

Slurry Ice: An alternative preservation medium - A study on Bombay duck (*Harpadon nehereus*)

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Bombay duck (*Harpadon nehereus*) is one of the major marine species abundant in North West coast of India. Traditionally the demand of fresh fish is limited and major portion of landings were converted to dried product. Bombay duck is prone to spoilage due to its high moisture content. Traditionally, block ice or flake ice is used for preservation. Moreover due to less demand and lower price these fishes are discarded into sea or kept under insufficient ice onboard. There is a need for alternate method for the preservation of fish onboard. It has been reported that slurry ice could maintain the quality of fish and shell fish better onboard when compared to block ice. The major advantages of slurry ice include: (a) it provides rapid chilling rate than other chilling methods due to large heat transfer surface area created by its numerous particles (b) it cover the fish surface completely which reduce the dehydration of samples (c) it can be prepared onboard with required condition. Slurry ice contains homogenous mixture of small ice particles and carrier liquid. The liquid can be either pure freshwater or a binary solution consisting of water and a freezing point depressant (eg. Sodium chloride, propylene glycol, ethanol and ethylene glycol). Several authors reported that fish and shell fish stored under slurry ice had extended shelf life (Mugica et al., 2008; Zhang et al., 2015; Narasimha Murthy et al., 2018; Jeyakumari et al., 2018). Very few studies have been carried out on quality of Bombay duck stored under conventional flake ice. Hence, the present study was undertaken to evaluate the quality of Bombay duck fish stored in slurry ice and it was compared with the conventional flake ice.

Fresh Bombay duck (*Harpadon nehereus*) (200-250g size; 20 ± 0.5 cm) were procured from fish market at Vashi, Navi Mumbai and brought to laboratory in iced condition (fish to ice ratio=1:1). A prototype system was used to prepare the slurry ice in this work (Chirag, Navi Mumbai, India). Fresh Bombay duck fish were divided into two sets. 1) The first set of fish was kept under flake ice (Control) 2). The second set of fish was kept under slurry ice. The ratio of fish to ice (flake ice/slurry ice) was maintained 1:1. The melted ice was drained and compensated with required ice at a regular interval. All the samples were kept in insulated ice boxes and samples were taken at known intervals for analysis until overall acceptability rejection. Biochemical parameters such as pH, TVB-N, TMA-N, PV and TBA showed an increasing trend during storage. It was observed that TVB-N and TMA-N content were within the acceptable limit in both samples during storage. Result indicated that TVB-N and TMA-N content were found to be poor indicator and did not show substantial increase when fish was found spoiled. Peroxide value crossed the acceptable limit ($20 \text{ meq.O}_2/\text{Kg}$) on 13th day in

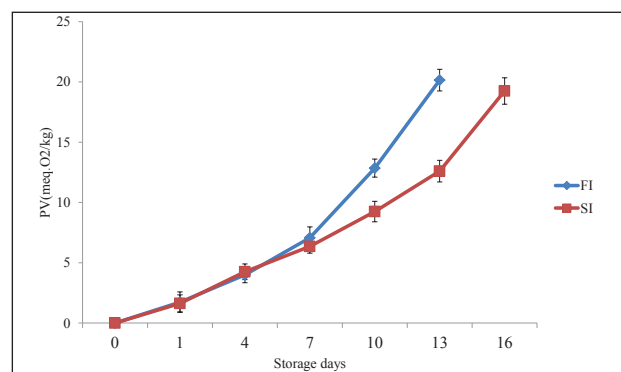


Fig. 1. Changes in PV of Bombay duck during storage

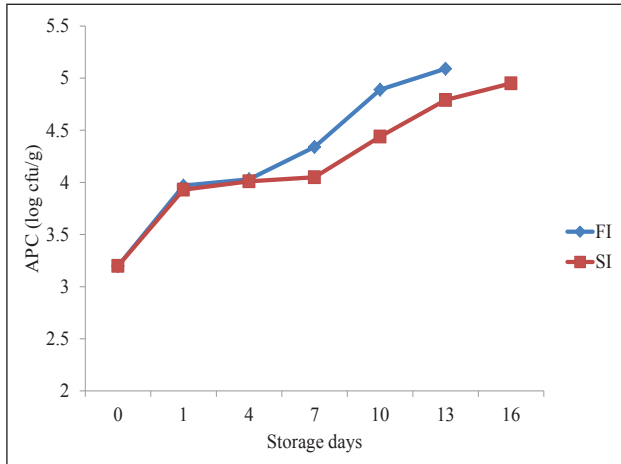


Fig. 2. Changes in APC of Bombay duck during storage

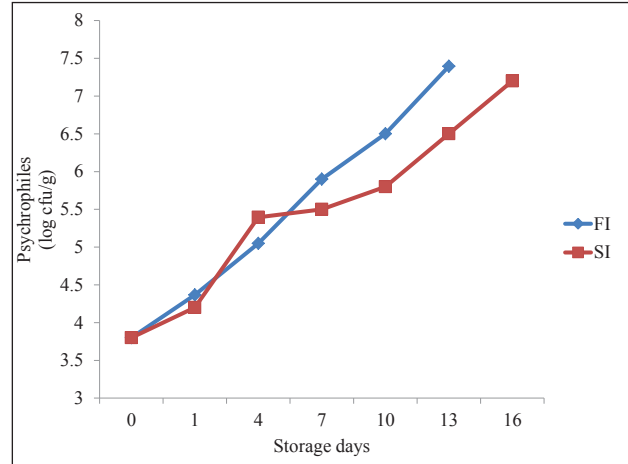


Fig. 3. Changes in psychrophilic count of Bombay duck during storage

control. However, fish stored under slurry ice had peroxide value of 19.25meq.O₂/ Kg on 16th day (Fig.1). In both the samples TBA values were within the limit throughout the storage. Salt content varied from 0.15-0.28% in control. However, fish stored under slurry ice showed increasing trend (0.15- 2.2%) in salt content during storage. Since, the slurry ice is prepared from filtered seawater, it might have influenced the salt uptake in fish samples during storage. However, it did not affect the sensory quality as indicated by higher score for overall acceptability. Microbial analysis showed a gradual increase in aerobic plate count (APC) during storage. Control reached acceptable limit of APC (5.09log₁₀) on 13th day. However, fish stored under slurry ice had APC of 4.95log₁₀ on 16th day (Fig.2). Psychrophilic bacteria showed gradual increase during storage and reached 7.39log cfu/g on 13th day, 7.20 log cfu/g on 16th day for fish stored under flake ice, slurry ice, respectively (Fig.3). Results indicated psychrophilic bacteria count can be considered as good microbiological quality indicator than TPC for the Bombay duck stored under slurry ice. The increase in psychrophilic bacteria count was coincided with sensory analysis. Based on the microbial and sensory and analysis, fish stored in slurry ice had an extended shelf life up to 16 days than control (13 days) when compared control.

References

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