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Production and marketing of dry fish through the traditional practices in West Bengal coast: Problems and prospect

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Abstract

The present study deals with the production and marketing of different dry fishes and their prospects and constraints in the coastal areas of South West Bengal. This study was carried out from June, 2014 to March, 2015. Various categories of fishes were caught through different gears operated in the inshore, offshore and demersal fishing areas (up to 40 fathoms depth) of the Bay of Bengal. The dominated fish species includes *Lepturacanthus savala* (Cuvier, 1829), *Liza persia* (Hamilton, 1822), *Opisthopecterus tardoore* (Cuvier, 1829), *Coilia dussumieri* (Valenciennes, 1848), *Panna microdon* (Bleeker, 1849), *Harpadon nehereus* (Hamilton, 1822), *Sillago sihama* (Forsskål, 1775), *Corica soborna* (Hamilton, 1822), *Satipinna phasa* (Hamilton, 1822), *Arius* sp (Cuvier and Valenciennes, 1840), *Upeneus sulphureus* (Cuvier, 1829), *Nemipterus japonicus* (Bloch, 1791), *Chirocentrus dorab* (Forsskål, 1775), *Scomberomorus guttatus* (Bloch and Schneider, 1801), *Drepane punctate* (Linnaeus, 1758), *Cynoglossus* sp (Hamilton, 1822), *Metapenaeus toluensis* (De Haan, 1884), *Penaeus semisulcatus* (De Haan, 1884), *Metapenaeus monoceros* (Fabricius, 1798) etc. Amongst them few species are highly demandable and were transported to the local market for domestic consumption and less acceptable species have been vending in different Khaties where they have procured for the drying. The major Khaties located at coastal West Bengal includes Digha mohana, Sankarpur, Jaldha, Junput, Mandarmoni, Petuaghat etc. There are several antibiotics, herbicides, insecticides, which are indiscriminately used during the process of dry fish production and their long term preservation and they may create severe harm to the consumers in future. Moreover, dried fishes were traded to the different states of India as well as exported to different Asian countries for earning foreign currency. More than thousands of people around the coastal belt are actively involved in the production and marketing channel of dry fishes and they have smoothly maintained their livelihoods as well as uplift the socio-economic status of local people.

Keywords: Dry fish production and marketing, problems and prospect

1. Introduction

The fisheries and aquaculture sector is a vital source of livelihoods, nutritious food and economic opportunities. Fish and fishery products are among the most important agricultural commodities providing significant contribution to the world's food security and economic development. Fish remains among the most traded food commodities worldwide, worth almost US\$130 billion in 2012 and pointing to an increase for 2013 [6]. From 2007 to 2012, the global fishery production had continuously increased from about 140.7 million metric tonne to 158 million metric tonne [6]. With this increasing production and greater availability for consumers, per capita fish consumption continues to rise – up from 10 kg in the 1960s to more than 19 kg in 2012 – driven by higher demand from a growing population, rising incomes and more efficient distribution channels [6]. As per FAO, 2014 the per capita fish consumption per annum in Japan - 62kg, China- 35.1kg, Srilanka- 28kg, Bangladesh- 27kg, India -6 kg. According to the per capita fish consumption in India Lakshadweep ranked first followed by the Goa, Kerala and West Bengal [5].

India is the second largest fish producing country in the world with the contribution of 5.43% of total global fish production and West Bengal ranked second position after Andhra Pradesh [4]. West Bengal has a coastline of 158 km and covers mainly the districts of South and North 24 Parganas and Purba Medinipur [3]. Fish is an important part of the regular diet and is a cheap source of protein for the peoples of West Bengal. In West Bengal about 78% of total fish catch is consumed in fresh condition, 6% is used as dry fish and rest is used as frozen fish [11].

Sun drying of fishes is a simple and the oldest traditional method of fish preservation throughout the Indian sub-continent. Drying method is considered as the least expensive method of fish preservation [1]. Indian dry fish export contributes 7.86% of all form of fish exports and earned 819 crores during 2013-2014 [12]. The nutritional quality of dried fish remains intact, sometimes retains higher quality standards compared to fresh fish [7].

