PRESENT STATUS OF PRODUCTION OF SMOKED FRESHWATER FISH IN MINNERIYA, SRI LANKA

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Keywords: Fish; Smoked fish; Technology

INTRODUCTION

Fish products represent the major source of animal protein in the Sri Lankan diet which is often cheaper than meat (Cutting 1996). Fish provides a good source of high quality protein and contains many vitamins and minerals. Further ω−3 fatty acids found in fish prevent coronary heart diseases (Wimalasena and Jayasuriya, 1996). Fish is an extremely perishable food and most fish become inedible within twelve hours at tropical temperatures. Spoilage begins as soon as the fish dies, and processing should therefore be done quickly to prevent the growth of spoilage bacteria. Fish is a low acid food and therefore very susceptible to the growth of spoilage bacteria. Flesh and body fluids of newly caught fish are sterile and little or no bacterial activity occurs until the period of rigor mortis (Govindan 1985). Spoilage occurs in fish due to three main causes, *viz.* bacterial, enzymatic and bio-chemical. As a result in the past methods of preservation to counteract these processes have been essential in the utilization of fish as food (Cutting 1996).

The reduction of physical postharvest losses, preservation and value addition are very important aspects in postharvest technology of fishery products. Today significant quantity of fish is lost due to the absence of adequate technology (Iliyasu *et al.* 2011). The need for efficient handling of perishable fish and products and the overwhelming gross value addition to the fish result in increasing the preference for fish consumption. Postharvest handling and reducing the wastage can be achieved by traditional preservation methods such as preparation of *jadi*, *ambul-thiyal*, *smoked fish*, *maldivefish* or by industrial processing such as canning (Salayo 2000).

The present investigation focused on identifying the technology and the freshwater fish species used for smoked fish preparation with those harvested at Minneriya reservoir, located in the North Central Province of Sri Lanka.

METHODOLOGY

Data were collected over a six month period by direct participant observations and interviews with 30 randomly selected fishermen and 50 consumers using a pre-tested semi-structured questionnaire. Consumers' demographic, psychographic data and data about consumer preference were collected. The method used for smoked fish preparation was identified by on-site observation in Minneriya area. Common names of fishes which they used for smoked fish preparation were recorded.

RESULTS AND DISCUSSION

Smoked fish preparation is a traditional fish preservation method, not only provide nutrition to Sri Lankans but also provide employment to rural people in Minneriya area.

Method used for smoked fish preparation

Damaged and small fish (6.88 cm- 8.75 cm) are collected from fish catches (approximately 8% of the total catch consists of such fishes) for processing. After splitting the fish gut, gonads and scales are removed in order to minimize the contamination from pathogens. Surface contaminants and micro-organisms are removed by washing with clean water. The cleaned fish are then subjected to the action of wood smoke, by placing them on a rack kept on top of a hearth (*Dum massa*) for 3-5 days. As the fish flesh is impregnated with smoke, preservation takes place. The preservative effect of smoking process consists of removing water from the fish flesh and lowering their moisture contents and deposition of natural chemicals of wood smoke in the fish flesh. Moisture contents in freshwater fish generally vary between 60% and 80% (Wimalasena and Jayasuriya, 1996) which also indicates that the drying/smoking are necessary to produce smoked fish. Heat from the fire causes drying, and if the temperature is high enough, the flesh becomes cooked. As smoke contains many chemicals such as phenols, organic acids, alcohol, carbonyl compounds and gases, it adds a unique taste and colour to the fish flesh and thereby increase consumer acceptance. *Manikara hexandra* (S:Palu), *Drypetes sepiaria* (S: Weera), *Schleichera oleosa* (S: Koon)and *Premna tomentosa* (S: Seru) are the commonly used firewood varieties in the production of smoked fish due to their high heating capacity. However the fishermen are not aware about the change of flavour in smoked fish according to the wood variety used as firewood. Soft woods are never used due to the presence of resinous substances in the woods.

