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Pickles from Edible Oyster (*Crassostrea madrasensis*) Meat

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Two recipes were formulated for the preparation of pickles from edible oyster (*Crassostrea madrasensis*) meat; a conventional hot spicy taste and a sweet and sour taste. Biochemical, microbiological and organoleptic tests were carried out during storage to assess the shelf life. The pickles had a shelf life of about 6 months at ambient temperature and organoleptically both the pickles had good acceptability.

The edible oyster (*Crassostrea madrasensis*) is a valuable seafood resource with high nutritive value and availability. However, oysters are not preferred locally due to inadequate knowledge about their nutritive value and delicious nature. The conventional processed products from oysters have poor consumer demand and hence their conversion into pickles may result in an increased preference, as pickles commonly go very well with south Indian dishes, are cheaper and involve low cost technology. Suitability of green mussel for pickled products has been studied by Muraleedharan *et al.* (1982). Similar studies on clam meat and blood clam meat were carried out by Vijayan *et al.* (1982) and Gupta & Basu (1985) respectively. Inspite of their vast natural resource potential and culture possibility, no report on pickles with oyster meat is available. The present study was taken up to formulate recipes for two different types of pickles from oyster meat and assess their shelf life.

Materials and Methods

Depurated and shucked oyster meat brought from the culture farms of CMFRI substation, Tuticorin was used for the study. Various recipes were tried, tested organoleptically and two recipes, one with hot and spicy taste (I) and another with sweet and sour taste (II) were formulated. Ingredients used in the preparation of pickles I and II using oyster meat are presented in Table 1.

Shucked oyster meat of size range 4-6 cm was blanched in boiling brine containing 5% common salt and 0.5% citric acid for 5 min. The blanched meat after draining was fried in refined oil to a light brown colour and kept apart. Green chillies, garlic, ginger and curry leaves were first fried for about 3 min and then chilli powder, salt, turmeric powder, powdered asafoetida, cumin and mustard were added and fried together for a few minutes. To this, the fried meat was added and the whole mixture stirred well. Finally curry masala powder was added and mixed. The pan was then removed from the flame, vinegar added, mixed and the whole mixture was kept in a closed container for 24 h for maturation so as to enable uniform mixing of all ingredients with the meat.

For the preparation of sweet and sour pickle (II), ginger syrup was prepared by crushing the ginger with sufficient water and sugar and boiling for a few minutes. This syrup was added just before the pan was removed from the flame and other procedures were similar to that of the pickle I. After a day of maturation, the pickled meat was packed in clean, glass screw-cap bottles, sealed and stored at room temperature and used for storage studies. Moisture, fat, protein and ash in shucked oyster meat were

Table 1. *Standard recipes used in the preparation of oyster meat pickles*

Ingredients	I (Hot & Spicy) %	II (Sweet & Sour) %
Shucked oyster meat	50.00	50.00
Salt	6.25	4.50
Chilli powder	5.00	1.75
Masala powder	0.50	-
Turmeric powder	0.25	0.25
Mustard	0.50	0.50
Cumin seeds	0.50	0.25
Asafoetida	0.20	0.10
Garlic (sliced)	5.00	3.75
Green chillies (sliced)	2.50	1.00
Ginger (sliced)	1.25	5.00
Curry leaves	0.25	0.25
Sugar	-	11.25
Refined vegetable oil	17.50	16.25
Vinegar	10.00	5.00
Sodium benzoate	0.10	0.075
Citric acid	0.20	0.075

Table 2. *Proximate composition of shucked oyster meat (as is basis)*

Moisture, %	80.30
Protein, %	12.55
Fat, %	2.80
Ash, %	1.25
Total free sugars, %	2.60

estimated by the methods of AOAC (1980) and total free sugars by the method suggested by Roe (1955). Samples drawn aseptically were homogenised in physiological saline (0.85% NaCl), serially diluted and analysed for total plate count (TPC) using plate count agar and total mould count using mycological agar respectively (APHA 1976). Total coliforms were estimated by MPN three tube technique using McConkey broth (Oxoid, 1982). The pH was measured using a Toshniwal Digital pH meter. Total volatile base nitrogen (TVBN) was determined by the method of Beatty & Gibbons (1937) using Conway micro-difussion units. The organoleptic quality was determined by a panel of six judges on a five point scale ranging from excellent to very poor.

