

2. Community Fish Smoking

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Harvested fishes cannot be kept fresh for a longer period as they degrade fast within 6-10 hrs after collection. Due to the lack of modern storage facilities in tribal localities, the local tribal employs traditional methods such as drying and smoking storage techniques that are found to be most reliable. A pointed stick made of bamboo is inserted into fish body from mouth to anus that supports dead fish to maintain its shape in straight position. Later, it is kept over the wooden rack hanging over the fire hearth of a height of about 1 meter. In this method, fishes are dried and smoked by the fire heat and smoke generated during cooking meals as such heat and smoke is not provided consistently but in intervals, hence traditional smoking process practiced by the local tribal people takes about 1 week to get properly dry and smoked fish.

After drying, the dried and smoked fish is kept in a perforated storage cage made of bamboo and cane, where it is stored and kept on large platform made of bamboo and wood, which acts as ceiling for years or else the cage is hanged high to a wooden pole to keep it safe from cats. Due to the effect of smoke from fire hearth at home, it remains safe from microbial infection for a long period. It is used for trade and commerce purposes apart from self- consumption.

Smoking is the easiest and common method of preserving fish practiced by local people. The smoked fishes are then either consumed from time to time as and when wished giving assurance to meet their need of protein or they are sold especially by the village women in the local market hence it gives a source of income to the village women.

Though, smoked fish is a delicacy to the local people and are consumed in the smoked form without any farther cooking or they are boiled along with bamboo sour (fermented bamboo shoots). However, due to crude method of smoking that do not eliminate the toxic substances in the smoke, their consumption is believed to be the cause of acidity and gastric problem common to the tribal people of Arunachal Pradesh. Hence, modern technology of smoking kiln can encourage to keep this delicacy amongst the tribal people and also reduce the risk of health problems arise due to toxic substances in smoke.

CIFT Intervention

Smoke curing of fish is a traditional practice in Orissa and North-Eastern States of India. During phase I, a survey was undertaken in Orissa, West Bengal, Assam, Arunachal Pradesh and Manipur and villages that are actively involved in smoke curing of freshwater fishes.

In these villages socio-economic conditions and the needs for technology development were assessed. During phase II, different models of community fish smoking kilns popularly known as CoFiSKi were designed and developed based on regional requirements.

During phase III, they were fabricated and installed at remote fishing hamlets which were adopted by CIFT for technology transfer. This was followed by training cum demonstration programmes on hygienic preparation of smoke-cured fish targeted at fishers self help groups.

The installation extended from remote fishing villages of Orissa to Eastern and North-Eastern states. During phase IV, improvements in design and fabrication were effected based on feedback from the end-users, in terms of process requirements for the smoke cured fish and ergonomics of the kiln design.

KVK Interventions

After realizing the problem with conventional method of smoking, KVK established Community Fish Smoking Kiln (COFSKI) supplied under NEH Programme from Vizhagh Research Centre of Central Institute of Fisheries Technology, Visakhapatnam during 2013 at its KVK Farm.

Capacity Building Programmes

A total of 6 skill based training programmes have been imparted benefitting 150 Farmers/ Farm Women/SHGs/Rural Youths. The feedback of the participants includes that less time & firewood consumption, better quality and appearance of product is obtained from CoFiSki.

Operational Procedures

The basic steps involved during the smoking process using CoFisKi are:

> *Selection of Fishes:* -

The fishes preferred for smoking should be lean fish like carps. Fatty fish like pangasius usually are not preferred as they cannot be properly smoked due to their high fat content.

The size of the fish is also important, bigger sized fish of 1 kg and above are usually difficult to smoke in its whole form, however, they can be smoked after splitting them into two halves along the abdomen. But such split forms may affect the preferences as consumers prefer to buy smoked fish in intact forms. Hence, fishes of smaller size that are usually not preferred by buyers to consume in fresh form are best to produce properly smoked fish and it is more economic in terms of smoking time and firewood requirement.

