

CANNING OF SMOKED SARDINE

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A process for canning smoked oil sardine (*Sardinella longiceps*) is described. Cold blanching of dressed fish in brine, smoking followed by drying in hot air or cooking in steam to reduce the moisture content to the required level and subsequent canning yields product with good organoleptic properties. Coconut husk is used as source of smoke.

INTRODUCTION

Smoking as a means of preservation of fish is known from very early times. Smoking imparts an attractive colour and characteristic flavour to fish besides instilling preservatives. Colour and flavour are mostly responsible for the preferential consumer appeal for such products. Smoke cured as well as smoked and canned delicatessen fish products are very popular in many of the overseas markets.

Oil sardine (*Sardinella longiceps*) is the single largest fishery of India. Madhavan, Unnikrishnan Nair and Balachandran (1974 a, b and c) have reviewed the literature on utilization of this fish. Unnikrishnan Nair *et al.* (1974) have reported a process for canning sardine in its own juice. The work of Kandoran, Solanki and Venkataraman (1971) on canning of smoked eel is, perhaps, the only work on smoked canned fish reported from India. No account has been reported on

canning of smoked sardine even though this offers great potentialities as a commodity for export. This paper presents the results of experiments conducted to work out a method for canning smoked sardine.

MATERIAL AND METHODS

Oil sardine landed by the country crafts near Cochin was utilised for this study. In general fish landed had remained open without icing for a period of 4-5 hours. Smoke chamber used was the same type as described by Solanki, Kandoran and Venkataraman (1970) for smoking eel. Dressed fish after thorough washing was dipped in 15% brine for 20 minutes and then drained by spreading over an aluminium mesh. Fish was then tentered through the tails using thin iron wire and the tenters were fixed on tenter frames.

Smoking

The tenter frames with fish were kept

in the smoke chamber. Smoke generated outside, by burning coconut husk was introduced into the chamber through the bottom. Smoking was carried out for 15, 20, 30 and 40 minutes at a temperature of $45 \pm 5^\circ\text{C}$.

Precooking/Drying

Smoked fish was packed in 301 x 206 size cans and cooked in steam at 0.7kg./cm.^2 pressure, the cans being kept inverted over a grid in the retort for such periods as to ensure retention of adequate smoke flavour, *vis a vis* reduction of moisture to the extent that drip in the oil used as filling media is not significant. Alternately the smoked fish was dried in an artificial drier at $50 - 55^\circ\text{C}$ for $\frac{1}{2} - 2$ hours.

Refined ground-nut oil, tomato sauce and dilute brine were used as filling media. The cans after filling with media were exhausted in steam, hermetically sealed in a double seamer and heat processed in steam at 1 kg. / cm.^2 steam for 45 minutes.

RESULTS AND DISCUSSION

Observations on the products prepared out of fish brined for varying periods showed that to render palatable saltish taste to the final product dipping in 15% brine for 15 minutes and 20 minutes respectively are required with respect to fish dried in air and cooked in steam after smoking.

Effect of smoking, precooking in steam and drying of smoked fish in hot air at 55°C on the quality of the end product is given in Tables I a and I b.

The quantity of smoke absorbed by

fish has to be kept at an optimum level so that perceptible and universally acceptable smoke flavour prevails in the final product after passing through different stages of processing.

Smoking for 15 minutes failed to impart adequate smoke flavour to the product in the case of fish cooked in steam after smoking, whereas fish smoked for 30 minutes yielded a product with pleasant flavour (Table Ia). Smoking for higher periods resulted in intense smoke flavour making the product less juicy and less acceptable. However, if the smoked fish is artificially dried instead of cooking in steam, the smoking time could be reduced to 20 minutes (Table I b).

While studying the suitability of ice stored mackerel and sardine for canning, Madhavan, Balachandran and Choudhuri (1970) suggested pre-cooking of brined sardine for 40 minutes at 0.35 kg. / cm.^2 steam. Varma, Choudhuri and Pillai (1971) suggested the maintenance of less than 5% water in fill oil so that the hazards of rancidity of meat as well as that of the fill oil could be minimised. Therefore the pre-cooking or drying time of the smoked fish has to be so chosen as to keep the water in oil to a minimum. However, this should not be at the expense of the desired smoke flavour. From an examination of the physical characteristics of smoked and canned sardine it could be seen that a period of pre-cooking of 30 minutes at 0.70 kg. / cm.^2 steam or alternately drying in hot air at $50-45^\circ\text{C}$ for 2 hours leaves practically no water in filling oil (Table I a and I b).

Selection of coconut husk as source of smoke has been made at random since

TABLE I a

EFFECT OF SMOKING AND PRE-COOKING TIME ON THE QUALITY OF CANNED SARDINE

Smoking min.	Time of Pre-cooking in stream min.	Product quality		Vol. of water in oil ml.
		Flavour due to smoke	Texture	
15	15	slight	firm	8
	30	faint	firm	3
	45	very little	firm and soft	nil
20	15	pleasant	firm	5
	30	moderate	firm and soft	nil
	45	faint	soft	nil
30	15	intense	firm	3
	30	pleasant	firm and soft	nil
	45	faint	soft	nil
40	15	intense	soft	nil
	30	intense	soft	nil
	45	moderate	soft	nil

TABLE I b

EFFECT OF SMOKING AND DRYING ON THE QUALITY OF CANNED SARDINE

Smoking min.	Time of Drying in hot air (at 55°C.) min.	Product quality		Vol. of water in oil ml.
		Flavour due to smoke	Texture	
15	30	moderate	soft	10
	60	moderate	firm and soft	8
	120	pleasant	firm and soft	3
20	30	pleasant	firm	10
	60	"	firm and soft	6
	120	"	firm and soft	nil
30	30	pleasant	firm and soft	6
	60	intense	firm	nil
	120	intense	firm	nil

it is a good source of smoke, is cheap and is available in plenty in all centres of sardine landings in India.

Suitability of different media like brine, tomato sauce and refined ground nut oil for packing smoked sardine has been studied. Brine is not a suitable medium for packing smoked sardine since the colour as well as the flavour of smoked fish gets into the brine and presents poor appearance. Groundnut oil in the pack absorbs some smoke constituents presenting an attractive appearance while the fish retains characteristic smoked flavour. Tomato sauce has been found to be a good packing medium for sardine. The colour of the sauce after processing is not affected due to the presence of smoke and the peculiar flavour produced as a result of the combination of smoke and sauce renders a high degree of palatability to the product.

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