Fish is perishable and must be processed within a few hours of being caught, because no form of processing or preservation can improve the quality of spoiled fish [10]. The natural process by which organic matter is broken down and enters into the nitrogen cycle, fish flesh is quickly affected, digested and spoiled by the microorganisms which are abundant on the skin, gills and in the digestive tract. Ferments also contribute to the dissolution and oxidation and are an additional process of deterioration. Fish is very susceptible to the growth of food poisoning bacteria. Therefore, methods of preservation to prevent these processes have become essential to the utilization of fish in the past [2].

The simple drying in the sun would have been the oldest method of fish preservation and it takes more time. Therefore, the method of salt curing is adopted to prevent this problem [8]. The dry fish preparation should open up new dimension and possibilities to reduce the physical post-harvest losses and also value addition in harvest.

In West Bengal marine fish drying is predominantly practiced in South 24 Parganas, North 24 Parganas and Purba

Medinipur district. These dried fishes have demand both in domestic and international market and plays an important role in employment generation of coastal poor people [8]. In this dry fish marketing channel people involved early in the production chain (fishing and drying) add relatively more value and make little profit due to small scale production, poor product quality, lack of market access and high transportation cost/toll/taxation etc. [13].

Different types of dried fish from all dry fish processing centers of coastal West Bengal like Digha mohana, Sankarpur, Jaldha, Mandarmoni, Junput, Petuaghat and neighboring state of Orissa usually assemblages in Egra Regulated Dry Fish Market for auctioning. These dried fish later distributed to different markets of neighboring States such as Tripura, Nagaland, Assam, Orissa, Bihar and Jharkhand including abroad (Bangladesh and Nepal).

2. Materials and methods

2.1 Location and duration of the study

The present investigation was carried out in different khaties like Digha mohana, Sankarpur, Jaldha, Mandarmoni, Junput, Petuaghat etc of coastal belt of West Bengal mainly in Purba Medinipur district (Latitude -21.6266° N and Longitude-87.5074° E). Figure-1 represents different Khaties of coastal Bay of Bengal. The Khaties are the places where fishes were dried under natural sunlight. This study was conducted for a period of 10 months (June, 2014 to March, 2015).

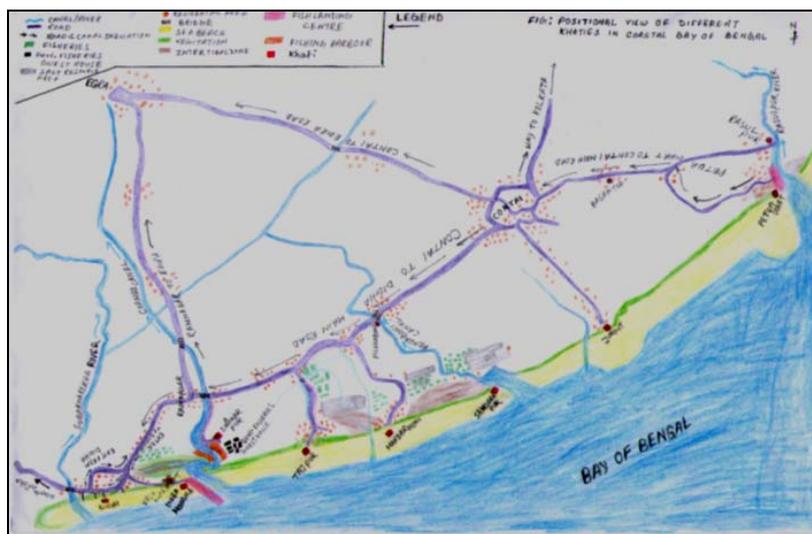


Fig 1: Different location of Khaties surveyed during study period

2.2 Sampling and data collection

On regular basis we have surveyed the different khaties for data collection. Data were periodically collected on fortnight basis from the study areas using a questionnaire. These include total area of the khati, number of fishermen involved, are they local or out sider? time of their engagement like partially or fully, the peak period of dry fish production, fish species were used in dry fish production, whether the salt, insecticide/ pesticide is used or not, sources of raw fish used in dry fish production, price of raw fish species, selling price of dry fish species, time to be needed for procurement of dry fishes, amount of dry fish produced from that raw fish species, selling point of dry fish, amount of dry fish is exported from a khati in a year, exported places of dry fishes, utility of dry fishes, socio-economic condition of the

fishermen involved in dry fish production etc. Questionnaire has been prepared after spot surveyed and distributed to the khati owners as well as engaged selected fishermen. The questionnaires were collected and data were tabulated and analyzed.

