

## Production and quality assessment of fish pickles from mola (*Amblypharyngodon mola*) fish

K. Pervin, M.À. Nayeem, A.W. Newaz<sup>1</sup>, M. Kamal\*, S. Yeasmine<sup>2</sup> and M. Nurullah<sup>2</sup>

Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

<sup>1</sup>Department of Animal Husbandry (Fisheries Discipline), Sher-e-Bangla Agricultural University, Dhaka-1207

<sup>2</sup>Bangladesh Fisheries Research Institute, Mymensingh 2201

\*Corresponding author

### Abstract

Fish pickles (with olive and tamarind) were prepared from mola fish (*Amblypharyngodon mola*) and their nutritional and food quality were assessed. The quality of the pickle prepared with olive was excellent and the pickle prepared with tamarind was found good. Moisture content of the two pickle products were 43.85% (with tamarind) and 50.89% (with olive). The protein and lipid contents of tamarind added pickle were 19.13 and 35.64% respectively; pickle with olive contained less protein (13.16%) compared to tamarind added mola pickle. Lipid contents were almost same in both cases. Ash content of two pickles was also found similar (1.00%). The quality of mola pickles stored either in cool condition (4°C) with vinegar or at room temperature with Na-benzoate were found good for consumption up to 90 days of storage. All of the fish pickles preserved under different condition were found in acceptable condition up to 240 days storage and pickle with vinegar stored at 4°C was found good for consumption at the end of 240 days.

Key words: Fish pickle, Tamarind, Olive, Organoleptic quality.

### Introduction

Among two hundred and sixty species of freshwater fishes available in Bangladesh, over one hundred and forty species are classified as small indigenous fish species (SIS). These fishes have been playing vital role providing the main source of animal protein for all rural and urban households as well. SIS's are also an important source of vitamin A, calcium and iron (Ahmed 1981, Wahab 2003). Among the SIS of Bangladesh, mola (*Amblypharyngodon, mola*) bears prime importance in terms of availability and popularity. Unlike many other fish species mola is not seasonal fish and is available in ample quantity throughout the year (Kohinoor *et. al* 2001). Mola has high vitamin A content which is highest among 26 commonly consumed fish species of Bangladesh (Roos *et.al* 2002, Zafri and Ahmed 1981). Moreover bones of mola serve as a rich source of calcium and some other minerals as this species is normally cooked and eaten whole (Ghosh *et. al* 2004).

Pickling is one of the oldest methods used for preserving various food items including fish. It is largely remained as a household art in India. Pickling protects the food and also helps to retain its wholesomeness and nutritive value for a long time. A variety of methods have been reported for the preparation of fish pickle (Chandrasekhar *et al.* 1978, Vijayan *et al.* 1982, Muraleedharan *et al.* 1982, Bandyopadhyay *et al.* 1985). The method is essentially same for preparing all types of fish pickles and the manufacturing process is not very complicated and requires comparatively less capital investment. Pickles are widely consumed in many South and South-east Asian countries including Bangladesh. Like any other vegetable or fruit pickles, fish pickles have also gained popularity in the recent past. The demand for these types of ready to serve fishery products is increasing day by day among the non-vegetarian population in our country. Considering the importance of small fish in the Bangladeshi diet, mola was chosen in the study for preparing pickle and assessing its quality aspects. Information on the quality can give an idea about the nutritive value, food safety and acceptability of the pickled product from fish.

