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Unit-IV

Methods of Fish Processing

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METHODS OF FISH PROCESSING

1. Salting
2. Drying
3. Smoking

1. SALTING

- **Salting is the traditional method used to reduce the water activity to retard the microbial spoilage and chemical reactions.**
- **Salts penetrates into the muscle and binds with the water.**
- **A concentration of between 6 and 10 per cent salt in the tissue will prevent the activity of most spoilage bacteria.**
- **Fishes are cut along its length and remove backbone from it. Salt are mixed in it for 15 days. As a result of salt concentration variation on osmotic difference occur. Then dried in sun light or hot air passing**

Uptake of salt by fish depends on the following factors are

- **higher the fat content, the slower the salt uptake**
- **thicker the fish, slower the penetration of salt to the centre**
- **fresher the fish, the more slowly salt will be taken up**
- **higher the temperature, the more rapid the salt uptake**

During subsequent drying the presence of salt has the following effects:

- **Higher the salt concentration, the greater the replacement of water and, therefore, the less water that remains to be removed during drying;**

- **Higher the salt concentration, the less water that needs to be removed to produce a satisfactorily preserved product;**

- **Higher the salt concentration, the more slowly the fish dries.**

Methods of salting

A. Brine salting (15-25% solution)

- Fish immersed in solution of salt.
- Frequent stirring necessary.
- Replacement of salt in brine may be needed.
- Need to supply fresh brine to new batch of fish.

B. Dry salting (3-4 parts fish to 1 part salt)

- Salt rubbed into fish surface and fish left uncovered to dry.
- Not recommended in tropical regions due to insects and rodents.

C. Kench salting

- Salt rubbed on split fish and stacked. Pickle formed which leaks away.


Removal of Backbone


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2. FISH DRYING

Drying is one of the popular method for preserving the fishes. It is otherwise called as dehydration.

Removal of moisture from fish keep the fish less perishable.

Drying of fish produces the following advantages

- **Dried fish require less storage space than other types of fishes**
- **Dried fish weight is less than the other preserved fish products (canned, chilled, etc.)**
- **Fish can be preserved without addition of any preservative.**

Since water is essential for the activity of all living organisms its removal will slow down, or stop, microbiological or autolytic activity and can thus be used as a method of preservation

DRYING OR DEHYDRATION OF FISH

a) Wash the fish thoroughly.
b) Open the belly cavity and the visceral organs.
c) Rinse the fish in running water. Drain.
d) Mix 10% brine solution (1 part salt to 9 parts water).
e) Soak the fish in a 10% brine solution of salt for 30 to 40 minutes.
f) Drain the fish and wash thoroughly.
g) Place the salted fish in woven bamboo racks to dry under the sun or solar dryer for 2 to 3 days.
h) Let cool, then place in clean boxes or baskets or wrap them in wax paper.
i) Store in a cool place.

METHODS OF DRYING FISH

1) Natural drying

The energy of the sun and/or the wind is used in many countries to dry fish. To obtain the best possible rate of drying under natural conditions, several factors should be considered:

- **Air movement at ground level is usually very slow; if fish are raised above the ground, by even one metre, the air movement is greater.**

- **Drying fish at ground level does not allow air to pass under the fish; drying fish above the ground on raised, slatted or mesh racks allows drying from the upper and lower surfaces.**

2) Mechanical driers

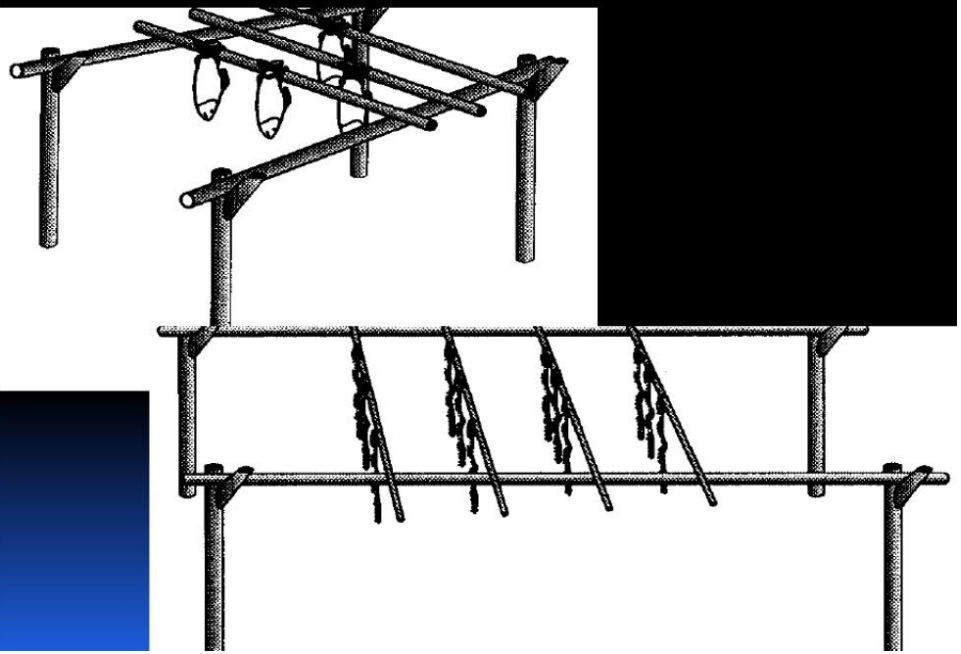
Several types of mechanically powered driers have been developed and used commercially in different parts of the world. Fish are dried in a fan driven air-stream; the air is usually heated and, in some cases, the air can be recirculated to control the relative humidity.

