

An Efficient Smoking Kiln for Fisherfolks

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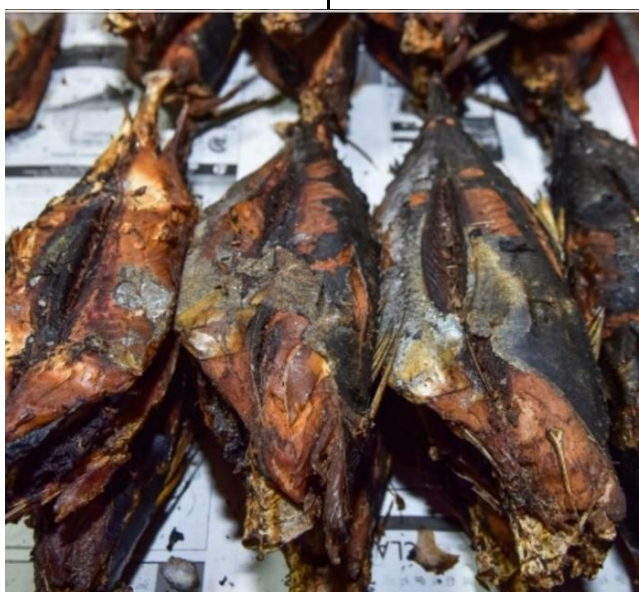
Fish is one of the most cost-effective animal protein sources and is rich in nutrients like omega-3 fatty acid, calcium and minerals. But it is highly perishable due to its high-water activity, protein content, neutral pH and presence of autolytic enzymes. So different methods are used to preserve and store the fish for longer duration. Smoking is one of the oldest methods of preservation of fish and smoked fish is one of the delicious cuisines in the north eastern region and consumed by many tribal communities across India.

The advantages of smoked fishery products are many. Fish that has been smoked has a longer shelf life, better flavour, and gets used more often in delicious cuisines such as sauces and soups. It allows storing the fish for the lean season and saves post-harvest loss during times of bumper catches. It makes fish easier to store, pack, transport and market, especially in the areas where it is scarce, and it boosts people's access to protein throughout the year.

Smoking preserves the fish through combination effects such as heat treatment, drying, salting and deposition of chemicals (phenols) produced from burning wood. Smoke has been reported to have both antioxidant and bactericidal properties. Smoked fish is preserved and has flavors that are in part due to the components of the smoke. The bactericidal action of smoking is enhanced by the heat produced during smoking. Salting is done usually before smoking which improves the flavor and

appearance of the smoked fish. Additionally, salting makes the fish flesh solid and manageable. Drying also happens during smoking simultaneously with smoke deposition. A tasty, smoky flavored and firm product is produced as a result of the smoking and drying process.

In addition to the domestic consumption, these smoked fish products also fetch high export value. The indigenous way of preparing smoked and dried fish, causes wide variation in the physico-chemical and sensory attributes of the product. So, it is necessary to process it under controlled and optimized conditions in order to ensure the product quality.



Hot smoked and dried tuna fish

Hygienic processing of hot smoked and dried fishes requires an appropriate system known as smoking kiln. Even though many smoking kiln designs are available, a cost-effective, easy to handle, hygienic and production of healthy smoked fish is a major concern. Hot smoking equipment works by the function of applying heat to remove the moisture and by applying smoke under controlled conditions. Modern fish smoking kilns are frequently made with sufficient airflow and heat exchange mechanism to remove moisture from the product. The use of a smoking kiln to mechanically smoke the fish allows for the elimination of traditional smoking's drawbacks and the production of uniformly high-quality goods that satisfy international standard. ICAR-Central Institute of Fisheries Technology has been working to

facilitate hygienic production of hot smoked and dried fish by designing and fabricating a smoking kiln. CIFT's existing design is very simple in construction having a holding capacity of 10 kg fish. The smoking kiln had a furnace at the bottom and trays are stacked above the furnace where the product gets smoked as the smoke passes through it and exit at top. The ash is collected at the bottom in the ash trays after smoking. Even though the fish is smoked in hygienic conditions, the smoking parameters are not properly controlled. Hence, an improved version of smoking



Smoking kiln

kiln is designed to solve the drawbacks of existing smoking kiln.

This new design of smoking kiln has a provision to smoke and dry the fish using the heat energy from biomass furnace and electrical heating coil as an auxiliary heating system. The advantage is that new design can be operated as biomass dryer when smoking is not needed. This smoking kiln is designed to have 20 kg capacity with a furnace to supply hot smoke, a filter mechanism to remove undesirable smoke particles/hydrocarbons and a provision to facilitate the cross flow of smoke and air, so that no manual turning of fish is needed during smoking and drying by placing it on the perforated trays inside the smoking chamber. Intermittent smoking and drying will be provided to have an optimum quality product with desirable moisture levels. Airflow and feed flow in the furnace will be controlled to increase smoking efficiency. The equipment is provided with electrical heating coils to maintain the internal temperature of the product to not less than 70°C for at least 30 min. smoking is done for 90 to 180 min with intermittent heating to reduce the moisture content to 10% (F.No.1-10(8)/Standards/SP/(Fish and Fishery Products)/FSSAI-2013).

The new smoking kiln design will help to reduce the risk of contamination from human resources, unhygienic surroundings, and hazardous smoke components. A standardized method of production of hot smoked and dried fish or shrimp is possible through the design and development of this smoking kiln. When smoking is not required, the smoking kiln can also be utilised as a biomass dryer.

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