2.4. Process of dry fish production

Dry fish is procured in two places:

2.4.1. In fishing vessel

After catching the fish in the sea the fishermen drying the fish in the fishing vessels. This method is more acceptable to the compare to the next method because in this process fishermen do not use any kind of salt or preservative or chemicals like-insecticides or pesticides.

2.4.2. In khaties

After fishing, fishes were dumped in the whole sale market for auctioning. Raw fishes were purchased from the market and transported to the khati for further procurement as and when required. Some dry fish producers catch fishes in the sea as they have their own trawler/fishing boat. This kind of activities mainly observed in Jaldha and Junput khaties.

Dry fishes were prepared through the process of washing and followed by salting in a separate chamber or direct application of salt. The dry fish producers used salts to remove the water from the fish body and dried under direct scorching sunlight on chhambra. The amounts of salts are used 3-4 kg /100 kg of raw fish. They indiscriminately used harmful pesticides and preservatives beyond the threshold limit like Dash, Ostad, Forent-10, EPC- powder, Dursban, Doom etc during salting. After salting, fishes are kept in the bamboo made structure called chhambra or pata for the drying of fishes. Chhambra or pata were changed in every 2-3 years. Fishes generally takes 3 to 7 days for complete drying. If there is not sufficient sunlight due to cloudy weather then the length of drying time

may increase up to one fortnight. After complete drying, dried fishes were stored in the jute bag, locally called ‘chat bosta’. After preparation of dry fishes, these are purchase by the Paikers or Beparis from the khati owners. The figure-2 shows different views of sun drying and figure-3 indicate different accessories, chemicals and drugs used in drying process.

Every khati have also produces fish meal from the trash fishes like lobster, squid, cuttle fish or from different crabs and raw fishes of low market price. During the period of fish meal preparation fishermen used to dump them on to the ground and spreading them by the locally wooden made instrument known as pata. After drying the fishermen grind the trash fish and sieving them with large mesh sized (3.0-4.0 cm) chaluni and then by the small mesh sized (0.5-2.0 cm) chaluni respectively. After fish meal preparation fishermen kept them in chat bosta and selling them to the Baparis. In fish meal preparation raw fishes were collected @ Rs. 5-7/kg and after preparation of fish meal it has sold @ Rs. 20-40/kg depending upon their quality.



Fig 2: Different picture of sun drying in different khaties of West Bengal coast:



Fig 3: Different accessories, chemicals and drugs used in sun drying

3. Results and Discussion

Therefore, 19 species were used for the production of dry fish, out of which 16 are finfishes and rest of them were shell fishes. The different types of fish species which are used in dry fish production are harvested by the fishermen in the coastal region of the West Bengal and their details like systematic position, vernacular name and area of collection were tabulated in the Table-1. The exploited fishes are

sundried by the fish curers mostly for making fish meal or domestic consumption purposes. The Table-2 indicate the total area of the khati, number of fishermen involved in the khati and their sources of raw fish collections. The information related with values of different fish species used in dry fish production as well as selling price recorded in Table-3.