3) Solar driers

The energy of the sun is collected and concentrated to produce elevated temperatures and an increased rate of drying.

Raising the air temperature increases the amount of water the air can hold, thus the relative humidity will be reduced and the air will be able to absorb additional water vapour.

Drying



ADVANTAGES AND DISADVANTAGES OF FISH DRYING

Advantages

- Sun dried fishes are highly concentrated fish when compared to other preserved form of fish
- As water content is reduced, there is no change of microbial spoilage
- Less expensive methods
- There is no complicated machineries are involved in this method
- Dried fishes are remain stable at most ambient temperature.

Disadvantages

- This process can be carried out when bright sunlight is available
- Longer duration is required
- In sun drying, possibility of contamination with dust, sand, infestation with insects, their eggs and larvae is high.
- Shelf life of the final product is not too long and poor quality final product is produced in most cases.

DRIERS

- **Driers are devices used to dry fish under the controlled environment**

- **A variety of driers are used for drying fish**

  Eg. Cabinet drier, Tunnel drier, Spray drier, solar tent drier etc.

3. SMOKING OF FISH

Smoking is one of the oldest methods of fish preservation developed in prehistoric period.

In recent times smoking is used as a method of preservation with the incorporation of smoke flavour and development of colour.

Smoking is a method of preservation effected by the combination of drying, deposition of naturally produced chemicals resulting from thermal breakdown of wood and salting.

Smoked fish is ready to eat and has great demand in western sophisticated markets.

Smoke is a good preservative since it contains bacteriocidal and antioxidant properties.

Around 2% of the total world catch is used for preparing smoked fish all over the world.

In India, "masmine" is prepared in Lakshadweep group of islands.

Smoking is a method of preserving fish which combines three effects:

1. **Preservative value of the smoke:** the smoke produced from burning wood contains a large number of compounds, some of which will kill bacteria, e.g., phenols.

2. **Drying:** the fire which produces the smoke also generates heat and this will dry the fish.

3. **Cooking:** if the fish are smoked at a high temperature, the flesh will be cooked and this will destroy the enzymes and kill bacteria.

DIFFERENT TYPES OF SMOKING

1. Hot smoking:

In this type, the temperature should be maintained above 30°c and the normal range is 70-80°c. In hot smoking fish is completely cooked and consumer can take it without further cooking.

2. Cold smoking:

In cold smoking temperature should be maintained below 30°c. Here meat will not be cooked and it is used to impart flavour in the meat. So it has to be cooked before consumption. This method is followed in temperate countries as temperature in these countries is very low.

3. Combined method of hot and cold smoking:

Here fish is first smoked below 30°c for few hours and finally it is hot smoked.

Types of wood used for smoking are mentioned below.

- **Coconut shell and husk**
- **Sag wood dust**
- **Sag wood leaves**
- **Mango wood**
- **Paddy husk etc.**

Bacteriocidal properties of smoke

- It is due to combined effect of heating, drying, salting and also deposition of chemical constituents of fish.
- Chemical constituents like acetic acid are found to show bacteriocidal effect, can prevent fungal growth and can inhibit viral activities.
- Deposition of smoke is more on the surface and hence smoke is more effective against bacteria on the surface than on the inner portion of fish.

Antioxidant properties of smoke

Smoke also has antioxidant properties and it is mainly due to the presence of three important chemicals namely 2,6-dimethoxyphenol, 2,6-dimethoxy-4-methylphenol and 2,6-dimethoxy-4-ethylphenol.

Carcinogenic compound

Smoke has carcinogenic property due to the presence of 3,4-benzopyrene. Depending on the method of smoking the amount of carcinogenic compound in smoke varies.

Smoke Houses

- Fish or meat is cured with smoke in houses known as smoke house. In a traditional fishing village, a smokehouse was often attached to a fisherman's cottage.

- The smoked products might be stored in the building, sometimes for a year or more. Traditional smokehouses served both as smokers and to store the smoked fish.

CONCLUSION

- **There are two main methods of smoking fish: the traditional method and the mechanical method.**
- **The traditional method involves the fish being suspended in smokehouses. The fish are left overnight to be naturally infused with smoke.**
- **In the mechanical method smoke is generated through the use of smoke condensates, which are created by the industrial process of turning smoke into a solid or liquid form.**
- **The flow of smoke in the mechanical kiln is computer controlled and the fish generally spend less time being smoked than in a traditional kiln.**
- **Smoking fish is one of the best ways to preserve fish.**
- **Smoked salmon and smoked mackerel are two of the top purchased smoked fish items in the world. Salmon, mackerel and herring are universally available.**

THANK YOU