

## PROBLEMS AND PROGRAMMES FOR POST HARVEST TECHNOLOGY DEVELOPMENT IN FISHERIES

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### ABSTRACT

The pattern of disposal of fish catch in the country has changed considerably owing to rapid strides in building up of infrastructural facilities for handling, transportation and processing of fish adequately supported by evolution of required technological base by research and development. For the development of an export market, the strongest support is to be provided by a properly organised domestic market which is the missing part in the Indian Sea Food Industry. The idle capacity of the commercial processing plants can profitably be utilised for freezing of pomfrets, ribbonfish, eel, perch, sciaenids, cuttlefish, etc. which have already met with demand from domestic as well as foreign markets. Diversified canned products from clams, mussels, crab, oysters, cephalopods, tuna in flavoured oil have good prospects both for internal market and abroad. Edible meat picked from mixed varieties of cheap fishes and frozen into blocks as 'fish kheema' has become popular as cutlet base and for incorporation into several products like fish soup powder, fish wafers, fish spirals, fish sausages, pet food, etc. either as such or after partial hydrolysis and deodorisation. Processes are developed for economic utilization of prawnshell waste from prawn processing plants and these would include preparation of protein concentrate in paste form and conversion of the remaining material into chitosan which has varied applications like sizing of paper and textile, clarification of wine, purification of water and as a general industrial flocculant.

### INTRODUCTION

INDIA is blessed with a very long coast line. It has a continental shelf of 57.9 million hectares excluding that around oceanic islands. Of this, an average only 5% is intensively exploited and another nearly 15% marginally exploited. Declaration of the 200 mile Exclusive Economic Zone has thrown open another vast area for exploration and exploitation. The inland water spreads covering several rivers, rivulets, reservoirs and lakes constitute another source for sustained fish yield. The recent successful introduction of aquaculture including mariculture for several species of fish and shellfish holds the promise of added aquatic productivity. Ranking 7th in the world in magnitude of production and landing 2.6 million tonnes of fish, India's exports of processed marine products touched an all time high record of 92184 tonnes netting a foreign exchange earning of Rs. 2620 millions in 1979. (The figures for 1985-86

being 83651 tonnes and Rs. 3,980 millions respectively.)

### UTILIZATION

Until late fifties the disposal of fish catch used to comprise around 50% for fresh consumption, 25% sun dried, 20% salted, the balance being converted as manure. The only processing technique known was that of salting/curing and sun drying of certain species of fish and prawn practised in a rather primitive manner. However, even this primitive knowledge supported the processing and export of sizeable quantities of dry prawn pulp. It was the collapse of these traditional markets for dry prawn pulp at the close of the World War II which in fact paved the way for the birth of the modern sea-food processing industry of India. This together with other developments in the sphere of disposal of fish like provision of a net work of motorable roads connecting the landing sites

with the interior, establishment of ice plants at or near the landing centres, employment of trucks for transportation of fish, development of containers for fish, etc. adequately supported by evolution of the necessary technological base by research and development activities in the country resulted in a change in the pattern of disposal of fish as follows: Consumption in fresh form 69%, frozen 3%, canned 0.2%, dried/cured 19% and reduction and other miscellaneous purposes 8.8%.

#### EXPORTS

A break-up of the commodities exported in 1979 reveals that over 58% in quantity and 85% in value is contributed by a single item viz. prawns which hardly contribute 10% of the total marine landings in the country. Whereas the country has an installed capacity for freezing 1250 tonnes of sea foods per day, that the export of frozen foods was only 83,492 tonnes in 1979 is a pointer towards the high degree of under utilisation of the capacity. The picture on the canning front is still worse. India exported 139 tonnes of canned sea foods, mostly prawn in 1979 against a production capacity of 250 tonnes per day.

A salvage from this state of affairs can be found only in diversification of the products. With a steady market existing for frozen and canned prawns, the industry had in the past, been reluctant to diversify, first because the fate of the new commodity in the international market was uncertain and second, because the technology of production of many products which could have had a market within the country and abroad, was not available. However, with agents like Marine Products Export Development Authority undertaking promotional activities and significant contribution made by research and development organisations, particularly CIFT, in the development of new products, there has been a greater awareness

towards the need for diversification for the very sustenance and any probable future expansion of the Indian Seafood processing industry.

For the development of an export market, the strongest support is to be provided by a properly organised domestic market, which unfortunately, is the missing part in Indian seafood industry. Our country is passing through a phase of rapid industrialisation which will result in urbanisation of several parts of the country. This will necessarily add an impetus to the popularisation of processed convenient foods, which means, if properly exploited, processed sea foods can find a ready market within the country as well which will significantly increase the importance of and need for diversification in processed fishery products to meet the internal demand.

#### SCOPE FOR PRODUCT DIVERSIFICATION

Frozen fish fillets in consumer packs are very popular in several countries. The technique of hand filleting of some species of fish giving maximum fillet yield has been perfected and from a study of the freezing and storage characteristics, the methodology as applied to fishes like synagris, catfish, sciaenids has been evolved and products so prepared have already met with demand from domestic as well as foreign markets. Pomfret, seer, sole, ribbonfish, eel, perch, tilapia, etc. when quick frozen in different forms like whole, round, fillet, etc. can have potential export market. Similarly frozen squid and cuttlefish have already established themselves as commodities for export. Technical know-how has been also worked out for freezing both the raw and pre-cooked meats of crabs, mussels and clams in glazed blocks. The idle capacity in our freezing plants can profitably be utilised for preserving these fishes, shellfishes both for export and internal distribution. Besides enabling the industry to run on more economic lines, this step ensures better distribution of our fishery resources season-wise and

area-wise so that a wide cross section of the population is benefitted. It is heartening to note that export of frozen fish other than prawns has shown a remarkable progress from 0.02% in 1970 to 26.11% of total exports in 1979, though value-wise its contribution was only 4.4%.

