Production of Biodiesel from Yellowfin Tuna *(Thunnus albacares)* Fish Skin Wastage

G.V. Amangilihewa[1]*, A.S.Mahaliyana[1], M.G.T.R.Kariyawasam[2], E.D.N.S. Abeyrathne[1] and T.N.B. Etampawala[3]

[1]*Department of Animal Science, Uva Wellassa University, Badulla, Sri Lanka*
[2]*Ceylon Fresh Seafood Company (Pvt). Ltd, Ja-ela, Sri Lanka*
[3]*Instrument Center, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*

Yellowfin tuna *(Thunnus albacares)* is one of the major exporting fish species in Sri Lanka. Approximately 50% of the total large pelagic catch in Sri Lanka constitutes tuna-like fish species and usually fillets, steaks, cubes are exported. The rest, which is approximately 1/3 of the harvest is discarded which contain head, skin, tail, viscera and fins. Roughly 5000 tons of fish waste are generated every year in Sri Lanka. Dumping such waste in to the environment can cause various environmental problems. This study was focused to add value to such waste by producing biodiesel as an alternative energy source for petroleum. Tuna fish skins were collected from local processing factory and brought to the laboratory under 4 ˚C and cut in to small pieces. Fish oil was extracted using different solvents; absolute ethanol, ether, n-hexane and 1:1 mixture of ethanol and water using ultra sonication and soxhlet extraction method. Fatty acid profile, energy and the yield was calculated. Accordingly there were no any significant difference in yield of the extracted oil with single solvents used ($p > 0.05$). But ether was selected as the best solvent (3.24 g±0.61). Among the two methods, Soxhlet method showed the highest oil yield (20 mL/kg of fish skin). Fish oil profile was obtained by using Thin Layer Chromatography (TLC) and Gas Chromatography-Mass Spectroscopy (GC-MS). The extracted oil was used to produce biodiesel using single step transesterification with potassium methoxide. The percent conversion of oil in to biodiesel was 88%. Fourier Transmission Infrared (FTIR) Spectroscopy method was used to characterize the fish oil as well as the biodiesel. The energy capacity of the synthesized biodiesel was measured using a Differential Scanning Calorimeter. All the test results were benchmarked against the commercially available petrochemical based diesel. Accordingly, ether soxhlet separation can be used as a potential biodiesel production from Yellowfin tuna fish skin.

Keywords: Biodiesel, Yellowfin Tuna, Soxhlet, Ether, Sonication