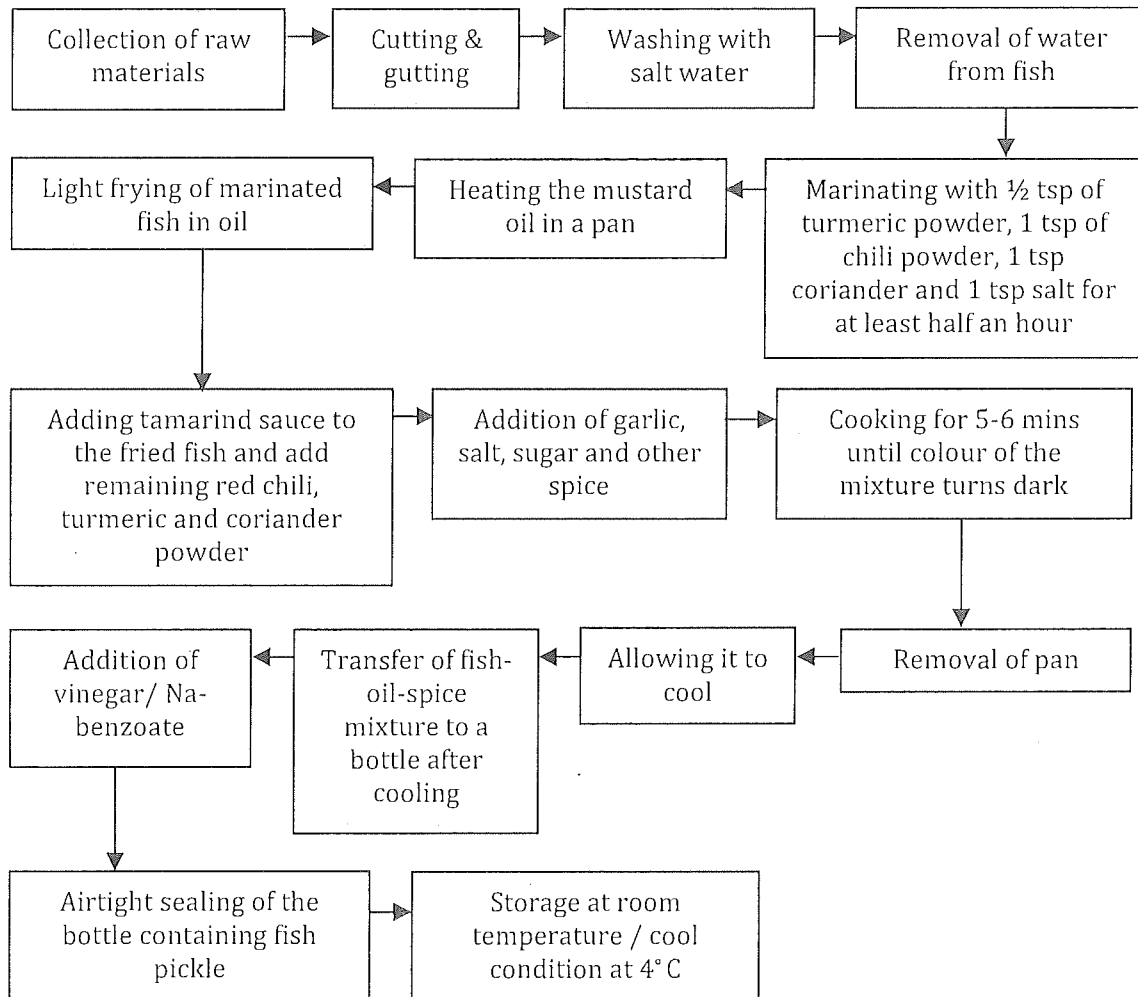
## Materials and methods

Fresh mola fishes of average  $2.53 \pm 0.3$  gm body weight and 6.20 cm length were collected from a local market and transported to the Laboratory of Fisheries Technology, Bangladesh Agricultural University (BAU) in an insulated box with ice. Good quality mustard oil was collected from the market. Red chili, coriander and turmeric powder, garlic, cinnamon, cardamom, olive, tamarind and pachforon (mixed spice) etc. were used as ingredients. Vinegar and Sodium Benzoate were used as preservatives. After proper dressing 1 kg of processed mola was used for preparation of pickles with tamarind and another 1 kg of processed mola was used for preparation of pickles with olive. These samples were packed in sealed transparent glass bottles and stored separately both in ambient atmospheric temperature and cool condition at 4°C for 240 days. The quality of pickle samples were examined at 30 days time interval by examining the organoleptic aspects.

### *Processing and preservation of mola fish pickle with tamarind*

After gutting, the samples were washed with salt water and then removed the water from fish. Then the fish were marinated with required amount of turmeric, red chili, coriander powder and salt for at least  $\frac{1}{2}$  an hour in a refrigerator at 4°C. Then lightly fried marinated fish in oil and then added tamarind sauce, required amount of chili powder, turmeric powder, coriander powder, garlic and salt. Required amount of spice such as cinnamon, pachforon (mixed spice), cardamom etc. are added toward the end of preservation. All the processes were done with adequate amount of the oil in the pan and total time required about 5-6 minute. The mixing continued until total mixture turned into dark. After cooking, the products were allowed to cool and then transferred it to an airtight bottle. Then required amount of Na-benzoate and vinegar was added to

bottles targeted for storage under ambient and cool temperature (4°C) respectively and were shaken thoroughly for proper mixing. Finally the products were stored at room temperature and cool condition at 4°C. A flow chart of mola fish pickle with tamarind has been presented in Fig.1.



