

Fish Sauce from two Species of Unexploited Deep Sea Fish *Peristedion adeni* and *Peristedion weberi*

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Two species of unexploited deep sea fish *Peristedion adeni* and *Peristedion weberi* caught from the Exclusive Economic Zone of India were subjected to fermentation at ambient temperature ($30 \pm 2^\circ\text{C}$) in the presence of salt in 4:1 ratio. Periodical analysis of the fermented product was carried out upto one year. The sauces had brownish yellow colour and conformed to special grade of the standards prescribed by the Food and Drug Administration. Further solubilization of protein after 9 month's maturation was not appreciable.

Work on different types of fish sauces popular in South East Asian countries has been carried out in plenty. However, little information is available on the various processes involved in the production of fish sauces. Considerable variations are observed in the amount and activity of proteolytic enzymes on different species of fish. This affects the quality and quantity of fish sauce produced as well as the time required to prepare an acceptable product. Yield and quality of fish sauce prepared from a few tropical fishes have been reported (Lekshmy Nair *et al.*, 1988 a). The chemical composition, nutritional quality and possible methods of utilization of *P. adeni* and *P. weberi*, two hitherto unexploited species of fish from the Exclusive Economic Zone of India have been reported by Lekshmy Nair *et al.* (1988b). *P. adeni* and *P. weberi* were so small in size that preparation of fillets, mince etc. from them was not feasible. Natural fermentation of these fish in the presence of sodium chloride to produce fish sauce seems to be a suitable technology for their economic utilization. The yield, physicochemical and organoleptic characteristics of the sauce were studied. The results of these studies are presented in this paper.

Materials and Methods

The fishes were caught in the trawl nets operated from the FORV 'Sagar Sampada' of the Department of Ocean Development, Government of India, during July 1985. Im-

mediately after catch, the fishes were washed well, frozen on board the vessel and stored in the frozen storage till the end of the cruise. On arrival at the laboratory, the fish was thawed and the whole fish was used for the preparation of sauce.

The fish was blended in a meat mincer and mixed with salt in ratio 4:1, small quantities of wash water were added and the mixture was allowed to mature at $30 \pm 2^\circ\text{C}$ in screw capped polythene jars for one year.

Physicochemical and organoleptic evaluation of the sauce were carried out according to the methods described by Lekshmy Nair *et al.* (1988a). Alpha amino nitrogen was determined according to the method of Pope and Stevens (1939).

Yield percent of sauce was calculated using the formula $1 - \frac{R}{I} \times 100$, where I is the initial weight of fish used and R is the weight of nonsolubilised residue. Percentage of nitrogen recovered in the sauce was determined as $\frac{V \times N_1}{I \times N_2}$ where V is the final volume of sauce obtained in ml, N_1 is the total nitrogen in sauce expressed as g per ml and I is the initial weight of fish used in g and N_2 the total nitrogen per g of the raw fish.

Results and Discussion

Table 1 shows the yield and quality of the sauces. Yields of sauce from *P. adeni* and *P. weberi* were lower than the yields of sauce

Table 1. *Yield and quality of fish sauces from deep sea fish*

	<i>P. adeni</i>	<i>P. weberi</i>
Yield %	18.0	16.4
Nitrogen recovered in sauce %	24.35	24.33
Colour	Brownish yellow	Brwnohis yellow
Odour	Fair	Fair

from sardine, barracuda and anchovies (Lekshmy Nair *et al.*, 1988a; Nahano *et al.*, 1986). This may be due to the lower protein content of the raw material used (Lekshmy Nair *et al.*, 1988b). Sauces from both species were brownish yellow in colour and the odour was adjudged to be fair on organoleptic examination. The residue after separation of the fish sauce is a good source of minerals and undigested protein.

Results of the physicochemical analysis of the two sauces are presented in Table 2. pH of the sauces are comparable to that advocated by Fuji and Sakai (1984 a, b) for best quality fish sauce. The specific gravity, sodium chloride content, total solids and protein content of both sauces were within the limits prescribed by the Food and Drug Administration (1977).

Table 2. *Physicochemical characteristics of sauce from deep sea fish*

Characteristics	<i>P. adeni</i>	<i>P. weberi</i>
pH	6.20	6.20
Specific gravity	1.21	1.21
Sodium chloride %	24.20	24.40
Total solids, g/100 ml	36.70	35.90
Total protein, g/100ml	9.20	8.90
Amino N, mg N/100ml	480.00	454.40
TVN, mg N/100 ml	182.00	202.00
TMA, mg N/100 ml	17.00	16.00
Total volatile acids, ml 0.01N NaOH/100 ml	25.00	27.00

Organoleptic evaluation of the final products showed that the sauces had a fairly good taste and fine quality compared with a sample provided by M/s. Lorenzana Food Corporation, Philippines. Overall acce-

ptability of the two sauces were 3.0 in comparison to 4.0 for the sample from M/s. Lorenzana Food Corporation on a 1 to 5 hedonic scale.

Changes in the quality of fish sauces after different periods of fermentation are shown in Table 3. There was no appreciable increase in total nitrogen after nine months maturation. Similar results have been reported by Saisithi *et al.* (1966) and Abe & Tsuyuki (1968).

Table 3. *Chemical changes in fish sauce produced from deep sea fish*

Fish used	Fer- menta- tion period months	Total solids g/100 ml	Total nitro- gen g/100 ml	α -amino nitrogen mg N/ 100 ml
<i>P. adeni</i>	1	29.6	0.32	150.2
	3	31.2	0.84	300.0
	6	34.8	1.08	410.2
	9	36.6	1.28	440.0
	12	36.7	1.47	480.0
<i>P. weberi</i>	1	28.4	0.28	100.6
	3	30.6	0.68	210.0
	6	32.8	1.12	388.0
	9	35.4	1.50	420.0
	12	35.9	1.42	454.4

The experimental results indicate that fermentation of *P. adeni* and *P. weberi* yield a fairly good quality fish sauce.

The authors are thankful to Shri M. R. Nair, Director, Central Institute of Fisheries Technology for his permission to publish the paper.

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