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MASTER OF SCIENCE (FOOD SCIENCE)

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PREPARATION OF EEL (*Monopterus albus*) PROTEIN HYDROLYSATE USING ALCALASE® AND ITS PHYSICOCHEMICAL, ANTIOXIDANT AND ANTICANCER PROPERTIES

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The study aims to determine the optimum condition of eel protein hydrolysate (EPH) produced using Alcalase® and its physicochemical, antioxidant and anticancer properties. The hydrolysis condition was optimized using Response Surface Methodology (RSM) by applying four factors (time, temperature, pH, Alcalase® concentration), 3-levels Central Composite Design (CCD) with six central points. The chemical and amino acid compositions, structural properties, solubility, emulsifying and foaming properties, water holding and fat binding capacity of EPH were determined. The EPH was separated through ultrafiltration membranes (10 kDa, 5 kDa and 3 kDa). The ferric thiocyanate, thiobarbituric reactive substance, reducing power, ferrous ion chelating activity and 1,2-diphenylpicrylhydrazyl radical scavenging activity of fractionated EPH were also determined. The anticancer activity was determined using MCF-7 cell lines. In order to obtain the optimum yield, degree of hydrolysis (DH) and DPPH activity, the optimum hydrolysis condition suggested was 84.02 min, 50.18°C, pH 7.89 and 2.26% Alcalase® concentration. Fat content was decreased by 96.48% after hydrolysis. Hydrolysis process had significantly increased the amount of both hydrophilic (serine and threonine) and hydrophobic amino acids (valine, isoleucine, phenylalanine and

methionine) which contributed to the antioxidant activity of hydrolyzed eel protein. There was no significant difference ($p>0.05$) between EPH at different pH levels in solubility. However, in terms of emulsifying and foaming properties, EPH showed significant difference ($p<0.05$) at different pH levels, while water holding capacity showed significant difference ($p<0.05$) at different EPH concentrations. The fat binding capacity at 1% EPH concentration found to be the highest, however, there was no significant difference ($p>0.05$) on oil binding capacity of EPH at different concentrations. The results of antioxidant and anticancer assays obtained showed that 3 kDa EPH possessed highest inhibition of lipid peroxidation, reducing power, DPPH scavenging activity and anticancer activity. The physicochemical properties possessed by EPH showed that EPH has a potential to be used as a good source of food ingredient as well as antioxidant and anticancer agent, hence play an important role in food industry.