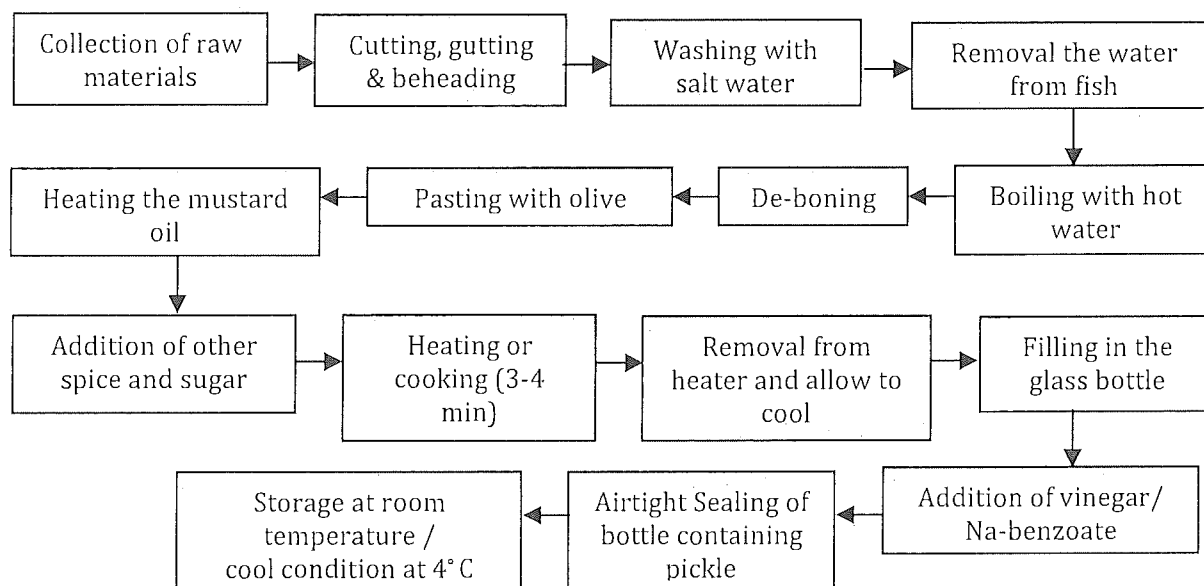
**Fig. 1.** A flow chart of mola fish pickle preparation with tamarind

*Pickle composition*

Ingredients		Mixture for marinating fish
1. Mola fish (Gutted): 1kg	7. Mustard oil: as required	Turmeric powder: ½ tsp
2. Red chili powder: 4 tsp	8. Salt: to test	Red chili powder: 1 tsp
3. Coriander powder: 3 tsp	9. Sugar: as required	Coriander powder: 1 tsp
4. Turmeric powder: 2 tsp	10. Tamarind (sauce): 6 tsp	Salt: 1 tsp
5. Garlic powder: 2 tsp	11. Na-Benzoate: 5 g	
6. Pachforon: 2 tsp (Mixed spice)	12. Vinegar: 2 tsp	

*Processing and preservation of Mola fish pickle with olive*

After proper dressing, the samples were washed with salt water and then removed the water from fish. Then the fish samples were boiled with hot water. After de-boning the samples were mixed adding adequate olive paste then separately in the pan adequate amount of the mustered was heated to boil and then mixed with olive paste in the pan with subsequent addition of required amount of garlic, sugar and other spice. Then the total product in the pan was heated for 3-4 minute. After heating all the products were allowed to cool and then transferred it to an airtight bottle. By following the procedure mentioned above. Na-benzoate and vinegar was added to the pickle in two separate groups of bottles and stored under ambient and cool temperature (4° C) respectively. A flow chart of mola fish pickle preparation with olive has been presented in Fig 2.



**Fig. 2.** A flow chart of mola fish pickle preparation with olive

*Pickle composition*

1. Mola fish: 1 kg	7. Mustard oil: as required
2. Red chili powder: 4 tsp	8. Salt: to taste
3. Coriander powder: 3 tsp	9. Sugar: as required
4. Turmeric powder: 2 tsp	10. Olive paste: 4 tsp
5. Garlic powder: 2 tsp	11. Na-Benzoate: 5 g
6. Pachforon: 2 tsp	12. Vinegar: 2 tsp

*Organoleptic evaluation*

Representative samples of pickle were taken on plate to assess the organoleptic characteristics such as general appearance, colour, flavour, taste, texture etc. and were evaluated by 5 member panel experts constituted in the Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh. The following set of guidelines (Table 1 & 2) has been prepared to get the maximum value from them by being able to compare the results.

