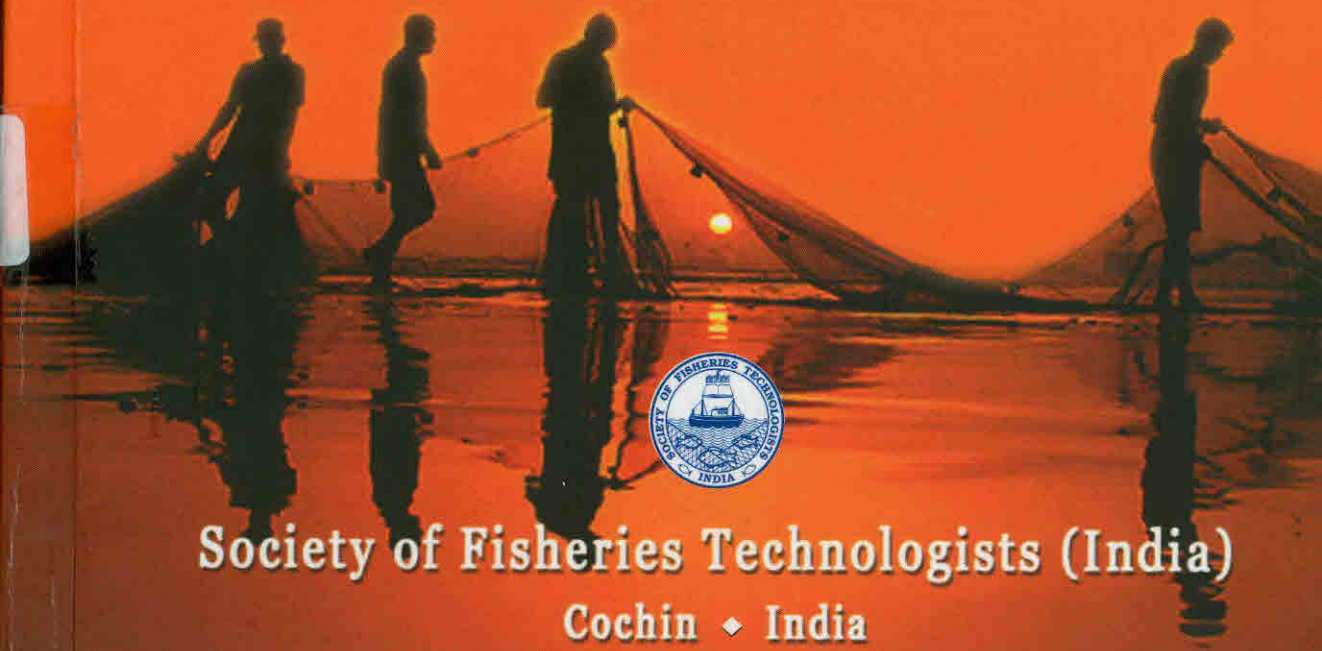
Coastal Fishery Resources of India

Conservation and Sustainable Utilisation



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Shelf Life Assessment of Ready to Cook Indian Mackerel under Iced Condition

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In India, fisheries sector has a vital role in income enhancement, poverty alleviation, and food security. A range of value added products like ready to cook and ready to fry products are slowly becoming popular as convenience food in the wake of changing lifestyle of consumers. Fish is a highly perishable product subject to spoilage during storage. During chilled storage of fish, significant deterioration of sensory quality and loss of nutritional value have been reported as a result of changes in chemical constituents leading to diminishing commercial value (Ashie *et al.,* 1996; Olafsdottir *et al.,* 1997; Whittle *et al.,* 1990). This degradation process is carried out in the initial stage by muscle enzymes and later by microbial enzymes. The rate of alteration depends on factors such as the nature of the fish species, size, lipid content, and condition of fish during capture, nature of the microbial load, and storage temperature.

The present study was undertaken to develop value added chilled convenience products from mackerel and to assess the shelf life of product in chilled conditions by evaluating the chemical, microbiological and sensory properties.

Materials and Methods

Indian mackerel (*Rastrelliger kanagurta*) was purchased in early post rigor condition from the local market and brought to the laboratory in iced condition. Mackerel (weight 160±20 g and length of 22±4 cm) were immediately washed, gutted and divided into two lots. Lot-I was taken as control without any treatment whereas lot-II was treated with condiment mixture (chilly, turmeric and salt in 2:2:1 proportion). Both the lots were packed in polyethylene bags (25x20 cm) and stored in iced condition. Periodically samples were drawn from both lots for biochemical, sensory

and microbiological analyses. Moisture, crude protein, fat and ash were determined according to the methods of AOAC (1995). Free fatty acid value and peroxide value were estimated according to AOAC (1995) and thiobarbituric acid was determined according to Yu and Sinhuber (1957). Ten per cent tri-chloro acetic acid extract was used to estimate non-protein nitrogen (AOAC, 1995), total volatile base nitrogen (Conway, 1947), and alpha amino nitrogen (Pope and Stevens, 1939). Microbiological analyses were carried out using USFDA (2001) method. Sensory evaluation was carried out using overall acceptability score on a nine point hedonic scales (Joseph, 2003) where the product was considered unacceptable if score was below 4.

