Proc. Second Workshop Scient. Resul. FORV Sagar Sampada, 1996, pp.535–538

Chemical and taste panel evaluation of the mechanically separated flesh of six species of fish

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ABSTRACT

The mechanically separated flesh of six species of fish, (*Tachysurus* sp., *Megalaspis cordyla*, *Upeneus vittatus*; *Johnius* sp., *Saurida tumbil* and *Trichiurus savala*), caught on board *FORV Sagar Sampada* from the northwest region of the Indian EEZ were examined chemically and by taste panel studies. *Saurida tumbil* gave maximum mince yield. Cooked mince of *Johnius* sp. scored maximum for overall acceptability.

INTRODUCTION

The world demand for seafoods is on the increase. One way of meeting this demand is through the exploration and exploitation of unconventional resources. Another way is through more efficient means of utilising the available catch. One such method of increasing importance is the production of minced fish flesh products (Young, 1983; Regenstein, 1986; Gopakumar, 1987; Martin, 1988; Anon, 1989). Development of mince-based products should provide dual opportunities of utilisation of low value fish and also diversification of the industry for international trade in value added products. This calls for a general understanding about the yield of mince from various fish and on the quality and characteristics of the mechanically separated flesh. This paper reports the yield of mince from six species of fish caught on board *FORV Sagar Sampada* and discusses the physical and chemical quality and taste panel evaluation of the separated flesh.

MATERIALS AND METHODS

Species of *Tachysurus* sp. (catfish), *Megalaspis cordyla* (horse mackerel), *Upeneus vittatus* (goatfish), *Johnius* sp. (jewfish), *Saurida tumbil* (lizard fish) and *Trichiurus savala* (ribbonfish), caught by high opening trawl onboard *FORV Sagar Sampada*, were used for the studies. Fish were washed in running water, arranged in

stainless steel trays in 10 kg lots and frozen in a contact plate freezer at -40°C. The frozen materials were kept in the cold room (-20°C) of the vessel till it touched port (15 days). In the shore laboratory, the blocks were allowed to thaw at room temperature, eviscerated and washed free of any undesirable matter.

Except catfish, all fish were deboned in a Baader-694 machine equipped with 3 mm perforated drum. Catfish was filleted and the flesh separated manually and minced in a hand mincer. The yield of the minces based upon the whole fish weight was noted. Moisture, protein, extractable protein and ash were determined in whole fish and mince, according to AOAC (1990) methods. Lipids were estimated by extraction with petroleum ether in a soxtec system (Tecator 1040).

Mince lots of 50 g were sealed in high density polyethylene pouches and steamed for 30 min without pressure. After cooking, samples were served to an experienced panel of members to mark the samples for aroma, flavour, toughness and acceptability on a ten point scale; the higher the score, the greater the attribute except in the case of toughness where score 5 was designated as preferred texture.

RESULTS AND DISCUSSION

The colour and appearance of the minces are given in Table 1. The minces were generally of light colour and pleasing appearance except those of catfish and horse mackerel which were unattractive with red-dark brown colour and oily appearance. The highest yield of mince was from lizard fish. Catfish recorded the lowest yield (27.42%) because of the high proportion of its head and viscera waste. The yield of mince from other fish was between 31% and 52% (Table 1).

The chemical composition of whole fish and the respective minces is given in Table 2. Moisture content of fish varied from 64.15% (goat fish) to 75.87% (lizard fish). Goat fish recorded the highest fat content and ribbon fish the lowest. This was true of the respective minces also. Dressing and mincing of the fish reduced the ash content which ranged from 1.01% (jewfish) to 1.79% (lizardfish). Protein values of the fish and minces did not record much variations but the extractability of protein was highest for jewfish mince. The bone content of the minces are uniformly low making them ideal for a variety of mince-based products which demand low levels of bone.

Taste panel evaluation of the cooked mince is given in Table 3. The results clearly differentiate catfish and horse mackerel mince with low scores for aroma and acceptability. The flesh of lizard fish was markedly tough and dry. This can be attributed to the presence of formaldehyde which caused rapid denaturation resulting in toughening of flesh. This agrees with the comparatively low value for protein extractability. Goatfish mince was rated soft but with less pleasing flavour because of the higher oil content. Jewfish scored high with aroma and flavour becoming the most acceptable mince of the lot. Ribbonfish had a relatively tough texture but the overall acceptability was high.

Table 1 - Details of fish processed and yield of mince

Species	Length (cm)	Weight (g)	Mince yield (%)	Mince appearance
Tachysurus sp.	45.75	1160.0	27.42	Dark reddish unattractive
Megalaspis cordyla	17.50	65.00	31.20	Slight dark brown
Upeneus vittatus	16.25	56.80	46.29	Pink-red
Johnius sp.	16.85	64.75	33.50	Off-white
Saurida tumbil	28.50	198.80	56.40	Off-white
Trichiurus savala	98.80	1082.00	52.50	Pink

Table 2 - Analytical characteristics of whole fish (A) and mince (B)

Species		Moisture (%)	Protein (N×6.25) (%)	Fat (%)	Ash (%)	Protein extractability (%)	Bone content (%)
Tachysurus sp.	A	69.84	17.06	7.52	4.78	-	-
	B	79.25	18.75	1.35	1.20	62.66	0.08
Megalaspis cordyla.	A	71.07	19.64	2.89	5.69	-	-
	B	76.82	20.63	1.40	1.38	51.86	0.10
Upeneus vittatus	A	64.15	18.01	12.58	4.98	-	-
	B	72.12	19.40	6.17	1.09	67.26	0.11
Johnius sp.	A	71.89	18.01	6.12	1.85	-	-
	B	77.99	18.23	1.74	1.01	75.15	0.08
Saurida tumbil	A	75.87	17.14	2.9	2.42	-	-
	B	76.68	19.85	1.75	1.79	51.46	0.12
Trichiurus savala	A	75.63	18.82	1.52	3.05	-	-
	B	77.83	18.36	1.32	1.14	55.01	0.07

Table 3 - Taste panel evaluation of cooked mince

Species	Aroma	Flavour	Toughness	Aceptability
Tachysurus sp.	4.2	4.4	4.5	4.8
Megalaspis cordyla	4.5	4.6	4.1	4.9
Upeneus vittatus	5.0	5.1	3.9	6.1
Johnius sp.	5.5	6.3	3.2	7.2
Saurida tumbil	5.3	5.8	7.2	6.3
Trichiurus savala	5.5	6.1	4.4	6.8

Most of the species of fish employed for the studies gave good yield of mince with desirable properties. But it may be borne in mind while formulating products that even in the case of mince with lower scores for acceptability, the properties are amenable to change with the addition of appropriate ingredients or by washing off of the unwanted fractions of flesh.

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