Table 1. Determination of defect points of mola fish pickles

Characteristics of The product	Defect characteristics	Defect points	Quality
1. Colour	1. Pinkish red 2. Brownish red 3. Yellowish Brown 4. Blackish	1 3 4 5	Excellent Good Average Bad
2. Flavour	1. Natural flavour 2. Faint sour odour 3. Slight moderate odour 4. Moderate to strong odour	1 2 3 4	Excellent Good Average Bad
3. Taste	1. Feeling very good after chewing 2. Feeling good 3. Feeling average 4. Feeling bad	1 3 4 5	Excellent Good Average Bad
4. General appearance	1. Bright, shining 2. Loss of brightness 3. Slight dullness 4. Definite dullness 5. Dull	1 2 3 4 5	Excellent Good Good Average Bad
5. Consistency of flesh	1. Firm and elastic 2. Loss of elasticity 3. Moderately soft 4. Limp and floppy	1 2 4 5	Excellent Good Average Bad

Table 2. Grading chart for mola fish pickles

Grade	Defect point	Degree of freshness
A	<2	Excellent
B	2 to 4	Good
C	4 to <5	Average
D	5	Reject

### Biochemical analyses

Biochemical analyses such as estimation of moisture, crude protein, lipid and ash were carried out according to the methods given in AOAC (1980) with certain modifications. All determinations of fish pickles were done in triplicate and the mean value were reported.

### Results and discussion

#### Organoleptic characteristics of mola fish pickle

The result of the organoleptic characteristics of the pickles immediately after processing was evaluated by four members of panel of experts. The organoleptic parameters such as general appearance, colour, flavour, texture, taste and overall quality of the products were examined. The organoleptic assessment of mola pickles with olive and tamarind immediately after are presented in the Table 3.

Table 3. Organoleptic characteristics of mola fish pickle

Product	General appearance	Colour	Flavour	Taste	Consistency of flesh	Grade	Overall quality
Pickles with olive	Bright shining	Brown yellowish or Brownish red	Natural odour	Feeling very good after mouth chewing	Loss of elasticity	A	Excellent
Pickles with tamarind	Bright shining	Pinkish red or Brownish red	Natural odour	Feeling good after mouth chewing	Firm and elastic	B	Good

The general appearances of the both products were bright and shiny with yellowish-brown color or reddish-brown colour. The flavour of the product was natural. According to panel members, the taste of the products was very good after mouth chewing. In the pickles produced with tamarind, the consistency of the flesh of the product was firm and elastic whereas, the pickle produced with olive, there was a loss of elasticity in the flesh of the product which is in agreement with Vijayan *et. al* (1982). The overall quality of the pickles produced with olive was excellent. On the other hand the pickle produced with tamarind was good.

Table 4. Organoleptic quality assessment of prepared fish pickles under different storage conditions

Sample	Characteristics (Colour, flavour, texture, taste, consistency of flesh)	Storage time (days)						
		0	30	60	90	120	180	240
Mola pickle with olive vinegar added (cool condition at 4°C)	Colour	Excellent	Excellent	Excellent	Good	Good	Brown yellowish	Brown yellowish
	Flavour	Excellent	Excellent	Good	Good	Good	Good	Good
	Taste	Excellent	Excellent	Good	Good	Good	Average	Average
	Consistency of flesh	Good	Good	Good	Good	Moderately soft	soft	Soft
	Overall quality	Excellent	Excellent	Good	Good	Good	Acceptable	Acceptable
Mola pickle with olive Na-Benzoate added (Room temperature)	Colour	Excellent	Excellent	Excellent	Good	Brown yellowish	Brown yellowish	Brown yellowish
	Flavour	Excellent	Excellent	Good	Good	Faint sour odour	Slight moderate odour	Slight moderate odour
	Taste	Excellent	Excellent	Good	Good	Average	Average	Average
	Consistency of flesh	Good	Good	Good	Good	Moderately soft	Soft	Soft
	Overall quality	Excellent	Excellent	Good	Good	Acceptable	Acceptable	Acceptable
Mola pickle with tamarind vinegar added (cool condition at 4°C)	Colour	Excellent	Excellent	Excellent	Good	Good	Good	Good
	Flavour	Good	Good	Good	Good	Good	Good	Good
	Taste	Good	Good	Good	Good	Average	Average	Average
	Consistency of flesh	Good	Good	Good	Good	Slightly loss of elasticity	Slight loss of elasticity	Moderately soft
	Overall quality	Good	Good	Good	Good	Acceptable	Acceptable	Acceptable
Mola pickle with tamarind Na-Benzoate added (Room temperature)	Colour	Excellent	Excellent	Excellent	Good	Good	Brownish red	Brownish red
	Flavour	Good	Good	Good	Good	Slight off flavour	Slight moderate odour	Slight moderate odour
	Taste	Good	Good	Good	Good	Average	Average	Average
	Consistency of flesh	Good	Good	Good	Good	Good	Slight loss of elasticity	Slight loss of elasticity
	Overall quality	Good	Good	Good	Good	Acceptable	Acceptable	Acceptable

