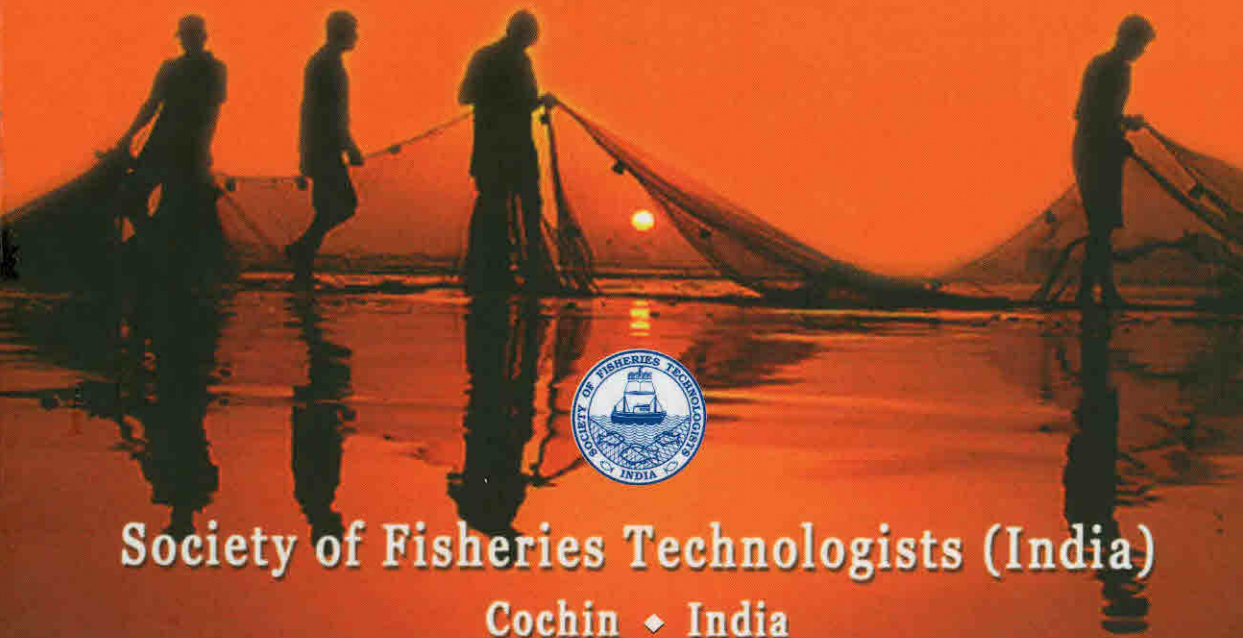


Coastal Fishery Resources of India

• Conservation and Sustainable Utilisation



Society of Fisheries Technologists (India)

Cochin ♦ India

Coastal Fishery Resources of India: Conservation and Sustainable Utilisation

Proceedings of the National Seminar on Conservation and Sustainability of Coastal Living Resources of India, 1-3 December 2009, Cochin

Organised by

Society of Fisheries Technologists (India), Cochin
and
Centre for Ocean and Environmental Studies, New Delhi

In association with

Ministry of Earth Sciences (New Delhi)
Central Marine Fisheries Research Institute (Cochin)
National Institute of Oceanography (Goa) and
Central Institute of Fisheries Technology (Cochin)



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ISBN: 978-81-901038-7-9

Published by

Society of Fisheries Technologists (India)
P.O. Matsyapuri, CIFT Junction, Cochin - 682 029, India

URL : www.fishtech.org
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Citation:

Rao, G.S. (2010) Current status and prospects of fishery resources of the Indian continental shelf, In: Coastal Fishery Resources of India: Conservation and Sustainable Utilisation (Meenakumari, B., Boopendranath, M.R., Edwin, L., Sankar, T.V., Gopal, N. and Ninan, G., Eds.), p. 1-13, Society of Fisheries Technologists (India), Cochin

Cover design: Vineethkumar, P., CIFT, Cochin

Printed at PAICO, Cochin - 682 035, India

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11953



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P.O. Matsyapuri, CIFT Junction, Cochin - 682 029, India

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Characteristics of Meal and Oil Prepared from Marine Fishes

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Introduction

Fish meal is a highly concentrated nutritious feed supplement consisting of proteins, minerals, vitamins of B group and other vitamins. It is prepared by cooking, pressing, drying and grinding the skeletal remains along with the adhering proteinaceous tissues of fish from filleting or canning operations. Traditional fish meal production in India is from the sun dried fish collected from various drying centers' all along the coast. Fish meal has high protein content which enables its use as an additive in animal feed. The Ministry of Food and Agriculture has, as early as in 1959, laid down specifications of fish meal. Later, the Indian Standard specifications for fish meal as livestock feed IS: 4307-1983 was introduced (BIS, 1983). The yield of oil depends on the raw material used and process employed. Fish oil contains essential omega-3 fatty acids such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Windsor (2001) reviewed the manufacture, storage, composition and use of fish meal and oil.

