

Seasonal Variations in Biochemical Composition of Sardines and Mullet from Pakistani Waters

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Summary: Proximate chemical composition of Sardines and mullet during the course of four different fishing seasons is presented. An average commercial size of Sardines 14-20cm and mullet 8-29cm) with average weight of 20-25 gm of each type fish. The effects of seasonal variations in protein, fat ash moisture, and carbohydrate were observed. This report is based on the data collected for a period of one year. Protein and fat contents varied significantly was noticed, while fat and ash contents remained, constant from March to December.

Introduction

The coastal waters of Pakistan abound in a number of conventional and non-conventional varieties of small fish means trash fish (size ranged 5-12 cm) mostly used in making of fish meal [1]. Marine Fisheries Department (MFD) [2] records show that during the years 1987 to 1996, inedible fish reduced to fishmeal production, was between 170087 and 188449 tones/year. This included the use of small size pelagic fish (Sardinella, Thryssa and herring). There is no doubt, about there nutritional bio chemical and economical importance of these raw material from which only 5% is consumable as such by man and 95 % is used in making fish meal Sardines and Mullet are good nutritional source but their utilization as protein source is not common in Pakistan due to their small size and our peoples are not basically fish eater [3].

In the present study a comprehensive survey of the Sardines and mullet around the Karachi coast has been undertaken along with the effect of seasonal variations on biochemical constituents thus whole year information by analysis of regular monthly sampling is provided. In past however such study was not done to maintain a database for seasonal variation of Sardines and mullet from Karachi coast. Sardines and mullet are most important non-conventional fishes inexpensive sources of protein among marine resources These fishes are not in general edible due to their small size, poor taste and spiny structure and unattractive appearance [3]

There are socio-economic factors that can explain low fish consumption in Pakistan. People prefer larger fish such as pamphlet, croaker and mackerel, which are quite expensive, and not within

the reach of poorer people. Fish is eaten as a delicacy and not for its nutritional value or as every day source of nutrition. However, over the last few years has developed in population, and people become more conscious of the health advantages of small fish are commercially low utilized fish in nutrition. Bearing in mind these problems and to facilitate increased consumption Sardine and mullet are utilizing in development of vale added products such as Canned Sardines and fish preserve, fish pickle, and fish protein concentrates or isolates for use as protein supplements. The human food uses is considered a longer-term possibility.

The purpose of this study was to obtain basic information on the seasonal variations in chemical composition Sardine and mullet from Northern Arabian Sea for better planning of utilization of their nutritional values.

Results and Discussion

In Pakistan small size fishes are the raw material for making of fish meal, poultry feed and producing fish oil. Approximately half of the total finfish landed in Pakistan is including Sardines and mullet [1]

Marine Fisheries Department (MFD) records show that during the year 1987 and 1996, inedible fish reduced to fish meal production; was between 170087 and 188449 tones/year. This indicated the use of small size pelagic fish (Sardinella (sardines) Tryssa, mullet and herring). Abundance of sardines and mullet was calculated percentage basis in a measurable amount of trash fish (Fig. 1). It was

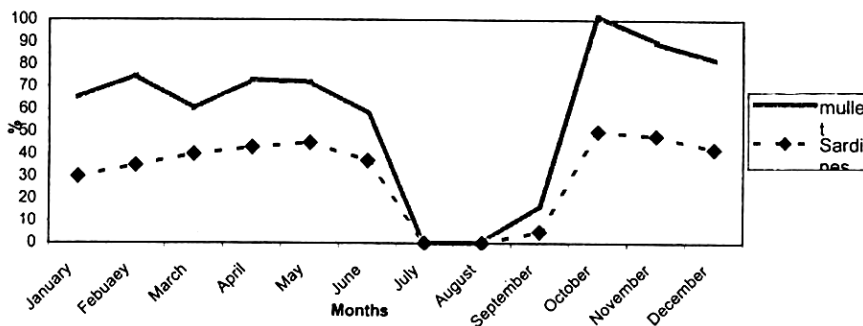


Fig.1: Abundance of Sardines and Mullet in Trash Fish During the Year.

