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Fatty Acid Composition of Oil Extracted From Surmai Fish (*Scomberomorus commerson*) From Marathwada Region.

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ABSTRACT

The Surmai Fish (Scomberomorus commerson) is a species of freshwater fish native to Indo-Pacific region and it contains high nutritional values. For the present study Surmai Fish is purchased from local market of Aurangabad (MS) India. The present study has been conducted in order to find out fatty acid composition of oil extracted from Surmai Fish. Fatty acid composition of the oil is determined by Gas Chromatography. It is observed that the Surmai Fish is rich in Palmitic acid, Stearic acid, Oleic acid, and Linoleic acid.

Keywords: Surmai Fish (Scomberomorus commerson), Fatty acid composition, Gas Chromatography,

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INTRODUCTION

Surmai fish (*Scomberomorus commerson)* belongs to Scombridae Family. It is found in the coastal tropical waters of the Indo pacific region. Surmai fish is considered one of the most important commercial fish species. Some studies have performed on *Scomberomorus commerson* such as Govender [1] performed study in order to find out the growth of *Scomberomorus commerson* off the coast of Natal, South. Hosseini [2] studied commercially important species *Scomberomorus commerson* and *Scomberomorus guttatus* based on fish biometry characteristics in chabahar coasts. Ghodrati shojaei *et al* [3] studied Age, Growth and Mortality Rate of the Narrow- Barred Spanish Mackerel *Scomberomorus commerson* in Coastal Waters of Iran from length frequency data. Taghavi *et al* [4] studied the Population Dynamic of the Spanish mackerel *Scomberomorus commerson* in Coastal Waters of Oman. Kaymaram *et al* [5] studied the reproduction and spawning patterns of the *scomberomorus commerson* in the Iranian coastal waters of the Persian gulf & Oman sea.

Recently we used supercritical fluid extraction technology [instrument name: SFC L-tex Japan] in order to extract compounds from various biological material such as plants and animals and also analyzed fatty acid composition of two animals [6-11]. The aim of this study is to analyze fatty acid composition of oil extracted from Surmai fish.

MATERIAL AND METHOD

The Surmai Fish are purchased from local market, at Aurangabad District (Maharashtra) India. The meat of Surmai Fish is dried in oven for 8 hours at 50 ^{o} C. After proper drying, the dried *fish* meat is subjected to supercritical fluid extraction process in order to obtain fish oil. Extraction is performed using SFC (L-tex, Japan) instrument. Carbon dioxide gas is used as supercritical fluid; Hexane is used as a modifier (co-solvent). Extraction is performed at constant flow rate, Constant temperature and constant pressure. Extraction Conditions: flow rate of carbon dioxide = 1 ml/min, flow rate of hexane = 1 ml/min, temperature = 40^{0} C and pressure = 25 Mpa. Extracted oil from the fish is used as a sample for fatty acid composition analysis.

I] Preparation of Methyl Esters (Method A):

500 mg sample is added to 100 ml boiling flask. 8 ml methanolic NaOH solution and boiling chip is added to the flask. Condenser is attached to the flask and refluxed until fat globules disappear (about 5–10 min). 9 ml BF solution is added through condenser and continued boiling for 2 min. Add 5 ml hexane is added through condenser and boiled for 1 more min. The boiling flask is removed and ca. 15 ml saturated NaCl solution is added. Stopper is placed on the flask and shaken vigorously for 15 s while solution is still tepid. Add additional saturated NaCl solution is added to float hexane solution into neck of flask. 1ml upper hexane solution is transferred into a small bottle and anhydrous Na_2SO_4 is added to remove H_2O.

II] Injection of Standards and Samples into GC:

The syringe is rinsed three times with hexane, and three times with the reference standard mixture (25 mg of 20A GLC Reference Standard FAME dissolved in 10 ml hexane). 1 ml of standard solution is injected, syringe is removed from injection port, and then start button is pressed. The syringe is rinsed again three times with solvent. The chromatogram obtained is used as described below.

The syringe is rinsed three times with hexane, and three times with the sample solution prepared by Method A. 1 ml of sample solution is injected, syringe is removed from injection port, then start button is pressed. Syringe is rinsed again three times with solvent. The chromatogram obtained is used as described below.

III] Data and Calculations:

Retention times and relative peak areas are reported for the peaks in the chromatogram from the FAME reference standard mixture. This information is used to identify the peaks in the chromatogram [12].

