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BIOCHEMICAL COMPOSITION OF SOME COMMERCIAL FISHES FROM PARANGIPETTAI WATERS*

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ABSTRACT

Even though literature is available on the nutritional value of many estuarine and marine fishes, studies relating to the biochemical composition of *Platycephalus indicus, Sorsogona tuberculata, Thysanophrys carbunculus, Grammoplites scaber, Suggrundus rodericensis* and *Scomberomorus commerson*, have not been carried out so far. The present investigation was therefore undertaken to study the biochemical constituents like protein, carbohydrates, lipids and calorific value in various body tissues like muscle, liver and gonad of the above mentioned commercial fishes of Parangipettai (Porto Novo) waters.

INTRODUCTION

THE PRESENT world population is 4000 million and experts believe that in the year 2000 it will exceed 6000 million. Taking the individual protein requirement per day as 70 gm, the total population require apart from land source about 120-130 million tonnes of protein annually from the sea (Chernyshev, 1977). In India, where high cereal and low animal protein intake is seen; about 79% of people are suffering from acute malnutrition either qualitative or quantitative protein deficiency. This leads to higher rate of infant and child mortality, stunted physical growth, low work output, premature ageing and reduced life span (Kandoran, 1976).

Biochemical studies on fish tissues are of specific interest, since such tissues constitute a rich source of high nutrients and calorific value (Joshi *et al.*, 1979). In India, few studies have been made on the chemical composition of marine fishes (Chari and Pai, 1948; Kamasastri, 1961; Antony Raja, 1969; Ramaiyan and Paulpandian, 1976; Vijayakumaran, 1976; Jayabalan and Ramamoorthi, 1984, Jayalakshmi, 1987). Hence an attempt is made presently to study the biochemical composition of six species of commercial fishes often caught from Parangipettai Coast.

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MATERIALS AND METHODS

Specimens of platycephalids and juveniles of seerfish are commonly caught in the inshore

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waters of Parangipettai. The species used for the present study are *Platycephalus indicus, Sorsogona tuberculata, Thysanophrys carbunculus, Grammoplites scaber, Suggrundus rodericensis* and *Scomberomorus commerson.* The fishes were procured from the commercial catch immediately after landing. They were brought to the laboratory for the proximate analysis. Muscle tissue taken just below the dorsal fin and above the lateral line, besides the liver and gonad were removed from the fish and they were kept in a hot air oven maintained at a temperature of 70°C to obtain constant weight and ground into powder, using morter and pestle. Powdered tissue was stored in dessicator until analysis. Excepting *Scomberomorus commerson*, other species considered for the present study had gonad maturity at stage IV.

Total protein was estimated colorimetrically using Biuret reagent as suggested by Raymon *et al.* (1964). For the estimation of fat, chloroform-methanol mixture was used adopting the procedure given by Folch *et al.* (1956). Total carbohydrate was estimated by phenol-sulphuric acid method of Dubois *et al.* (1956).

The calorific values for different fractions were worked out using 5.65 k. cal/g dry weight for protein 4.15 for carbohydrate and 9.4 for lipid (Phillips, 1969).

RESULTS

The protein, lipid and carbohydrate of oven dried tissues of six species of commercial fishes studied presently are given in Table 1. Each value represents the mean of five samples for each species. The values are expressed as percentage of dry weight in all cases.

TABLE 1. *Variations of protein, carbohydrate and lipid among the six commercial fishes.*

Species	Tissues	Protein (%)	Carbo-hydrate (%)	Lipid (%)
P. indicus	Muscle	46.47	0.42	1.55
	Liver	52.65	0.64	1.99
	Gonad	72.64	0.28	1.78
S. tuberculata	Muscle	44.99	0.27	3.25
	Liver	54.26	0.58	3.95
	Gonad	70.42	0.21	3.61
T. carbunculus	Muscle	32.45	0.40	4.88
	Liver	38.56	0.64	4.99
	Gonad	48.42	0.31	4.90
G. scaber	Muscle	33.19	0.35	5.65
	Liver	37.82	0.71	5.98
	Gonad	47.56	0.29	5.72
Su. redericensis	Muscle	34.66	0.38	4.88
	Liver	40.36	0.79	4.99
	Gonad	51.42	0.26	4.90
Sc. commerson	Muscle	74.00	0.40	5.12
	Liver	—	—	—
	Gonad	—	—	—

Protein : The protein content ranged from 32.45% to 74.11%. However in *Scomberomorus commerson* the protein content was very high (74.0%). The lowest was found in *Thysanophrys carbunculus* (32.45%). Relatively more protein content was observed in gonad when compared to liver and muscle.

Carbohydrate : The carbohydrate content ranged from 0.21% to 0.79%. *Suggrundus rodericensis* was conspicuous in possessing high content of carbohydrate (0.79%). The lowest was found in *Sorsogona tuberculata* (0.21%). The carbohydrate content of the liver is more when compared to muscle and gonad.