Quality assessment of mola fish pickle

*Changes in organoleptic characteristics of pickles during storage*

Mola pickles prepared with olive and preserved in vinegar and Na-benzoate were stored at 4°C and at room temperature respectively for 240 days. In another batch, mola pickles were prepared with tamarind preserved similarly for 240 days. The quality of these products were evaluated by 4 members panel of expert time to time and the results of the quality assessment for fish pickles stored under different conditions are presented in Table 4. The quality of all the products stored either in cool condition at 4°C or at room temperature was considered good for consumption up to 90 days of storage. Then quality of all the products changed rapidly with further storage period and at the end of 240 days of storage colour in most of the products changed. However the taste of the olive and tamarind added mola pickles preserved with vinegar was found average when stored at 4°C after 240 days. Moreover colour and flavor of pickles (olive and tamarind added) with vinegar remained good for longer period than those treated with Na-benzoate. But no considerable difference of vinegar and Na-benzoate was observed with regard to taste and consistency of flesh. Present findings were in agreement with Erichsen and Molin (1964) who reported a prolonged shelf life of products like fish marinades and pickles (containing acetic, citric or lactic acids) as various micro organisms are easily destroyed in high acid (below pH 4.5) environment.

*Biochemical composition*

The biochemical compositions of two pickled products were analyzed and the results are presented in Fig. 3. The overall results of the proximate analysis of two types of fish pickles indicated some variation in their composition.

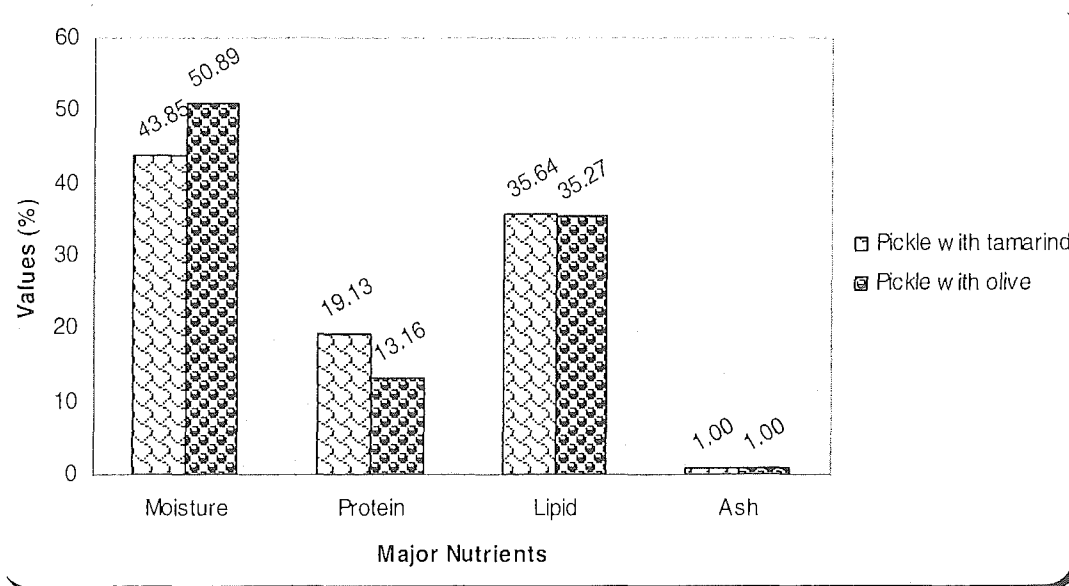


Fig. 3 Biochemical composition of mola fish pickle



Moisture content of the two products varied from 43.85 to 50.89% with the higher value recorded for mola pickles produced with olive. On wet weight basis, protein content varied from 13.16 to 19.13% with the higher value obtained from mola pickles produced with tamarind and lower value for mola pickles with olive. Lipid content varied from 35.64 to 35.27% on wet weight basis. There were little or no changes in ash content which were within 1.00% on wet weight basis. It was found that nutritional value of the pickled products with regard to major biochemical nutrient contents reported by Ghosh *et. al* (2004) and Bandyopadhyay *et. al* (1985) remain more or less unimpaired.

From the present study, it was observed that the nutritional quality of mola fish pickle prepared with tamarind and olive was quite satisfactory. Organoleptic assessment of product indicated that pickling can be a very efficient and practical way of preservation of mola fish even in ambient temperature for a considerable period of time. This can also augment the animal protein and vitamin-mineral availability for the general people of the country.

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