Table 1: Commonly available dried marine fishes

Sl. no.	Order	Family and Scientific name	Vernacular name	Area of collection
	Perciformes	Trichiuridae		
1.		<i>Lepturacanthus savala</i>	Savalai hairtail	In-shore
		Sciaenidae		
2.		<i>Panna microdon</i>	Drums or croakers	Off-shore
		Sillaginidae		
3.		<i>Sillago sihama</i>	Smelt-whitings	Coastal
		Mullidae		
4.		<i>Upeneus sulphureus</i>	Sulphur goatfish	Coastal
		Nemipteridae		
5.		<i>Nemipterus japonicus</i>	Japanese threadfin bream	Coastal
		Scombridae		
6.		<i>Scomberomorus guttatus</i>	Indo-Pacific king mackerel	In-shore
		Drepaneidae		
7.		<i>Drepane punctata</i>	Spotted sickle fish	In-shore
	Clupeiformes	Pristigasteridae		
8.		<i>Opisthopterus tardoore</i>	Tardoore	In-shore
		Engraulidae		
9.		<i>Coilia dussumieri</i>	Gold spotted grenadier anchovy	Coastal
		Clupeidae		

10.		<i>Corica soborna</i>	Ganges river sprat	In-shore
		Engraulidae		
11.		<i>Satipinna phasa</i>	Gangetic hairfin anchovy	In-shore
		Chirocentridae		
12.		<i>Chirocentrus dorab</i>	Dorab wolf-herring	Coastal
	Siluriformes	Ariidae		
13.		<i>Arius</i> sp	Warrior catfish	Off- shore
	Mugiliformes	Mugilidae		
14.		<i>Liza persia</i>	Gold spot mullet	Coastal
	Aulopiformes	Synodontidae		
15.		<i>Harpadon nehereus</i>	Bombay-duck	Coastal
	Pleuronectiformes	Cynoglossidae		
16.		<i>Cynoglossus</i> sp	Tongue sole	Coastal
	Decapoda	Penaeidae		
17.		<i>Penaeus semisulcatus</i>	Green tiger prawn	In-shore
18.		<i>Metapenaeus toluensis</i>	Greasy back shrimp	Off-shore
19.		<i>Metapenaeus monoceros</i>	Speckled shrimp	Off-shore

Table 2: Different Khaties and their description

Name of the Khati	Total area of the Khati (acre)	Total number of fishermen involved (approx.)	Source of the raw fish species
Sankarpur khati	4-5	2,000-2,500	Digha mohana and deep sea fishing
Jaldha khati	17	3,000-3,500	Digha mohana and fishing with their own boat
Digha mohana khati	5-6	1,500-3,000	Digha mohana
Mandarmoni khati	7-8	1,500-2,000	Digha mohana and fishing with their own boat
Junput-salua khati	20	3,500-4,500	Digha mohana and fishing with their own boat
Petuaghat khati	4-5	1,500-2,000	Petuaghat jette

Table 3: Different fish species and their average raw and dried price/Kg

Name of the fish	Average price of the raw fish/kg.(Rs.)	Average price of the dried fish/kg. (Rs.)
<i>Lepturacanthus savala</i>	40.00	80.00
<i>Liza persia</i>	60.00	120.00
<i>Opisthopterus tardoore</i>	40.00	80.00
<i>Coilia dussumieri</i>	40.00	60.00
<i>Panna microdon</i>	25.00	70.00
<i>Harpadon nehereus</i>	10.00	80.00
<i>Sillago sihama</i>	30.00	70.00
<i>Corica soborna</i>	20.00	110.00
<i>Satipinna phasa</i>	25.00	75.00
<i>Arius</i> sp	20.00	50.00
<i>Upeneus sulphureus</i>	20.00	70.00
<i>Nemipterus japonicus</i>	25.00	75.00
<i>Chirocentrus dorab</i>	20.00	60.00
<i>Scomberomorus guttatus</i>	25.00	70.00
<i>Drepane punctata</i>	20.00	60.00
<i>Cynoglossus</i> sp	15.00	60.00
<i>Metapenaeus toluensis</i>	10.00	50.00
<i>Penaeus semisulcatus</i>	10.00	55.00
<i>Metapenaeus monoceros</i>	15.00	60.00

