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COMPOSITION AND STABILITY OF FISH LIPIDS

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COMPOSITION AND STABILITY OF FISH LIPIDS

By

E. M.R.K. B. Edirisinghe

ABSTRACT

Fish lipids are becoming promising food material for human due to their high nutritional and pharmaceutical value. Fish lipids are reported to have high amount of polyunsaturated fatty acid and therefore are different in composition and stability than other lipids. The study was carried out to investigate novel extraction methods, composition, seasonal changes and stability during storage of fish lipids in small pelagics.

The proximate composition of thirty three different small pelagics were studied. On the basis of lipids content, abundance and price of fish species, four pelagics were selected for further studies. These were White sardinella, *Thryssa.sp*, Silver belly and Streaked sprinefoot. Extraction of fish lipids was carried out by four different methods. i.e. acid silage, microbial silage, wet rendering and steaming using White sardinella. Of the methods evaluated the most efficient extraction method was acid silage extraction which provided 73% of the total lipids and 52% of total lipids was extracted by steaming compared to the yield from Bligh & Dyer method.

The selected four fish species from different families showed different types of lipid composition. The triacyl glycerols contributed to the major proportion of lipids in three species. The complex polar lipids was the largest lipid class only in streaked spinefoot, contributing 38% from total lipids. Separation of cholesterol from 1,3 diacyl glycerol was difficult by the solvent system. Fatty acid profile of individual lipid classes were different

from each other. Polar lipid fraction of white sardinella lipids consisted with higher amount of polyunsaturated fatty acids than the triacyl glycerol fraction of the same fish lipid.

The study when extended to fatty acid assay of forty fish species revealed that the percentage of omega-3 polyunsaturated fatty acids were high in Yellowstripe scad (*Selaroides leptolepis*), Dorab-wolf herring (*Chirocentrus dorab*), Spotted sardinella (*Amblygaster sirm*), Blacktip sardinella (*Sardinella melanura*), Buccaneer anchovy (*Stolephorus punctifer*), Brushtooth lizard fish (*Saurida undosquamis*) and Big-eye barracuda. However, these species contributed low amounts of these acids due to the low fat content present in them. White sardinella and *Thryssa.sp* showed the highest amount of lipids during the months of November and February whereas the month of May was the lowest level. Relatively low amounts were found in Silver belly and Streaked sprinefoot with no marked seasonal peaks or troughs. In general, the lipids content was low during the period April -June due to the spawning season of most species.

Influence of temperature (32, 0 and -18°C) on the quality of fish and fish lipids was studied using White sardinella. Oxidation was very rapid when stored at room temperature (32°C); ice storage (0°C) maintained good quality over a period of one month; freezing (-18°C) considerably slowed down undesirable quality changes. During the 446 days storage period, the omega-3 PUFA content slightly decreased.

When the antioxidant property of some plant extracts in relation to rancidity was taken into consideration, Indian Gooseberry (Nelli, *Phynanthus emblica*) showed the ability to offer highest protection for fish lipids. Active components in Indian Gooseberry, when extracted using Ethanol instead of other organic solvents and water, produced more efficient results. Furthermore, the ethanolic extract was separated using different solvents with different polarity and the best activity was recorded in ethyl acetate system. This system recorded higher activity at 1000ppm compared to 200ppm of BHT.