> ***Dressing of Fish :-***

Washing: Fish should be properly washed with clean potable water so that slime and other matter attached to fish body is washed off. Care should be taken to avoid dirt and sand in water.

Gutting: Gutting involves proper removal of gut (intestine), air bladder. Gutting is important in order to avoid rotting of fish body tissue as rotting initially starts in viscera due to the enzymatic digestion and high microbial load in the viscera. Moreover, presence of viscera also gives bad and bitter taste to smoked fish.

Removal of Fins: Removal of fin is not necessary, but depends on the preferences of the consumers, however if fins are not removed, usually it burns to black and gives bad appearance to final product.

Removal of Gills : Gills may be removed as most buyers do not prefer or consider gills as edible portion, moreover, gills usually contain organic matters, soil dirt and sands giving gritty texture to final products.

Salting of Fish: Salting may or may not be done depending on the preference of consumer preferences. However, salting aids to get better smoked fish as salting helps in reducing microbial loads and water content in fish body other than taste enhancement.

The above mentioned steps are very much important to get properly smoked fish in terms of its marketable quality, hygiene, taste, appearance and shelf life quality.

> ***Fire and Smoke generation :-***

For generation of fire, hardwoods should always be used. Unlike softwood, hardwood produces proper flame and gradually turns to red hot charcoal which gives uniform and consistency in heating.

Once good quantity of red hot coal is obtained smoke can be generated using dry saw dust. The overall quality of the final product mainly depends on proper monitoring of heat and smoke, too much or too low flame will gradually result in black burn of outer skin and undercooked fish from inside. Hence utmost care and constant monitoring should be taken during this operation.

> ***Arrangements of Trays :-***

Arrangement and re-arrangement of trays inside the smoking kiln is another important aspect to get good quality smoked fish. Timely re-arrangement of trays at regular intervals

provides uniform heating and smoking. Properly dressed fishes should be arranged uniformly on the tray keeping considerable distance from one another so that they do not get stick to each other. Care should be taken to avoid breaking of fish as consumers usually prefer intact body of smoked fish.

Care and Precautions

- Safety of people involved during smoking is also important, they should not wear loose or free flowing dresses. Care should be taken to properly tie their cloth intact to body for avoiding fire incident. One should wear proper gloves while re-arranging trays as they will be hot during operation.

- Hygiene and quality product is very important as it is directly related to the consumers appeal towards the product.

If possible people involved in smoking should wear head gears, mask and hand gloves so that dirt, germs or hair strands do not fall to the final product. One should always remember to clean the tray and inside of smoking kiln as it may contain spider web or insects etc

- Once fish is properly smoked and dried with hard golden colored outer skin and firm inner flesh, fishes should be taken out with care and should be kept on hygienic platform and allow to get cooled. Later they can be packed in LDPE poly pouches and sealed using sealing machine enhances the shelf life of the product.

- Fish arranged on trays should never be placed inside the kiln before generating proper heat and smoke because while generating flame, ashes or dirt from bottom may get attached to wet fish with air blow from vent.

- The door of the kiln should be kept closed while smoking operation as closing of door provides containment of heat and channelize smoke across the whole column of kiln.

- At all times, one should always remember and keep in mind that kiln surface will be hot. Hence one should take proper care and precautions.

Impact

The awareness/ exposure of participants have enriched them with sound knowledge on improved method of smoking fish. The gained knowledge has boosted their confidence level and as a result they are at present demanding for unit to establish in their respective villages.

SMOKING OF FISH USING COFISKI



Traditional methods of smoking over the fire hearth



Locally available smoked fish in the market



Fresh fish after dressing ready to be smoked



Arranging fish on trays



Ready to eat smoked fish



Farmers tasting the product

3. Fish Balls

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Fish ball is a ready-to-cook convenient product prepared using the minced fish meat. The fish meat is mixed with various ingredients and shaped in the form of ball, battered and breaded. The fish balls obtained can be stored in deep freezer for longer duration and can be served hot by frying in oil.