Results and Discussion

The proximate composition of shucked oyster meat is given in Table 2. The biochemical and microbiological characteristics of pickles I and II on storage are presented in Table 3. The result of the organoleptic evaluation are presented in Table 4. A gradual reduction of pH was observed in the initial stages of storage which stabilized around 4.2 after two months in both the pickles. This low pH inhibits most bacterial activity although some bacterial groups like *Staphylococcus* sp. and *Pseudomonas* sp. are reported to grow in pickles with a pH of less than 4 (Karunasagar *et al.*, 1988). TVBN values of both pickles increased on storage.

Table 3. *Storage characteristics of pickles from oyster meat*

Storage, days	pH		TVBN(mg%)		TPC g-1		Mould counts	
	I	II	I	II	I	II	I	II
0	4.35	4.40	7.6	9.0	2.0×10^4	1.3×10^5	0	0
30	4.25	4.28	12.0	14.0	1.15×10^4	6.0×10^3	0	0
60	4.20	4.25	14.0	15.0	1.6×10^2	1.15×10^3	0	0
90	4.15	4.25	16.8	18.3	3.3×10^3	3.0×10^3	0	0
120	4.20	4.20	18.5	18.8	4.9×10^3	3.8×10^3	0	0
150	4.15	4.15	20.5	19.5	4.2×10^3	4.0×10^3	0	20
180	4.10	4.10	21.4	21.1	6.2×10^3	5.0×10^3	20	20
200	4.20	4.10	24.3	23.2	6.8×10^3	3.0×10^4	20	20

I = Pickle with hot spicy taste; II = Pickle with sweet and sour taste.

There was a reduction in the bacterial population in the initial stages of storage and later on there was an increase which may probably be due to the multiplication of acid tolerant bacteria. Similar result was observed by Vijayan *et al.* (1982), but, Gupta & Basu (1985) reported a reduction in the bacterial load even in later stages of storage.

Table 4. *Organoleptic evaluation of pickles from oyster meat*

Storage, days	Appearance		Colour		Odour		Texture		Taste	
	I	II	I	II	I	II	I	II	I	II
0	5	4	4.0	3.5	5.0	4.0	3.0	3.0	5.0	4.0
30	5	4	4.0	4.0	5.0	4.0	3.5	3.0	5.0	4.0
60	5	4	4.0	4.0	5.0	4.5	3.0	4.0	5.0	4.0
90	4	4	4.0	4.0	4.0	4.5	4.0	4.0	5.0	4.0
120	5	4	4.0	4.0	4.5	4.0	4.0	4.0	5.0	3.0
150	4	4	4.0	4.0	4.0	4.0	3.0	4.0	4.0	3.0
180	3	3	3.5	3.0	2.0	2.0	3.0	3.0	3.0	1.0
200	2	2	2.0	2.0	1.0	3.0	3.0	3.0	1.0	1.0

Scores: 5 = excellent; 4 = good; 3 = fair; 2 = poor; 1 = very poor/unacceptable.
All values are average of six panelists; I = pickle with hot spicy taste; II = pickle with sweet and sour taste.

There was no marked variation in the pattern of change of bacterial load on storage between pickles I and II except a lower load on II. Coliforms were totally absent throughout the storage and moulds appeared after 150 days storage particularly when the meat was exposed.

Organoleptic evaluation revealed a significant change in overall quality after five months of storage. Initially the texture was hard which on ageing became ideal in 2 months but turned soft on further storage. After six months, the pickles were rejected mainly because of off-odour which might be due to the rancidity of oil. These oyster pickles kept well for a period of about 6 months at ambient temperature. When the overall quality and consumer preference was compared between pickles I and II, pickle I with a hot and spicy taste was rated better than the pickle with sweet and sour taste.

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