Ice Storage Studies of Kati (*Pellona* sp.)

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Studies were carried out on the effect of ice storage on the composition of kati (*Pellona* sp.). On the basis of biochemical, bacteriological and organoleptic evaluations, it was observed that kati can be stored in ice for a period of 9 days without appreciable loss in overall quality.

Large amounts of kati (*Pellona* sp.) are landed every year on the north-west coast of India. This also forms an important food fish of this region, proper preservation of which is essential both after catch and during transportation and distribution. Though ice storage studies on mackerel and sardine (Madhavan *et al.*, 1970), pomfrets (Kamasastri *et al.*, 1967), mussels, clams and crabs (Chinnamma *et al.*, 1970) and perch (Solanki *et al.*, 1977) have been reported, there appears to be a paucity of data on the preservation of some of these fishes of the north-west region. The present investigation was therefore undertaken to study the amenability of kati to ice storage.

Materials and Methods

Fresh kati of uniform size (2–4 nos. per kg) were procured from local landings at Bombay and immediately brought to the laboratory in crushed ice. Fish were thoroughly washed and stored in insulated box provided with a raised perforated platform and mixed with ice in 1 : 1 ratio. Ice was replenished for the quantity melted during storage. The insulated box was also provided with an outlet to drain out water so that the fish, throughout the investigation, was never in contact with water. Samples were drawn and analysed every alternate day for physical, organoleptic and biochemical qualities. Moisture, total nitrogen and non-protein nitrogen were determined according to AOAC (1960), total volatile nitrogen by the procedure of Conway & Byrene (1933) and α-amino nitrogen in accordance with the procedure of Pope & Stevens (1939), free fatty acids by the method of Dyer & Morton (1956) and thiobarbituric acid value according to the method of Tarladgis *et al.* (1960). Total bacterial count was determined as

Table 1. *Biochemical and bacterial changes during ice storage of kati*

Storage period (days)	0	3	5	7	9	11	13
Moisture %	76.41	77.11	77.25	77.21	77.03	78.69	78.85
Total nitrogen %	3.38	3.08	3.08	2.97	2.89	2.88	2.77
Non-protein nitrogen %	0.333	0.312	0.291	0.265	0.283	0.268	0.238
Total volatile nitrogen mg/100 g	11.70	11.90	12.25	12.85	14.70	15.40	16.52
α-Amino nitrogen mg/100 g	18.20	17.92	15.82	6.02	8.12	6.19	5.32
Free fatty acid as oleic acid %	0.59	0.62	0.81	0.96	1.09	1.29	1.65
Thiobarbituric acid (micromoles malonaldehyde per kg flesh)	1.50	2.25	4.87	6.37	8.25	11.25	15.00
Total bacterial count/g	4.18×10^4	1.65×10^3	1.15×10^3	1.09×10^4	2.15×10^4	5.55×10^4	5.45×10^6

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per IS : 2237 (1971). Organoleptic assessment was carried out after cooking the meat in 2.5% solution of sodium chloride for 10 min.

Results and Discussion

The biochemical and bacterial changes taking place during ice storage of kati are presented in Table 1. The moisture content of the stored fish increased from 76.41 to 78.85% on the 13th day of storage. Total nitrogen content decreased from an initial value of 3.38 to 2.77% and non-protein nitrogen from 0.333 to 0.238%. This decrease may be attributed to leaching during ice storage. Shenoy & James (1974) have also obtained a gradual decreasing

Table 2. *Changes in physical and organoleptic quality during ice storage of kati*

Storage period (days)	0	3	5	7	9	11	13
Components							
Eyes	Convex bright shining	Bright convex	Flat but clear	Flat and slightly cloudy	Flat and cloudy	Sunken opaque	Sunken opaque
Gills	Bright red without slime	Bright red	Red	Red	Pale red with slight slime	Brown with slime	Brown with slime
Colour	Bright silvery white	Bright	Decrease in bright silvery colour	Dull white	Dull white	Dull	Dull with scales getting very loose
Texture	Firm	Firm	Firm	Slightly firm leaving no thumb impression	Slightly soft	Soft	Very soft leaving thumb impression
Odour	Fresh fish odour	Fresh fish odour	Fresh fish odour	Neutral odour	Neutral with slightly rancid	Stale and slightly rancid	Stale and putrid smell
Cooked characteristics							
Texture	Firm; dry	Firm; dry	Firm	Firm	Slightly soft	Soft breaks easily	Soft and sticky
Flavour	Very good	Good	Good	Fair	Slightly rancid	Stale and rancid	Stale and off
Taste	Very good	Good	Good	Fair	Fair	Fair but slight after taste	Poor and bitter after taste

pattern for total nitrogen and non-protein nitrogen values during ice storage of seer. α-amino nitrogen values registered a decline with progressive ice storage from an initial value of 18.20 to 5.32 mg/100g. on the 13th day. This may also be due to leaching. This decrease is marked with the loss in flavour of the material. Solanki *et al.* (1977) have reported similar trend while working on the ice storage characteristics of perch. Total volatile nitrogen steadily increased during ice storage but the values were not very high. Free fatty acids, as a result of lipid hydrolysis, increased from 0.59 to 1.65%. These observations are in conformity with those of Madhavan *et al.* (1970) with reference to ice storage of mackerel and sardine. Thiobarbituric acid value increased from 1.5 to 15 on the 13th day resulting in strong rancid odours. Total bacterial count, which was 4.18×10^4 initially, decreased to 1.15×10^3 by the 5th day. Thereafter, it gradually increased to 5.45×10^5 by 13th day. The fall in bacterial count during initial stages of ice storage may be due to the washing out of surface slime together with bacteria along with ice-melt water. Gradual icrease in bacterial count after the 5th day may be due to the proliferation of psychrophilic bacterial flora.

Physical and organoleptic changes taking place in ice stored kati are presented in Table 2. Texture of the fish was firm upto 7 days. Beyond this period it indicated perceptible sign of softening and by the 13th day it became very soft. At this stage, the scales were very loose and easily separable. The fish also emitted off odour. Texture, flavour and odour of the cooked material were poor after 9th day and the fish was unfit for consumption on the 13th day.

Results presented above indicate that kati was in fairly acceptable condition till 9th day. On the 11th day, the acceptability was on the border line and on the 13th day it was highly spoiled and unacceptable.

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