Freshwater fish species used for smoked fish preparation

Lean fish with lesser lipids are used to produce smoked fish, as lipid decomposition takes place during the process of smoking of fish. Therefore less lipid fish such as *Oreochromis mossambicus* (2.3±0.7g/100g), *O. niloticus* (2.3±0.7g/100g) and *Channa striatus* (1.7±0.9 g/100g) are used for smoked fish preparation.

Smoked fish marketing in Minneriya area

Smoked fish preparation is done on a small scale, and only a few fishermen (16.66%) in Minneriya produce smoked fish mostly for domestic consumption. Any excess production is easily sold since there are many distribution channels such as boutiques and small restaurants in rural and urban areas. The buying price of raw fish was Rs. 70.00/kg and the selling price of smoked fish was Rs. 350.00/kg. Although they could get a higher profit from the production of smoked fish, lack of knowledge about consumer preference for smoked fish and lack of infrastructure cause low production rate of smoked fish. On the other hand fishermen pay more attention to the fresh water fish market (Consumer preference more than 90%) than other preserved products.

Consumer preference for smoked fish

An efficient market for smoked fish could be developed since it is very popular, with a consumer acceptance of about 88% in Minneriya. As smoking adds unique taste and colour to the fish, the consumer preference may be higher. It also could preserve quality and nutritional value of fish

CONCLUSIONS

The study indicated that the consumer acceptance and market potential for smoked fish is high in Minneriya. Development of low cost and simple techniques such as pre-salting the fish prior to smoking, thereby increasing the shelf life of the product is recommended (Figure 1).

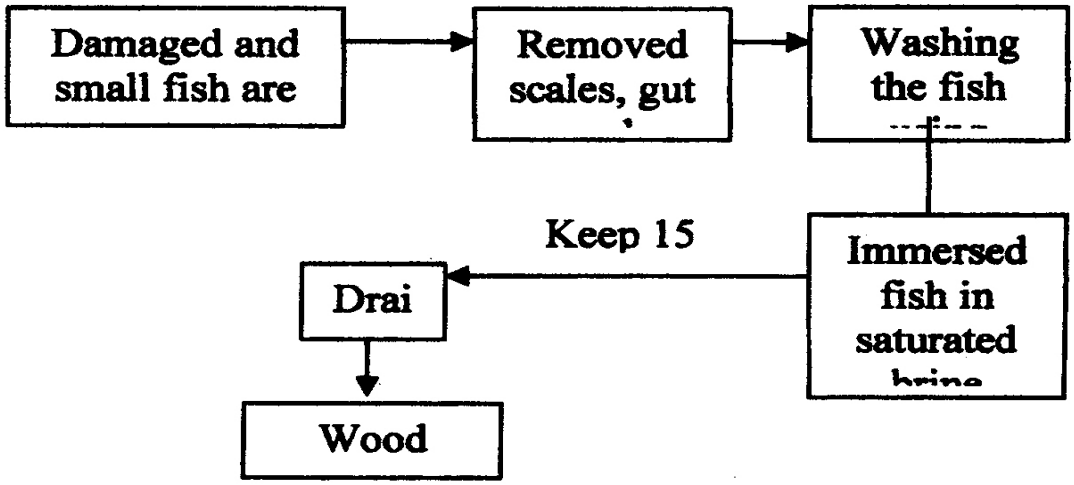

Figure 1- Recommended method

Smoking alone does not help to reduce the water content. The water level of the product should be further reduced by pre-salting. Saturated salt solution could be used for pre-salting and it will penetrate into the fish muscles. In addition salt gives flavour and an anti-microbial action by providing unfavourable osmotic conditions for micro organisms. After salting, the excess moisture should be removed by draining and wood smoke to produce the final product.

Most of the extremely delicious nutritious food types developed through indigenous local knowledge are being ignored by Sri Lankans. Through ancient biotechnology, or traditional method fish can be preserved for a long time, without using unscientific and harmful imported toxic food stuffs. Use of our ancient biotechnology in the preparation of smoked fish not only provides nutrition but also provide employment to the rural poor. Therefore, it is recommended to conduct workshops to impart knowledge asbout method of increasing shelf life of smoked fish and consumer preference for smoked fish, to the fishermen.

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