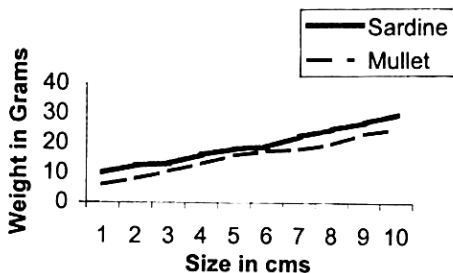


Fig.2: Relationship between Average Weight and Size of Sardine and Mullet.

these two fishes depends upon their biochemical compositions.

The relationship in percentage of mullet and sardines size by weight is mentioned (Fig. 2). However, length distribute (size) and weighed in different seasons (Fig. 3) indicated that more varieties in the months of May and June. Sardines were not available during months of July- Sept and mullet was July- August.

Average proximate composition of protein, lipid and moisture and given in table-1. for sardines

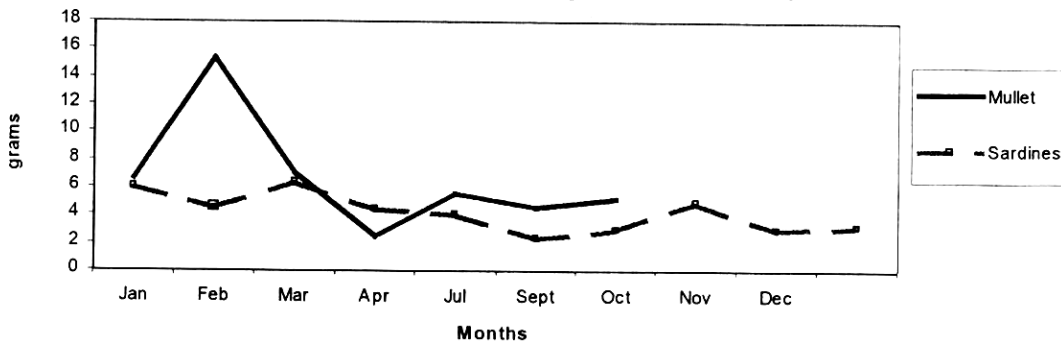


Fig. 3: Mean Ash Content of Sardines and Mullet During Fishing Season.

observed catch and by catch levels are affected both by diurnal and by seasonal factors The chairman of fisheries cooperative society, Karachi, indicated that less by catch was caught during the day than that was caught during the night fishing [4] on the other hand reported higher catch/unit effort (kg/HR.) was obtained during the daytime.

Recently, interest has heightened in the patented for utilization of mullet and sardines in higher valued products. Nutritional importance of

and table-2 for mullet show by Fig. 3 Minimum protein was observed in November for sardines and for mullet it was 14.20 per gram (table-2). Fish composition varies not only among species but also within the same species for Example, Anchovies caught off the coast of southern California have an average fat composition ranging from 2 to 12% depending on the season they are caught.

In proximate composition of sardines and mullet protein and found similar to that of cod,

Table-1: Seasonal Variations in the Proximate Composition of Sardines

Month	No. of samples	Protein $\bar{x} \pm SD$ (gms)	Lipid $\bar{x} \pm SD$ (gms)	Moisture $\bar{x} \pm SD$ (gms)
January	7	15.57 ± 0.98	14.02 ± 0.21	61.47 ± 0.50
February	5	18.78 ± 0.25	5.59 ± 0.20	69.12 ± 0.04
March	7	15.70 ± 0.51	12.19 ± 0.47	62.98 ± 1.12
April	7	15.88 ± 0.61	13.32 ± 0.65	63.83 ± 0.32
May	6	17.20 ± 0.65	15.45 ± 0.51	61.44 ± 0.10
June	9	17.61 ± 0.62	12.57 ± 0.56	64.03 ± 1.02
July	n.a	n.a	n.a	n.a
August	n.a	n.a	n.a	n.a
September	5	16.34 ± 0.37	14.60 ± 0.25	63.05 ± 1.24
October	10	17.23 ± 0.45	15.04 ± 0.96	61.78 ± 0.77
November	12	14.11 ± 1.09	12.10 ± 0.51	69.72 ± 0.51
December	13	17.66 ± 0.51	15.39 ± 0.51	61.51 ± 0.51

Table-2: Seasonal Variations in Proximate Composition of Mullet.