The objective of the present study was to compare the characteristics of meal and oil prepared from four species of marine fishes, viz., Indian oil sardine (*Sardinella longiceps*), Indian mackerel (*Rastrelliger kanagurta*), catfish (*Arius* sp.) and triggerfish (*Sufflamen* sp.).

Materials and Methods

Four species of marine fishes, viz. Indian oil sardine (*Sardinella longiceps*), Indian mackerel (*Rastrelliger kanagurta*), catfish (*Arius* sp.) and triggerfish (*Sufflamen* sp.) were collected from local fish markets at Cochin. The proximate composition of these fishes were analysed as per the methods of AOAC (2000). Refractive index, iodine value, saponification value and peroxide value were determined as per the methods of AOAC

(1975). The fish was cooked in boiling water and the oil was filtered and pressed to remove maximum water. The residue was dried and pulverized to produce the fish meal. The press liquor containing oil was separated and purified to get pure oil. The fatty acids in the form of methyl esters were detected using gas chromatograph (GC Varian CP3800, Varian Inc. Lake Forest, USA) (AOAC, 1975) and compared with standards supplied by SUPELCO (595, North Harrison Road, Bellefonte, PA, USA)

Results and Discussion

The proximate compositions of all the four species of fish are given in Table 1. It is observed that oil sardine has the highest fat content, followed by Indian mackerel, catfish and triggerfish. Protein content among the species varied between 19 and 21%.

Table 1: Proximate composition of fishes

Components	Oil sardine	Mackerel	Catfish	Triggerfish
Moisture, %	67.0	71.2	76.2	79.7
Ash, %	1.7	1.3	1.1	0.9
Protein, %	19.4	21.2	19.2	18.6
Fat, %	11.1	7.5	3.4	0.8

Proximate composition of fish meal has shown that the moisture content is below 10% (Table 2). Protein content was high in oil sardine (68.9%), followed by mackerel (62.3%), triggerfish (61.2%) and catfish (54.5%). Fat content was high in mackerel (9.8%), followed by oil sardine (7.2%), triggerfish (6.9%) and catfish (4.5%). Ash content was highest in triggerfish (8.1%), followed by mackerel, catfish and lowest in oil sardine (10%).

Fish oils are produced whenever fatty fish are processed into meal. Characteristic properties of fish oil from oil sardine, mackerel, catfish and triggerfish are given Table 3. Refractive index of oil was within the range of 1.46-1.48. Iodine value was highest in triggerfish, followed by Indian mackerel, catfish and lowest in sardine oil. Saponification value was highest in oil from triggerfish, followed by oil sardine, Indian mackerel and lowest in catfish oil. Peroxide value was within the range of 0.9-1.4. The yield of oil was highest in oil sardine (7%), followed by mackerel (4.5%),

Table 2: Proximate composition of fish meal

Components	Oil sardine	Mackerel	Catfish	Triggerfish
Moisture, %	5.6	6.7	7.5	8.1
Ash, %	10	14.7	13.8	18.4
Protein, %	68.9	62.3	54.5	61.2
Fat, %	7.2	9.8	4.5	6.9

catfish (2%) and triggerfish (1.2%). The variation in the yield of oil between different species could be due to seasonal and biological factors.

Table 3: Characteristics of oil

Characteristics	Oil sardine	Mackerel	Catfish	Triggerfish
Refractive Index	1.47	1.48	1.46	1.47
Iodine value	107.0	113	112	125.5
Saponification value	176.7	167	143	215.3
Peroxide value	1.4	1.1	1.0	0.9
Yield of oil, %	7.0	4.5	2.0	1.2

Fatty acid composition of the oil from oil sardine, mackerel, catfish and triggerfish are given Table 4. Saturated fatty acids were comparatively higher in triggerfish, followed by oil sardine, mackerel and catfish. Mono and polyunsaturated fatty acids were highest in catfish (62.7%), followed by mackerel (59.8%), oil sardine (57.9%) and lowest in triggerfish.

Table 4: Fatty acid composition of fish oil

Fatty acids*	Oil sardine	Mackerel	Catfish	Triggerfish
Saturated	40.2	37.8	35.9	42.6
Monounsaturated	28.2	27.5	30.3	23.8
Polyunsaturated	29.7	32.3	32.4	28.6

* % of total fatty acids

Conclusion

The study has indicated that all the four species of marine fishes, viz. Indian oil sardine, Indian mackerel, catfish and triggerfish are rich in polyunsaturated fatty acids (PUFA), which are reported to have excellent cardio-protective properties.

The author is grateful to the Director, CIFT, Cochin for permission to publish this paper.

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