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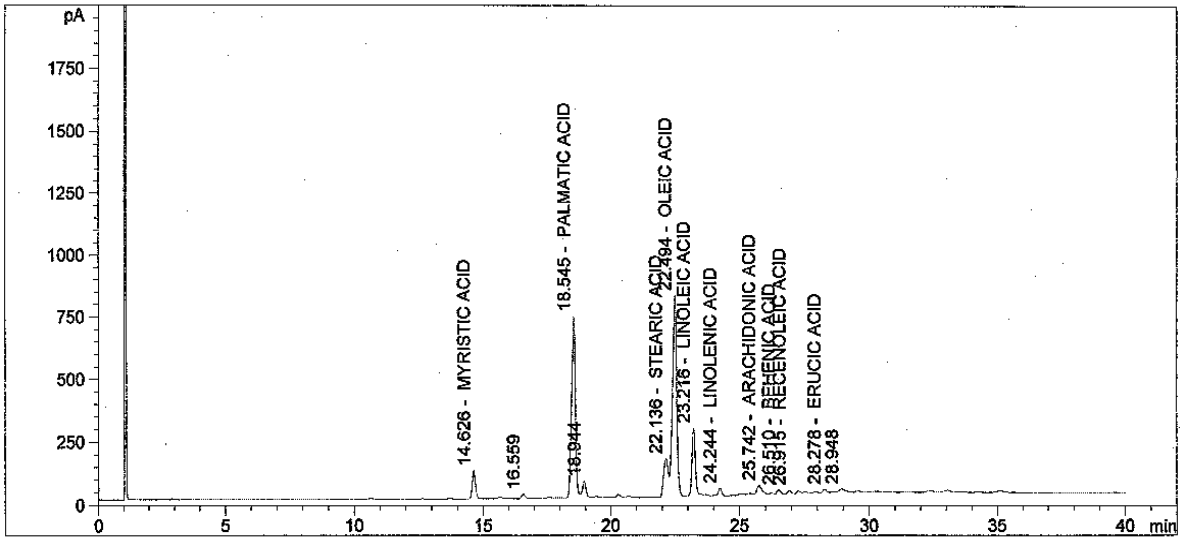
RESULT

The oil is tested for fifteen fatty acids out of which only ten fatty acids are found in the fish oil namely: Myristic acid, Palmitic acid, stearic acid, Behenic acid and Erucic acid which are saturated fatty acids, Oleic acid and Erucic which are monounsaturated fatty acid, Linoleic acid and Arachidonic acid which are polyunsaturated fatty acids, Linolenic acid is also unsaturated fatty acid. The concentrations of saturated acids: Myristic acid, Palmitic acid, stearic acid, Behenic acid and Erucic acid are found to be 4.12% and 31.12 %, 7.79%, 0.76% and 0.44% respectively. While the concentrations of unsaturated acids: Oleic acid Linoleic acid, Linolenic acid Arachidonic acid and Recenoleic acid are found to be 38.21%, 9.91%, 1.04%, 1.94% and 0.55% respectively.

Table: Fatty acid Composition

Sr. No.	Parameter	RT (minute)	Width (minute)	Height	Area	percentage
	Fatty acid Composition:					
	Methyl esters of					
1.	Caproic acid	0.00	0.00	0.00	0.00	0.00
2.	Caprillic acid	0.00	0.00	0.00	0.00	0.00
3.	Capric acid	0.00	0.00	0.00	0.00	0.00
4.	Lauric acid	0.00	0.00	0.00	0.00	0.00
5.	Myristic acid	14.626	0.11	110.06	978.36	4.12
6.	Palmitic acid	18.545	0.12	721.48	7392.48	31.12
7.	Stearic acid	22.136	0.15	152.59	1849.41	7.79
8.	Oleic acid	22.944	0.13	800.92	9075.61	38.21
9.	Linoleic acid	23.216	0.11	264.97	2352.76	9.91
10.	Linolenic acid	24.244	0.10	29.66	247.50	1.04
11.	Arachidonic acid	25.742	0.16	35.35	460.41	1.94
12.	Behenic acid	26.510	0.12	17.88	180.80	0.76
13.	Erucic acid	28.278	0.10	13.08	104.86	0.44
14.	Lignoceric acid	0.00	0.00	0.00	0.00	0.00
15.	Ricinoleic acid	26.915	0.11	14.75	129.88	0.55



