The restoration of the quality of fish species, *Wallago attu* during ice preservation through the addition of a few additives.

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**Abstract**

The restoration of the quality of fish is a major issue of the food industry, one that concerns growers or farmers for their security of livelihood, durability as well as for human nutrition. Immediately after fishing, fishes are susceptible to rapid spoilage in tropical regions. This is because of the prevalence of high temperature and humidity. Several other factors such as the growth of various microbes, autolysis, activity of different enzymes which deteriorate the muscle proteins, degraded lipids which lead to the formation of ammonia, amines, free fatty acids and undesirable odours. The post-harvest technology needs several devices which could be useful in the restoration of the quality of the fish. Several preservation techniques are being practiced in different parts of the country. Freezing is one of them which is effective in bringing down the deterioration of the fish.

**Keywords:** Restoration, post harvest technology, freezing.

1. **Introduction**

   The main factors responsible for the decomposition of fresh fishes are bacterial activity, autolysis and oxidative rancidity (Tarr, 1956a). The studies of Dingle and Hines (1975) demonstrated protein denaturation because of the presence of an enzyme which transformed trimethylamine oxide to dimethylamine and formaldehyde in tissues and thus increased the rate of protein denaturation. After death the lipids in fish are subject to two major changes, namely lipolysis and autoxidation. The effects produced by these changes are considered undesirable and often the major causes of spoilage (Fukuda, 1955; Toyama, 1956). The autoxidation is the most important particularly in the deterioration of frozen fish products causing flavor (Banks, 1939), colour (Jones, 1962) and textural changes (Sikorski et al., 1976). The degree of spoilage is dependent on several factors, which are intrinsic, that is the sum of attributes inherent in the fish muscle. Besides, there are several external factors having direct bearing on spoilage. Therefore, the biochemical processes have been extensively studied in order to identify potential quality indicators or to determine means to control postmortem degradation.

2. **Materials and methods**

   Restoration of quality during ice preservation through the addition of citric acid and sodium tripolyphosphate has been attempted to restore the quality of *Wallago attu* species during ice preservation (up to 90 days). The restoration of quality is measured from the proximate composition and other parameters.

   Moisture content was determined by the standard hot air oven method (AOAC, 2000).

   The ash content was measured by the method described in AOAC, 2000. The total nitrogen was estimated by Kjeldahl method, AOAC, 1995 (Protein value was calculated by multiplying the total nitrogen value by a factor of 6.25). Fat content of moisture free sample was determined by extracting the fat with a
suitable solvent (petroleum ether) by using soxhlet apparatus (AOAC, 1995). The TVB-N (Total volatile base nitrogen) was determined by AOAC (1995) recommended method. The SSN (Salt soluble nitrogen) was estimated by the method of Dyer et al (1950). The NPN (Non protein nitrogen) was estimated by Nambudiri (1985). The FFA (Free Fatty Acids) content in sample was determined by the method recommended by Nambudiri (1985). The PV (Peroxide value) of the lipid was determined from the lipid extract using iodometric method as described by Jacobs (1958). The TBA (Thiobarbituric acid) value of fresh and frozen samples were determined by using distillation method described by Sinnhuber and Yu (1958).

Preparation of fish sample: The procedure used for the fish sample preparation and experiment were designed. After transporting all fishes to the laboratory in iced condition, they were immediately washed and dressed accordingly by deheading, degutting, descaling and cutting fins without tail. The dressed fish samples were mainly divided into three lots viz., whole fish, gutted fish and steak. The whole fishes were further divided into two batches whereas steaks were for five batches. Steaks were than treated with different antioxidants according to the experimental designs.

3. Results and discussion

In the present experiment, the attempt has been made to use Citric acid (Citric acid) and Sodium tripoly-phosphate (STPP). Steaks of freshly caught *Wallago attu* were prepared (thickness 5cm, length 15cm) and their proximate composition were analyzed. The steaks are preserved in –20° c for up to 90 days with following protocols:

1. Control steaks: Fresh steaks without any addition of additives.
2. Experimental steaks: a) Steaks treated with 1% and 5 % Citric acid (CA) and later frozen in -20°c for 90 days. b) Steaks treated with STPP, 1% and 5% in -20°c up to 90 days. The details are shown in the table: 1.

*Wallago attu* is a commercially important cat fish of the Brahmaputra river system and this fish constitutes a considerable population in the flood plain wetlands of N.E. India. Considering the preservation of the fish, the present experiments have clearly shown that refrigeration and treatment with antioxidants like CA and STPP enhance the storage life of the flesh up to 90 days in –20° c. The different proximate composition of the chemical characteristics could be retained in normal conditions without any major changes. It is important that TVN and TBA no. are significantly low in treated fishes in comparison with the control flesh. Other parameters remain almost the same without any significant changes. Since, in control untreated fish the TVN and TBA no. are significantly high showing that the fish is not fit for consumption.

<table>
<thead>
<tr>
<th>Proximate compositions</th>
<th>Control with refrigeration ( in days )</th>
<th>Treated with CA (in days )</th>
<th>Treated with STPP (in days )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>Moisture %</td>
<td>77.0</td>
<td>78.5</td>
<td>80.0</td>
</tr>
<tr>
<td>Protein %</td>
<td>16.5</td>
<td>16.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Fat %</td>
<td>5.0</td>
<td>3.5</td>
<td>3.2</td>
</tr>
<tr>
<td>Ash %</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>TVN mg/gm</td>
<td>10.0</td>
<td>18.0</td>
<td>35.0</td>
</tr>
<tr>
<td>NPN mg/gm</td>
<td>0.6</td>
<td>0.5</td>
<td>0.3</td>
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<tr>
<td>Soluble N mg/gm</td>
<td>0.5</td>
<td>0.45</td>
<td>0.5</td>
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<tr>
<td>TBA no.</td>
<td>0.5</td>
<td>9.5</td>
<td>20.5</td>
</tr>
<tr>
<td>FFA %</td>
<td>5.0</td>
<td>4.5</td>
<td>3.5</td>
</tr>
</tbody>
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References


