

Evaluation of organoleptic and biochemical status of the Fish, *Cyprinus carpio* at different storage temperatures

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Abstract:

The global demands compel a consistent food supply that too in good quality. These demands are fulfilled by the intensive aquaculture practices in particular to provide enormous quantities of protein rich food. Fish reaches the consumers either in fresh or processed conditions. The advantage of preservation is to reduce wastage of fresh products, extends the shelf life, develops, value added products and to provide convenient preferable forms. Most of the sensory and biochemical indices are the reflection of the extent of microbial spoilage. In organoleptic evaluation the skin appearance and colour decreased in time dependent manner, texture of body was loosed and odour was increased due to increment of storage period at room temperature. The proximate composition of fish fillets reduced during storage period at room temperature. The fish muscle carbohydrate, protein and fat contents were reduced 50%, 30% and 30% respectively in one day room temperature storage fish but the level of proximate composition not much affected in fish stored at -80°C. Critically reviewing the above points, the present study was taken up to assess the natural sequence of changes occurring during spoilage of fillets during storage at various temperature viz., room, refrigerator, -20 and -80°C. Evaluation of organoleptic and biochemical constituents are carried out after storage treatment. The assessment of spoilage was carried out on the basis of organoleptic scores, biochemical status of the fish or fish fillets. Biochemical analyses include determination of protein, lipid and carbohydrate.

Keywords: *Organoleptic evaluation, Cyprinus carpio, fish fillets and biochemical estimation.*

Introduction:

Modern life-style demands a consistent food supply with high quality that is convenient as well as affordable (FAO, 2007). There are several animal and plant food savers available worldwide. Among them, the most important animal protein saver that caters to the human needs comes from aquaculture. The world population is continuing each and every year that will exceed 10 billion by the year 2050 (Subasinghe, 2005). Generally fish is considered as a highly protein rich food in relation to vegetable and other animal foods. It is a fact that millions of people in developing countries are suffering from malnutrition mainly because of protein deficient food. Fish can play an important role as a source of protein of high digestibility, minerals especially calcium and iron and vitamins (Coway *et al.*, 1981). Small fish is a good source of calcium as in milk. Fish supplies abundant amount of essential amino acids. Fish production alone does not ensure the availability of protein to all unless it is affected in systematic manner. The comprehensive viable technology packages have become inevitable. Fish is a

highly perishable commodity. Less quality in fishery products may be attributed to three main causes namely catalytic, enzymatic and bacterial actions. Literatures in various quality aspects like biochemical sensory characteristics of common carp from tropical region under refrigerated storage are found to be scarce (Band Yopadhyay *et al.*, 1986). Most of the sensory and biochemical indices are the reflection of the extent of microbial spoilage. Hence, in the present investigation findout organoleptic and biochemical status of the fish *C. carpio*.

Materials and Methods:

In the present study, easily available *Cyprinus carpio* (Family: Cyprinidae) was selected as a candidate species, popularly known as “common carp” in Tamil.

Collection of samples:

For the present study, the edible freshwater fish *Cyprinus carpio* with the length of 30-35 cm weighing 500-600 g were collected from the fish culture pond of Government Fisheries Department, Anaikuttam (Virudhunagar), Tamilnadu State, India. The fishes were brought to the laboratory using

Table 1: Organoleptic evaluation *Cyprinus carpio* fillets during storage at different temperature

Storage Temperature	Storage Period (hrs)	Skin appearance	Texture	Odour	Discoloration	Overall sensory score
Room temperature	0	4.50	5.00	5.00	5.00	4.88
	2	4.50	4.50	4.50	4.50	4.50
	4	4.00	4.00	4.00	4.00	4.13
	6	3.50	3.50	3.50	3.50	3.50
	8	3.00	3.00	3.50	3.50	3.13
	12	2.00	2.50	3.00	3.00	2.38
	24	1.00	1.50	2.00	2.00	1.38
4°C	0	4.50	5.00	5.00	5.00	4.88
	24	4.00	4.50	4.50	4.50	4.50
	48	4.00	4.00	4.00	4.00	4.13
	72	3.50	3.50	3.50	3.50	3.50
	96	3.50	3.50	3.50	3.50	3.50
-20°C	0	4.50	5.00	5.00	5.00	4.88
	24	4.00	4.50	4.50	4.50	4.50
	48	4.00	4.50	4.50	4.50	4.50
	72	4.00	4.00	4.00	4.00	4.13
	96	4.00	4.00	4.00	4.00	4.13
-80°C	0	4.50	5.00	5.00	5.00	4.88
	24	4.50	5.00	5.00	5.00	4.88
	48	4.00	4.50	4.50	4.50	4.50
	72	4.00	4.50	4.50	4.50	4.50
	96	4.00	4.50	4.50	4.50	4.50

sterile plastic buckets containing pond water. The fish samples were brought to the laboratory within two hours after collecting the samples for organoleptic test and biochemical analysis.

Treatment

On arrival to the laboratory, the fish were sacrificed by shock treatment. The samples were processed as fillets, packed and stored at different temperatures, such as room temperature, 4° C, -20° C and -80° C. Samples were evaluated for sensory and biochemical attributes at 0, 2, 4, 6, 8, 12 and 24 hrs under room temperature and at intervals of 24hrs upto 4 days under different storage temperatures.

Organoleptic assessment

Organoleptic assessment was laid on general appearance, slime formation on the body surface, nature of eye, colour of gills, texture, odour and overall acceptability of the fish examined by Sadasivam and Manickam (1996).