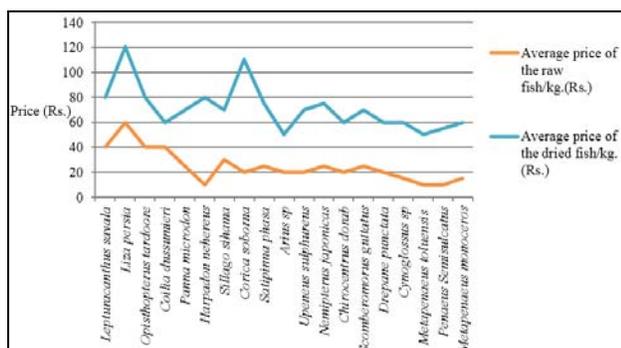


Fig 4: Comparison of prices in different raw and dried fishes

Above figure indicate that the average raw price of *Harpadon nehereus* is low (approx. Rs. 10/-) and *Liza persia* is high

(approx. Rs. 60/-) and the average dried price of *Arius* sp and *Metapenaeus toluensis* is low (approx. Rs. 50) and *Liza persia* is high (approx. Rs. 120/-)

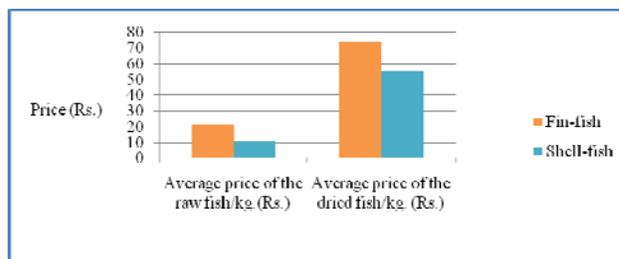


Fig 5: Comparison of raw and dry fin fish and shell fish in their respective values

The above figure reveals that the raw fishes are collected mainly the fish landing centre of Digha mohana and Petuaghat at a comparatively low price and sold in the market after processing at comparatively high price. The average price of raw fin fish and shell is around Rs. 20/- and Rs. 10/- respectively. The average price of dried fin fish and shell fish is around Rs. 80/- and Rs. 60/- respectively.

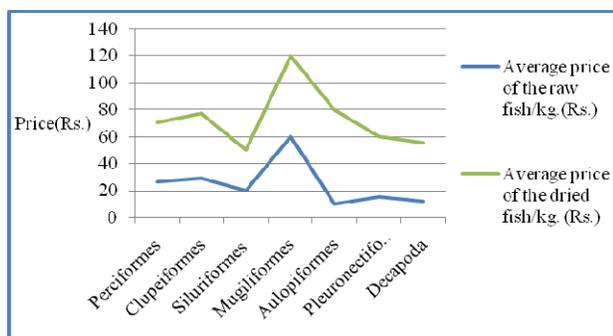


Fig 6: Order wise rate of different fishes used in sun drying

The above figure shows that the Order-Muguliformes is sold at high price (approx. Rs. 120/-) in the market and the Order-Siluriformes and Decapoda is sold at low price (approx. Rs. 40/- and Rs. 50/- respectively) in the market.

4. Conclusion

In West Bengal, fishes were cultivated in different types of water bodies like freshwater, brackish water, marine water and sewage or waste water. Due to the advancement of culture practices the economically important brackish water fishes were cultured extensively in the coastal areas of the state. Marine fishes are captured in different areas of Bay of Bengal. The demandable few marine fishes are sold in high price in the local market in fresh condition and some species were dried and transported to domestic market as well as abroad. The dried fishes play important role in the upliftment of socio-economic condition of the rural area of the West Bengal. The dry fish marketing is a profitable business for small scale dry fish producers of the coastal area of the Bay of Bengal. The quality of the dried product could be improved though making awareness among the fishermen to use high quality water and salt. The introduction of simple dry fish equipment like- solar or artificial drier for processing can avoid the contamination. However, special emphasis are to be needed to prevent the use of different harmful pesticides / insecticides during the preparation of dry fishes through the state Government.

5. Recommendation

To improve the quality standards of dried fishes and avoid the long term impact of human health following to be considered:

- Special concerns are to be needed to maintained hygienic condition in an around of the Khati area.
- The poor infrastructure facility of the fish drying units needs scientific and modern equipment.
- The dry fish producers should avoid the use of different harmful insecticides and pesticides to consider the human health impact.
- Fish drying chambers should be periodically cleaned and washed to avoid any contamination.
- The road and transport facilities should improve to expedite the transportation system.

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