#### *Canning*

Though started initially with prawns, with an export bias for achieving a peak export worth Rs. 5.24 crores in 1973, of late, the demand for this commodity has gone down considerably in the world market. This crisis has been precipitated by several reasons like lack of demand from world market, high cost of production caused by the imported tin container and the demand for raw prawns of all size grades from the freezing industry which offered higher prices for this commodity. Barring some small quantities of oil sardine and mackerel being canned for internal markets and defence supplies, our entire installed processing capacity lies idle which could be advantageously made use of for processing our wider variety of other fishes and shell fishes. We have now readily at hand the know-how for canning of tuna, seer, silver and black pomfret, hilsa, *Lactarius*, tilapia, *Polynemus* and smoked eel. Technology has been evolved for canning sardine in different forms like 'natural style' which dispenses with the use of filling medium and thus reduce the cost of production, in oil and in sauces. Methods have also been worked out for canning of our important shell fishes like clams, mussels, crabs, oysters and also the cephalopod, squid, canned 'prawn with peas', tuna in flavoured oil as well as with onion and peas are some of the novel items. All these types of canned products can find good demand both in the internal market and abroad especially as they do not require any cold chain for transportation and distribution like frozen and iced fish. It is also possible to organise a 'home canning' set up

to utilise any surplus fish for processing into canned products.

#### *Dried, smoked and pickled products*

Improved methods for dry curing and sun drying which can produce products of extended shelf life and good consumer preference are now available. Smoked fish is a delicacy for which taste is yet to be developed. Smoking as a method of preservation is quite suited to oil sardine, a fish which cannot be preserved by drying due to the development of rancidity. Oil sardine subjected to 'Meditarranean salting' could be further canned in a special style and is considered as a delicacy in several consuming countries. Methods are available for the production of a delicacies product light smoked dried mussel meat. Methods have also been perfected for preparing pickles from less utilised shellfishes like clam, mussels and oysters.

#### *Miscellaneous products*

Small varieties of miscellaneous fishes as well as some larger types which are not popular as fresh fish command very poor demand from fresh fish markets. Methods have been worked out to convert them into edible products. A colourless and odourless fish protein concentrate in dry powder form can be prepared from such fishes, suitable for being incorporated with wheat flour in the preparation of chapathis, bread, biscuit and host of other preparations. A bacteriological peptone suitable for microbiological culture studies and even superior in performance to the best imported brand of the material in promotion and growth of micro-organisms has been developed from some of these varieties of fishes. Similarly edible meat picked from the mixed varieties of cheap fishes free of skin and bones with the help of a machine and frozen in blocks as 'fish kheema' has been found to be very popular as a cutlet base as well as for incorporation in several products,

like fish soup powder, fish wafers, fish spirals, fish jams, fish sausages, pet foods, etc. either as such or after partial hydrolysis and deodourisation.

Trash fishes as well as offal from fish processing factories can be easily converted into fish meal for poultry and cattle feed by boiling, pressing, drying and pulverising. Both offal and trash fishes can be minced and ensiled by lactic acid fermentation and the fish ensilage so prepared could keep in good condition at atmospheric condition and can be fed to cattle, etc. either as such after neutralising the acid or after converting into a dry feed mix incorporating rice bran, tapioca powder, seaweed powder, etc. and drying.

#### *Shark fins and fish oil*

Among the conventional fish products dry shark fins still find a good export market for making shark fin soup. As the importing countries extract the rays out of the fins before using them in soup, a simple method has been worked out for separating the rays from the fins which besides facilitating handling and transportation ensures better financial return than by exporting the fins as such. Livers of shark are at present put to maximum use in our country for extracting oil which is a rich natural source of vitamin A and D. The residue left after extracting the oil is now used for poultry feed and live stock feed compounding.

Sardine oil is yet another conventional product which was used only for smearing on country crafts as a preservative in olden days. Recently

methods have been developed for scientific extraction of oil and its conversion into several industrial products such as factice (artificial rubber filling compound), paint and printing ink bases and lubricating oil.

#### UTILISATION OF PROCESSING WASTE

Among the non-traditional uses of our marine resources, mention may be made of methods worked out recently for economic utilisation of prawn shell waste. An estimated 40-50 thousand tonnes of prawn heads and shells are thrown out from processing factories per annum as waste. A small portion of it is cooked, dried and powdered for manure and poultry/cattle feed. A process has now been developed for preparation of protein concentrate in paste form and conversion of the remaining materials into chitosan, a versatile industrial chemical having wide and varied application like sizing of paper and textiles, clarification of wine, purification of water and as a general industrial flocculant.

The products mentioned are only indicative and not exhaustive and also for which the technology is already available. There is vast scope for expanding the consumer sector in both traditional and non-traditional marine products. Since diversified products could meet consumer preference of a wider cross section of people both inside the country and abroad, simultaneously providing industrial and pharmaceutical products, resorting to the step of diversification of fish products will ensure better and more economic utilisation of our marine resources.