Biochemical estimation

The carbohydrate, protein and lipid were analysed in fish fillets before and after treatment by following standard methodologies Anthrone, Lowry *et al.*, (1951) and Bligh and Dyer (1959) respectively.

Results and Discussion:

The shelf life and storage characteristics of air packed fish fillets were treated and analyzed in terms of sensory and biochemical characteristics and results were described. Change in the organoleptic of fish

Table 2: Proximate composition of muscle tissue of *Cyprinus carpio* during storage at different temperature

Storage Temperature	Storage Period (hrs)	Carbohydrate(mg)	Protein(mg)	Fat(mg)
RT ^o C	0	2.20	16.25	3.10
	2	2.03	15.072	3.00
	4	1.95	15.23	2.52
	6	1.40	13.60	2.28
	8	1.22	13.29	2.08
	12	1.13	12.80	2.06
	24	1.01	12.09	1.98
4 ^o C	0	2.20	16.25	3.10
	24	2.20	16.25	3.10
	48	2.02	15.30	3.03
	72	1.89	14.29	2.87
	96	1.89	14.29	2.87
-20 ^o C	0	2.20	16.25	3.10
	24	2.20	16.25	3.10
	48	2.18	16.05	3.00
	72	2.15	15.91	2.96
	96	2.15	15.91	2.96
-80 ^o C	0	2.20	16.25	3.10
	24	2.20	16.25	3.10
	48	2.20	16.25	3.10
	72	2.20	16.25	3.10
	96	2.20	16.25	3.10

during storage at room and different temperature were recorded in the Table 1.

In organoleptic evaluation the skin appearance and colour decreased in time dependent manner, texture of body was loosed and odour was increased due to increment of storage period at room temperature. At the same time the fish stored at 4^oC also reduced quality in considerable level, but only very limited changes alone occurs in fish stored at -20^oC and 80^oC.

The result of the present investigation showed that there was a gradual decrease in protein content of fish fillet during the period. The protein content was reduced in fish storage at room temperature was 25.6% for after 24 hrs of storage, 4^oC was 12.06% after 96 hrs, -20^oC was 2.09 and -80^oC was nil the spoilage upto 96 hrs of storage.

Similarly lipid and carbohydrates also decrease during storage period (table 2).

The proximate composition of fish fillets reduced during storage period at room temperature. The fish muscle carbohydrate, protein and fat contents were reduced 50%, 30% and 30% respectively in one day room temperature storage fish but the level of proximate composition not much affected in fish stored at 4^oC, -20^oC and -80^oC. Similar works also performed by various workers in some other fishes also support the present investigations (Durairaj and Krishnamurthy, 1986; George and Gopakumar, 1988 and Huss, 1995).

In the present investigation it was clear that the unprocessed raw whole fish can be kept for maximum period of 6 hrs and its shelf life can be extended upto 3days under

refrigeration temperature. The spoilage indices with the simultaneous reduction in protein, lipid and carbohydrates at different storage period of fish. Increase in spoilage with the reduction of quality in the major substrates caused rapid deterioration of carps.

Conclusion:

The fish pellets stored in very low temperature is very effective preservation technique to prevent spoilage and food produce deterioration compound to whole fish storage at room temperature. The proximate composition of the fish also reduced remarkably, the range of reduction varied depends on storage temperature. From this study the consumers are advised that avoid consumption of fish stored at room temperature and long period of high temperature storage preserved fish.

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References:

- [1] Band Yopadhyay, J.K., Chattopadhyay, A.K and S.K. Bhattacharyya. 1986. On the ice storage characteristics of *Catla catla* and *Labeo fimbriatus*.23:140-142.
- [2] Bligh E.G. and W.J. Dyer. 1959. A rapid method of total lipid extraction and purification. *Can. J. Bio. chem. Physiol.* 37:911
- [3] Coway C.N, Cooke D.J, Matty A.J and J.W. Adron. 1981. Effects of quantity and quality of dietary protein on certain enzyme activities in rainbow trout. *Journal of Nutrition* 111 : 336-345.
- [4] Durairaj, S and S. Krishnamurthy. 1986. Preservation of some Indian freshwater fish. *Fish Technol.* 23(2):115-119
- [5] Food and Agriculture Organization of the United Nations. 2007. *FAO Fisheries Department Review of the State of World Aquaculture Health Management in Aquaculture.* (<http://FAO/newsroom.com/>).
- [6] George, C and K. Gopakumar. 1988. Spoilage changes in the muscle of crab, *Scylla serrata* stored at three different temperatures. In: Mohan Joseph, M. *The first Indian Fisheries Forum*

Proceedings, Asian Fisheries Society, Indian Branch, Mangalore. pp.347-349

- [7] Huss, H.H. 1995. Quality changes in fresh fish. *FAO Fisheries Technical Paper No.348.* FAO, Rome.
- [8] Lowry, O.H., Rose brought, N.J., Farr, A.L and R.J. Randal. 1951. Protein measurement with folin phenol reagent. *J.Biol.Chem.*,193: 265-275.
- [9] Sadasivam, S and A. Manickam. 1996. *Biochemical methods.* New Age International (P) Ltd. Publishers, pp. 126-128.
- [10] Subasinghe, R. P. 2005. Epidemiological approach to aquatic animal healthy management: oppurtunities and challenges for developing countries to increasae aquatic production through aquaculture. *Med* 67:117-24.