



Characterizations of Pepsin-Soluble Collagen Derived from Lizardfish (*Saurida tumbil* Bloch, 1795) Skin, Bone and Scales

A. Aziz Jaziri¹, Nurul Huda¹, Rossita Shapawi², Ruzaidi Azli Mohd Mokhtar³, and Wan Norhana Md. Noordin⁴

¹Faculty of Food Science and Nutrition, Universiti Malaysia Sabah, Kota Kinabalu 88400, Malaysia, azizjaziri@ub.ac.id, drnurulhuda@ums.edu.my

²Borneo Marine Research Institute, Universiti Malaysia Sabah, Kota Kinabalu 88400, Malaysia, rossita@ums.edu.my

³Biotechnology Research Institute, Universiti Malaysia Sabah, Kota Kinabalu 88400, Malaysia, ruzaidi@ums.edu.my

⁴Fisheries Research Institute, Batu Maung, Penang 11960, Malaysia, wannorhana@yahoo.com

Abstract: Reducing food waste is critical for sustainability. In the case of fish processing, more than sixty percent of by-products are generated as waste. Lizardfish (*Saurida tumbil* Bloch, 1795) is an economically important species for surimi production. To address waste disposal and maximize income, an effective utilization of fish by-products is essential. This study aims to isolate and characterize pepsin-soluble collagens from the skin, bone and scales of lizardfish. Significant differences ($p < 0.05$) in the yields of collagen were noted with the highest yield recorded in pep-sin-soluble skin collagen (PSSC) ($3.50 \pm 0.11\%$), followed by pepsin-soluble bone collagen (PSBC) ($3.26 \pm 0.10\%$) and pepsin-soluble scales collagen (PSCC) ($0.60 \pm 0.65\%$). Through SDS–polyacrylamide gel electrophoresis, the presence of two alpha chains were noted and classified as type I. From Fourier transform infrared spectroscopy (FTIR) analysis, the triple-helix structure of the collagen was maintained. The X-ray diffraction and UV visible spectra characteristics of the lizardfish collagens in this study are similar to the previously reported fish collagens. In terms of thermostability, PSSC ($T_{max} = 43.89\text{ }^{\circ}\text{C}$) had higher thermostability in comparison to PSBC ($T_{max} = 31.75\text{ }^{\circ}\text{C}$) and PSCC ($T_{max} = 30.54\text{ }^{\circ}\text{C}$). All pepsin-soluble collagens were highly soluble ($>70\%$) in acidic conditions (particularly at pH 4.0) and at low sodium chloride concentrations (0–30 g/L). Microstructural analysis depicted that all extracted collagens were multi-layered, irregular, dense, sheet-like films linked by random coiled filaments. Overall, pepsin-soluble collagens from lizardfish skin, bone and scales could serve as potential alternative sources of collagens.

Keywords: lizardfish by-product, pepsin-soluble collagen, structural and physicochemical properties