Chromatogram of Fatty acid Composition of Oil Extracted From Surmai Fish

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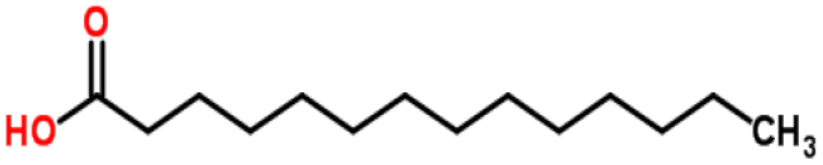
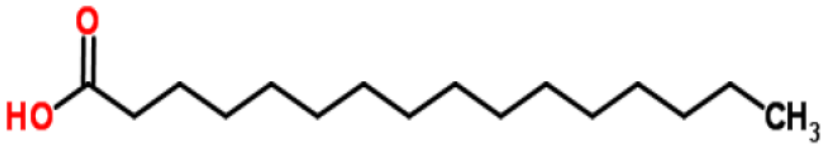
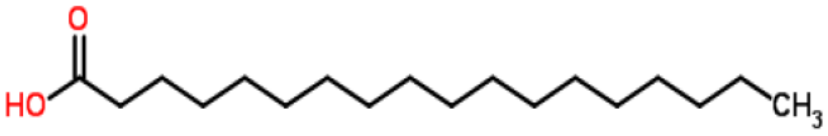


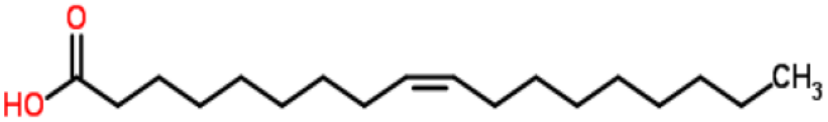
Mystric acid



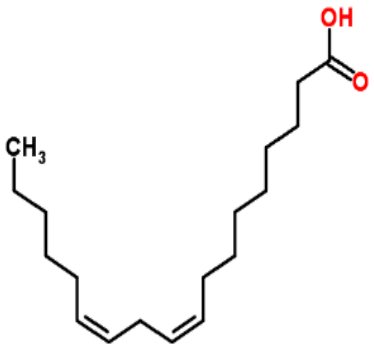
Palmitic acid



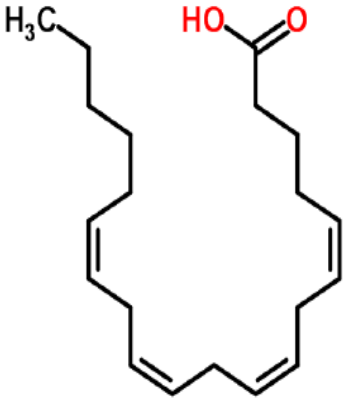
Stearic acid



Oleic acid



Linoleic acid



Arachidonic acid

Chemical Structures of Identified Compounds

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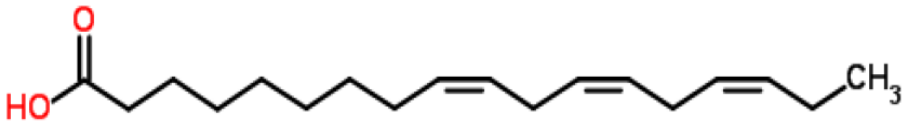
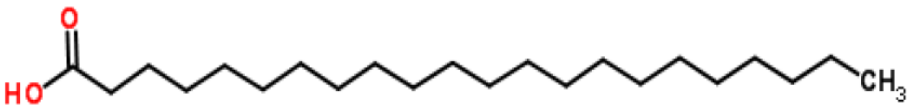
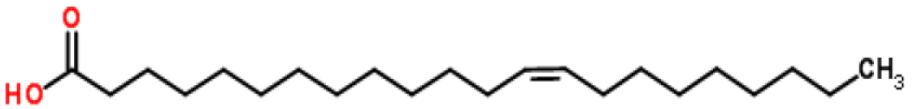


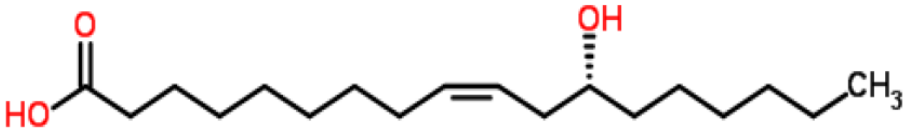
Linolenic Acid



Behenic acid



Erucic Acid



Ricinoleic acid

As we know that unsaturated fatty acids are good for health. These fatty acids help decrease heart diseases, reduce cholesterol levels and have other health advantages. Unsaturated fatty acids remain liquid at room temperature, on the other hand saturated fatty acids remain solid at room temperature. Oleic acid is strong antioxidant and free radical hunter [13]. Unsaturated fatty acids are essential for good health; they lower LDL cholesterol (Low density lipoproteins are referred to as bad cholesterol) but do not lower HDL cholesterol (High density lipoproteins are referred to as good cholesterol) [14]. Linoleic acid and Arachidonic acid are members of the omega 6 family of polyunsaturated fatty acids [15]. Omega 6 fatty acids have achieved significant interest in recent years. These fatty acids are necessary for good health. These fatty acids cannot be created by human body. These fatty acids have to be taken in food [16].

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