction yield, extractable phenolic content (EPC), and antioxidant activities including DPPH-, ABTS-radical scavenging activity, and ferric reducing/antioxidant power (FRAP). According to the prediction value at optimum condition, longan seed had highest extraction yield, EPC, and antioxidant activities compared with lychee, passion fruit, and rambutan seed extracts. The optimal conditions for longan seed extraction based on combination responses were 53 % (v/v) ethanol, 58 °C, and 139 min. These optimum conditions yielded EPC of 5,804 mg gallic acid equivalents (GAE)/100 g dry sample with DPPH-, ABTS- radical scavenging activity, and FRAP values of 2,442, 8,620, and 3,609 GAE/100 g dry samples, respectively. The experimental values were well agreed with those predicted values. Thus longan seed was used to extract antioxidant compound for development of active gelatin film.

Gelatin films incorporated with longan seeds (LS) extract or butylated hydroxytoluene (BHT) at different concentrations were developed and characterized. The properties including tensile strength (TS), elongation at break (EAB), protein solubility and FTIR spectra of the films were similar to the film made without LS or BHT. The increase in redness (a^*) and yellowness (b^*) values of film were observed with the increasing concentration of LS extract ($P < .05$). The results showed some interactions of phenolic compounds in LS extracts, especially when LS was added at higher concentration as evidenced by the higher glass transition temperature, decreased in EAB, and increased water solubility of the films. Films with LS extract or BHT incorporated showed preventive effect on lipid oxidation of soybean oil. The peroxide formation (PV), conjugated diene (CD), and thiobarbituric acid reactive substances (TBARS) values of soybean oil slowly changed compared with the control film.

Keywords: Active film / Antioxidant / Extraction / Giant catfish skin gelatin / Tropical fruit seed