

**COMPOSITION AND STABILIZATION OF SHARK
LIVER OIL EXTRACTS OF SELECTED
SHARK SPECIES**

by

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Thesis submitted to the University of Sri Jayawardanepura, Sri Lanka for
the award of the Degree of Master of Philosophy in Chemistry on 11th
November 1999.

DECLARATION

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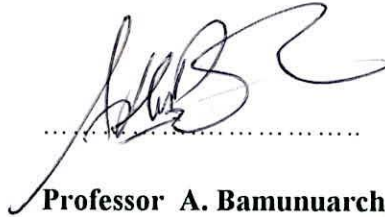
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ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervisors, Professor A. Bamunuarachchi and Dr. W. M. K. Perera for their valuable guidance extended and constructive criticism throughout my study and also critical reading of the manuscript.

I am very grateful to Dr. M. U. Jayasekara (former Director General, NARA), Dr. V. K. Graffham (former Head, IPHT, NARA) for their valuable guidance and making necessary arrangements to obtain financial support from the European Economic Community (EEC) under the project on Science and Technology for Development – Phase III (STD3) "Improved utilization of low value fish species", grant no TS3* CT93 - 0207 through Food and Agriculture Organization and NARA.

My special thanks to Professor P. W. Epasinghe (Chairman, NARA); Dr. D. S. Jayakody, (Director General, NARA); Dr. J. M. P. K. Jayasinghe (Head, IPHT, NARA), Professor T. S. G. Fonseka (former Head, IPHT, NARA) and Professor W. S. Fernando (Dean, Faculty of Applied Science, University of Sri Jayawardanepura) for their encouragement and co-operation given to me through out the study period.

My sincere thanks also given to Mr. R. Edirisinghe (Research Officer), Mr. S. Jayasooriya, Mrs. K. Hettiarachchi, Mrs. J. M. Chandrika, Mrs. R. Samaradivakara, Mr. C. Galappaththi,, Mr. G. Wijerathna, Miss. M. Paththapperuma, Mrs. U. K. Kusumalatha and Mr. K. Jayasena and other staff members of the IPHT, for their

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assistance in collecting and analyzing the samples in an efficient manner and support extended to complete this study successfully.

I am deeply indebted to Mr. David James (Senior Fishery Industry Officer, FAO); Dr. Peter Ben Embarek (Co-ordinator, STD3 Project) and Professor H. H. Huss (Research Co-ordinator, EEC) for their co-operation extended to complete the program successfully and providing opportunities to participate at International Conferences held in Sri Lanka, Philippines and China.

I greatly appreciate the support of Mr. S. Amarasekara (Indo Pacific Tuna Programme), Mr. D Amarasooriya (Research Officer, NARA) and Mr. A. Gunarathne (Information Officer, NARA) to prepare this thesis in good manner.

I would also like to thank Mr. G. Jayasinghe and Mr. S. Mohottala (Scientific Officer, CISIR) for assistance provided me with their comments.

Finally my special thanks to my dearest Jagath and parents, without their blessing, support and constant encouragement, I would never have completed this study successfully and I get this opportunity to dedicate the thesis to my loving daughter Yomalka.

ABSTRACT

COMPOSITION AND STABILIZATION OF SHARK LIVER OIL EXTRACTS OF SELECTED SHARK SPECIES.

By

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ABSTRACT

In the recent years, scientists have given more emphasis on the use and stability of fish lipid in the food industry as it consists of unsaturated fatty acids with distinct health and pharmaceutical value. This thesis presents the results of a series of experiments carried out on shark liver oil with regard to its composition, extraction methods, seasonal variations of oil content and stabilization using natural antioxidants.

Liver samples of fifteen shark species landed in the West coast of Sri Lanka were analyzed for proximate composition. Silky shark (*Carcharhinus falciformis*), Hammerhead shark (*Sphyrna lewini*) and Oceanic white tip shark (*Carcharhinus longimanus*) were selected for further studies as they have been identified as the predominant species with comparatively high liver oil content.

As the quality of raw livers has an affect on the oil quality, selection of fresh livers for oil extraction is very important. Organoleptic score card developed in the present study categorized 4.3% of the livers as best in quality while 30.4, 56.5 and 8.7 percentages as good, medium and poor in quality respectively at landing sites of Negombo and

Beruwala. Icing (0°C) and good handling practices on board would help to maintain the freshness of livers for more than 15 days.

Fatty acid composition of liver oil of three species were determined. Palmitic acid (C16:0; 22-26%) was dominant followed by oleic (C18:1; 13-23%) out of twenty fatty acids identified. Significantly ($p < 0.05$) highest n-3 poly unsaturated fatty acids (PUFAs) recorded by silky shark (*Carcharhinus falciformis*) (27.4%) followed by hammerhead (*Sphyrna lewini*) (24.6%) and oceanic white tip (*Carcharhinus longimanus*) (20.2%) sharks. The contribution of eicosapentaenoic and docosapentaenoic acids for the total n-3 PUFAs by the three shark species was very high. Oceanic white tip (*Carcharhinus longimanus*) contributed highest value (94%) while hammerhead (*Sphyrna lewini*) and silky shark (*Carcharhinus falciformis*) contributed (85%) and (77%) respectively. The ratio of n-3/n-6 was highest (6) in oceanic white tip shark (*Carcharhinus longimanus*) liver oil. The variation pattern of liver oil content of silky (*Carcharhinus falciformis*) and hammerhead (*Sphyrna lewini*) shark species showed more over similar and high values in December and low values in March - April. But, oceanic white tip shark (*Carcharhinus longimanus*) showed peak values in October. Results of this study revealed that liver oil content varies with the species, season and gender.

Influence of extraction methods i.e., steam rendering, wet rendering, incubation, alkali digestion and acid silage on the quality and yield of shark liver oil was determined. Results suggested that extraction of oil using steam rendering and ensilage methods are suitable to be introduced as small - scale industry to coastal communities in Sri Lanka.

Influence of natural antioxidants i.e., tamarind (*Tamarindus indica*), garcinia (*Garcinia cambogia*) and bilin (*Averrhoa bilimbi*) and butylatedhydroxy toluene (BHT) on quality of liver oil extracted by ensilage and steam rendering methods was studied. The results showed the possibility of obtaining high quality liver oil using bilin (*Averrhoa*

bilimbi) juice during the extraction of oil by ensilage method and butylated hydroxy toluene (BHT) (200 ppm) in steam rendering extraction procedures.

Shark liver oil was treated with ethanolic extracts of turmeric (rhizome of *Curcuma domestica*), tamarind (fruit and seeds of *Tamarindus indica*) and synthetic antioxidants (BHT and ascorbic acid) to determine the effectiveness of treatments as antioxidants. Turmeric (*Curcuma domestica*) turned out to be the most effective. A level of less than 250 ppm of ethanolic extract of turmeric (*Curcuma domestica*) was sufficient to prevent oil oxidation and comparable to 200 ppm of BHT.