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Amenability of *Euthynnus affinis* to Preparation of Masmin - like Products by a Modified Process

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Euthynnus affinis has been processed to products resembling masmin and masmin flakes by cooking the dressed and brined fish under steam pressure followed by cooling, separation of the fillets (shredding for flakes) and alternate drying and smoking. The process yielded 4% more product than the traditional method. Preparation of masmin flakes can be achieved in 3 days compared to 10 days for masmin production. Both masmin and masmin flakes from *E. affinis* were graded very good and palatable. The water soluble protein and non - protein nitrogen were higher in the product prepared by the modified process.

Masmin is a traditional product of Lakshadweep Islands and is prepared from Skipjack tuna (*Katsuwonus pelamis*) fillets by cooking in sea water followed by alternate drying and smoking till the moisture content is less than 10%. It is high in protein and has a long shelf life of more than a year. The process has been described by Muraleedharan & Valsan (1980) and Govindan (1985). David Kingston *et al.* (1990) have reported a comparative study on the quality characteristics of traditional masmin and mechanical kiln prepared masmin. The present study was aimed at (i) Studying the amenability of *Euthynnus affinis* to masmin production, (ii) simplifying the process and (iii) reducing the processing time. Results of these investigations are presented in this communication.

Materials and Methods

In all the experiments *E. affinis* procured from the local fresh fish market was utilized. The whole tuna were beheaded, gutted and allowed to bleed in ice and water. The traditional product was prepared as described by Govindan (1985). In the modified process, the beheaded, eviscerated and washed tuna (average weight: 1 kg) were dipped in saturated sodium chloride brine containing undissolved salt at the bottom of the dipping vessel for 1 and 2 h with occasional stirring. Individual tuna weighing more than a kg were scored longitudinally along the midbone to facilitate salt absorption. After draining they were cooked in steam under pressure at 121°C for 20 min and allowed to cool in the retort itself. The next day they were taken out and the meat was separated as four longitudinal pieces. These pieces were freed of pinbones and skin and were alternatively sun dried and hot smoked using coconut husk till the moisture was less than 10%.

Masmin is usually made into shavings or flakes before preparing food dishes. The hardness of the product makes the preparation of shavings or flakes very difficult. Hence the cooked fillets were shredded by hand, smoked and sun dried to a low moisture level (<10%) to yield masmin flakes.

Yields of masmin prepared by both procedures were determined as also that of the masmin flakes. Proximate analysis of all the three samples were carried out as per AOAC (1980), Total volatile nitrogen (TVN) and Trimethylamine were estimated as per

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Conway (1947). Water soluble protein and nonprotein nitrogen were estimated as described by Govindan (1962)

The masmin flakes were made into "Thoran", a traditional Kerala dish by soaking in warm water for 3 h, followed by cooking till soft and addition of grated coconut, condiments, and Malabar tamarind. This was further cooked till all the free water was evaporated. Similarly both the samples of the masmin were converted to chutney by grinding to a paste with grated coconut, onion, garlic, red chillies and tamarind by the method described by Govindan (1962). Both products were evaluated by 15 staff members to get their opinion on eating quality.

The masmin and masmin flakes were stored in glass stoppered bottles for an year and observed periodically for visible signs of quality deterioration.

Results and Discussion

Results on salting showed that dipping in saturated brine for 2 h was sufficient for optimum absorption of salt. Similarly steam cooking at 121°C for 20 min was found satisfactory for *E. affinis*. Results on yield, time for preparation and proximate composition are given in Table 1. It can be seen that preparation of masmin flakes takes only 3 days compared to nearly 10 days for masmin. The yield is 4% higher in the modified procedure. The higher yield of the product is partly due to the lower loss of soluble proteins during cooking as is shown in Table 2 and partly due to the lower loss of meat during filleting of the cooked tuna.

The masmin prepared by the modified process from *E. affinis* was comparable in taste to the traditional product of Lakshadweep but was darker. Further, the product was considered tough which according to the Islanders is a positive quality attribute.

Both the chutney and the "thoran" were graded as "very good" and "highly palatable." The products were free of any visible deterioration upto an year at ambient temperature.

The study has established that *E. affinis* can be converted to products similar to masmin and masmin flakes with reasonable storage life and quality characteristics by the modified process.

Table 1. *Yield, preparation time and proximate composition of traditional masmin, masmin by modified process and masmin flakes*

Prameters	Masmin (traditional method)	Masmin (Modified method)	Masmin flakes
Yield, %	17.33	21.36	20.00
Preparation time, days	10	10	3
Moisture, %	8.2	7.4	6.0
Fat, %	3.3	3.4	3.2
Protein, %	81.2	81.6	83.1
Ash, %	6.3	6.7	6.5
Sodium Chloride,%	4.1	4.8	4.3
TVN, mg%	47.6	36.4	34.0
TMA, mg%	2.8	2.8	2.8

Table 2. *Changes in moisture, total protein, water soluble protein and non protein nitrogen during different stages of processing of masmin by the two methods.*

Description of samples	Moisture %	Total Protein % (DWB)	Water soluble protein %(DWB)	Non protein nitrogen, % (DWB)
Modified method				
Fresh tuna meat	72.34	82.1	21.9	2.65
Beheaded and eviscerated tuna after salting	72.88	74.9	28.8	2.45
Pressure cooked tuna	62.30	81.1	12.5	2.04
Traditional method				
Washed raw fillets	73.75	84.9	16.30	2.13
Tuna fillets after cooking in brine	67.43	79.5	4.4	0.97

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