Lipid : The lipid content varied from 1.55% to 5.98% however in *Grammoplites scaber,* the lipid content was very high in all the three tissues when compared to other species. Among the six species, the lowest was

TABLE 2. *Variations of Protein, Carbohydrate and Lipid with estimation of calorific values in six commercial fishes of Parangipettai Coast*

Species	Tissues	Protein (dry weight)		Carbohydrate (dry weight)		Lipid (dry weight)		Total Calories P+C+L Cal/g
		mg/g	x 5.65 Cal/g	mg/g	x 4.15 Cal/g	mg/g	x 9.4 Cal/g	
Platycephalus indicus	Muscle	464.69	2625.50	4.25	17.64	15.5	145.7	2788.84
	Liver	526.50	2974.73	6.42	26.64	15.9	187.1	3188.47
	Gonad	726.40	4104.16	2.81	11.66	17.8	167.3	4283.12
Sorsogona tuberculata	Muscle	449.94	2542.16	2.70	11.21	32.5	305.5	2858.87
	Liver	542.60	3065.65	5.82	24.14	39.5	371.3	3461.10
	Gonad	704.20	3978.73	2.10	8.72	36.1	339.3	4326.75
Thysanophrys carbunculus	Muscle	324.54	1833.65	4.00	16.60	48.8	458.7	2308.95
	Liver	385.60	2178.64	6.41	26.60	49.9	469.1	2674.34
	Gonad	484.20	2735.73	3.13	12.98	49.0	460.6	3209.31
Grammoplites scaber	Muscle	331.92	1875.35	3.50	14.53	56.5	531.1	2420.98
	Liver	378.20	2136.83	7.14	29.63	59.8	562.1	2728.56
	Gonad	475.60	2687.14	2.90	12.04	57.2	537.7	3236.88
Suggrundus rodericensis	Muscle	346.67	1958.69	3.80	15.77	48.8	458.7	2433.10
	Liver	403.60	2280.34	7.91	32.83	49.9	469.1	2782.27
	Gonad	514.21	2905.29	2.63	10.91	49.0	460.6	3376.80
Scomberomorus commerson	Muscle	740.03	4181.17	4.06	16.85	51.2	481.2	4699.30
	Liver	—	—	—	—	—	—	—
	Gonad	—	—	—	—	—	—	—

observed in *Platycephalus indicus*. Among the tissues studied presently, the lipid content was the highest in liver compared to gonad and muscle.

Calorific content : Total calorific content was calculated by adding the calorific contents of the protein, carbohydrate and lipid of the three tissues of six species of fishes. The total calorific content of oven dried tissues of six species of fishes is given in Table 2. Each value represents the mean of five samples for each species. The values are expressed as Cal/gm dry weight. The highest total calorific content was observed in *Scomberomorus commerson* (4679.30 Cal/gm) whereas the lowest was observed in *Thysanophrys carbunculus* (2308.95 Cal/gm). Further total calorific content was high in gonad when compared to liver and muscle.

DISCUSSION

Among the fish analysed, *Platycephalus indicus* and *Sorsogona tuberculata* have less than 4.0% of lipid. Based on this, these two species are suitable for conversion into fish meal. Platycephalids being an important fraction of our demersal fish catches, they can play a significant role as a protein source. Juveniles of *Scomberomorus commerson* are frequently landed at Parangipettai Coast, during the postmonsoon and summer months. The protein, carbohydrate and lipid contents were very high in the juveniles of *Scomberomorus commerson* when compared to other five species of demersal fishes. The present study indicated that all the six species of fish studied presently are nutritively equal to any other food fish and they could be exploited successfully for food and for preparing various fish by-products.

REFERENCES

ANTONY RAJA, B. T. 1969. The Indian Oil Sardine, *Bull. Cent. Mar. Fish. Res. Inst.*, **61** : 1-128.

CHARI, S. T. AND P. ANANTHA PAI 1948. Fish meal from shoaling fishes of the Madras Presidency and their role in animal nutrition. *Indian Farming*, **9** : 358-363.

——— 1948. Nutritive value of some of the west coast marine food fishes of the Madras Province. *Indian J. med. Res.*, **36** : 253-259.

CHERNYSHEV, M. 1977. Can the seas feed mankind? *Seafood Export Journal*, **9**(7) : 25-26.

DUBOIS, M., K. A. GILLS, J. K. HAMILTON, P. A. REBERS AND F. SMITH 1956. Colorimetric method for determination of sugars and related substances. *Analyt. Chem.*, **28** : 350-356.

FOLCH, J., M. LESS AND G. H. SOLANE STANLEY 1956. A simple method for the isolation and purifications of total lipids from animal tissues. *J. Biol. Chem.*, **226** : 497-509.

JAYABALAN, N. AND K. RAMAMOORTHI 1984. A brief note on the proximate composition of silverbellies of Porto Novo waters. *Indian J. Fish.*, **31**(3) : 393-395.

JAYALAKSHMI, S. 1987. Proximate analyses of few trash fishes collected from Parangipettai Coast. *M. Phil. Thesis, Annamalai University*. pp. 56.

JOSHI, B. D., D. K. GUPTA AND L. D. CHATURVEDI 1979. Biochemical composition of some tissues of a freshwater fish *Heteropneustes fossilis* during winter months. *Matsya*, **5** : 47-49.

KAMASASTRI, P. U. 1961. Studies on Indian Sardine Oil. *Indian J. Fish.*, **7** : 443-447.

KANDORAN, M. K., 1976. Fish in Nutrition and Economy. *Seafood Export Journal*, **8**(4) : 23-26.

PHILLIPS, A. M., 1969. Nutrition, digestion and energy utilization. *In :* W.S. Hoar and R. J. Randall (Ed.). *Fish Physiology I.* Academic Press, London. pp. 391-432.

RAMAIYAN, V. AND AL. PAULPANDIAN 1976. Biochemical studies on the fishes of the order Clupeiformes. *J. mar. biol. Ass. India*, **18**(3) : 516-524.

RAYMONT, J. E. G., J. AUSTIN AND E. LINEFORD 1964. Biochemical studies on marine zooplankton I. The biochemical composition of *Neomysis integer. J. Cons. Perm. Emplor. Mer.*, **28** : 354-363.

VIJAYAKUMARAN, M. 1979. Chemical composition and calorific content of *Ambassis gymnocephalus. J. mar. biol. Ass. India*, **21** (1 & 2) : 182-184.