Results and Discussion

Proximate composition of Indian mackerel is given in Table 1. The composition of a particular species often appears to vary from one fishing ground to another, and from season to season, but the basic causes of change in composition are usually variation in the amount and quality of food that the fish eats and the amount of movement it makes.

Table 1: Proximate composition of Indian mackerel

Proximate composition	%
Moisture	70±1.02
Protein	22.6±0.19
Lipids	6.3± 0.12
Ash	1.4±0.09

Change in PV during chilled storage of lot-I and lot-II sample are given in Fig. 1a. The PV of both the samples remained steady till 5th day of the storage period. Lot-II showed an initial PV of 12.28 meq $O_2.kg^{-1}$ of fat which increased to 20 meq $O_2.kg^{-1}$ of fat on the third day and then decreased to 18.6 meq $O_2.kg^{-1}$ of fat on the fifth day. Similar pattern was observed in the lot-I where PV decreased from initial 17.72 meq $O_2.kg^{-1}$ of fat to 8.26 meq $O_2.kg^{-1}$ of fat. The decreased PV observed with extended storage time was presumed to be due to the decomposition of hydro peroxide. PV of lot-II showed higher values in comparison with lot-I. This may be due to the antioxidant property of condiments incorporated

in the sample. Lipid oxidation is a complex process in which unsaturated fatty acids react with molecular oxygen, usually via a free radical mechanism, to form hydro peroxides, the primary oxidation products (Simic and Taylor, 1987). Hydro peroxides break down in several steps, yielding a wide variety of decomposition products, including aldehydes (Nawar, 1996).

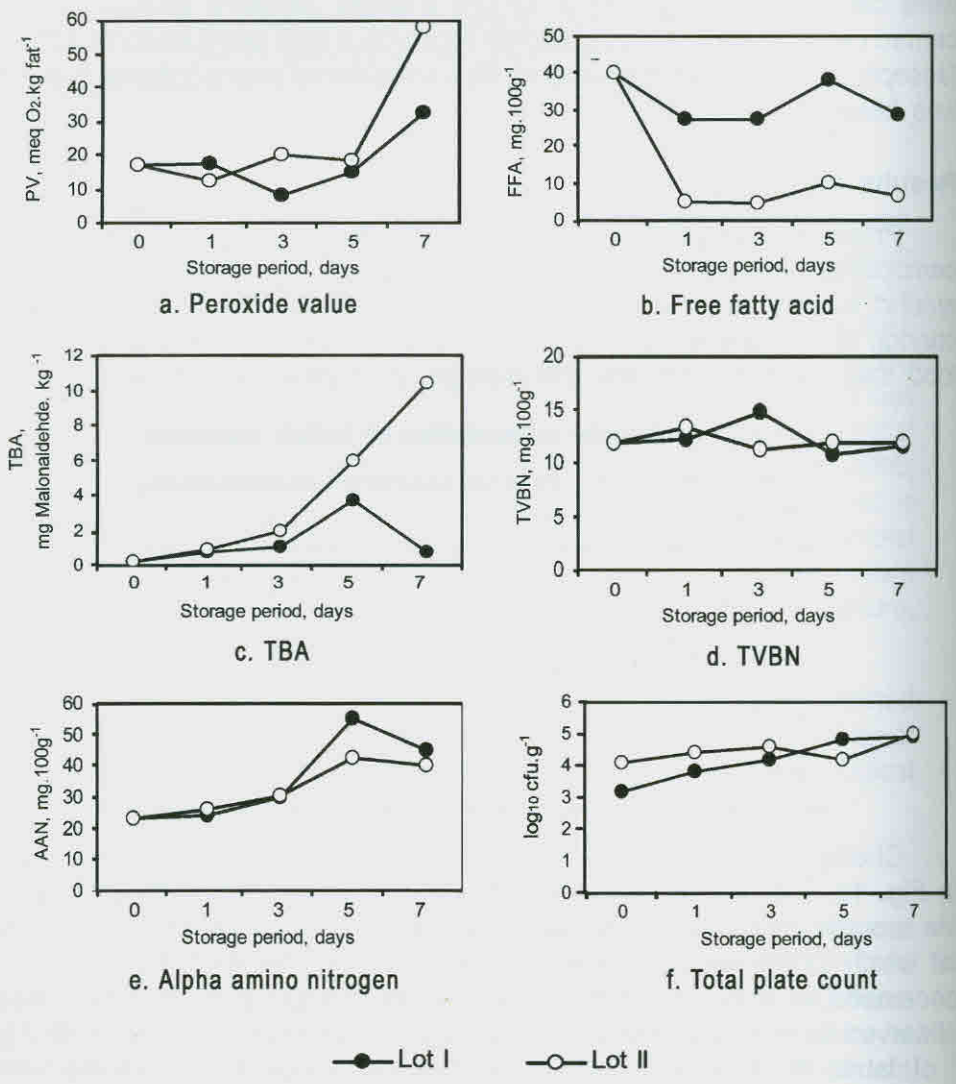

Fig.1: Changes in (a) Peroxide Value, (b) Free Fatty Acid, (c) TBA, (d) TVBN, (e) AAN, and (f) TPC of Indian mackerel during chilled storage