Months	No. of samples	Protein $\bar{x} \pm SD$ (gms)	Lipid $\bar{x} \pm SD$ (gms)	Moisture $\bar{x} \pm SD$ (gms)
January	8	17.34 ± 0.98	1.42 ± 1.37	71.63 ± 1.30
February	13	18.78 ± 1.34	5.66 ± 2.01	68.69 ± 0.98
March	17	15.70 ± 2.33	12.19 ± 1.36	68.69 ± 1.26
April	17	15.88 ± 1.87	13.32 ± 2.01	62.98 ± 2.01
May	11	14.20 ± 1.90	11.39 ± 1.98	64.34 ± 1.98
June	15	12.64 ± 1.67	13.85 ± 1.20	65.10 ± 2.13
July	n.a	n.a	n.a	n.a
August	n.a	n.a	n.a	n.a
September	20	18.58 ± 1.33	11.64 ± 2.6	64.78 ± 1.96
October	13	15.37 ± 1.67	13.49 ± 1.98	64.76 ± 2.16
November	10	14.11 ± 1.79	13.32 ± 2.12	63.02 ± 1.96
December	18	18.67 ± 1.66	12.59 ± 2.00	65.41 ± 2.01

Pollock, rock fish and flounder but fat and moisture over fanned net to be similar [5].

Relationship between average weight and size Sardines and mullet was determined. Over the last few years, awareness has developed among the population and people have become more conscious of the health advantage of fish in nutrition.

Technologies have been developed for utilization of underutilized fish such as Sardine and mullet for example fish presence and canned Sardines are producing at PCSIR Labs Complex Karachi.

Average value of protein was 16 and moisture was 7.5 & 1.6 for sardine and mullet that leads to conclusion that proximate composition is affected by seasonal variation.

Significant effect was observed in Fat and ash content of both fishes during the whole year [6].

Carbohydrate was determined on the basis of difference. It was found that carbohydrate & protein are also significantly ($p > 0.01$) affected due to seasonal variation [7]. Caloric values and moisture contents were not significantly affected by seasonal variation [8]. Minimum protein was observed in month of November (Table 1) for sardines and for mullet it was May i.e. 14.20 per gram (Table 2). The amount of protein in fish is influenced by the fat and water content. There is inverse relationship between the fat and protein contents of the edible part of one and the same fish.

The fat content may vary between 0.3 and 17% or more sere in sardine, Atlantic (canned) 21% [9] David *et al* 1976 [8] investigated, that protein of sardine was superior to casein, with a biological value on the average 50% higher.

There is significant effect upon ash and or fat content depended upon the time of season during which sardine or mullet were caught [6]. Dubrow *et al* (1976) [8] invested that the protein of Sardine was superior to casein because its biological value was found 50% higher than that of biological value of casein. Carbohydrate and protein contents were each significantly ($P < 0.01$) affected by the time of season [7]. Caloric and moisture contents were not significantly affected by the time of season [8]. Thus it is concluded there season affected the composition via the range of the 16 mean values for protein and moisture was 1.5 and 1.6, respectively.

Similarly, mean values of all samples for fat, moisture and protein were within normal ranges of previously reported results [7].

Experimental

When fishing in distant fishing grounds (7-15 5 days or more at sea) the by catch of the last few hauls, when the boat is en route to the home port). These small boats brings by catch to harbor, where all good conditions edible fishes separated and bed condition catch goes to fish and poultry meal factories. The specimen of sardines and mullet were procured on a monthly basis from Karachi fish harbor west wharf. The collection of specimen were brought to fish harbour via small boats are big trawlers as by catch. At harbor all good quality edible fishes were separated and condition by-catch were used for fish meal. Monthly every fish was weighed and length from head to tail was measured in cm after washing

thoroughly in the stream of fresh water. Every time 5-6 identified group of fishes were minced with the help of a mincing machine subsequently dried at 70 °C in a drying oven for 48hrs. This dried material was then ground to a consistency of 30 mesh powder and used for the analysis of crude protein, ash, moisture and fat according to technique described by AOAC (2000) [9].

Ash was determined at 600 °C in furnace and moisture at 105°C in oven. Variation in size and weight was observed in both fishes during whole calendar year. The average size of both fisher varies from 12-17cms that is directly proportional to weight of fishes (Fig. 2).

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