

Sun-drying marine fish at Junput-Birampur, Purba Medinipur, West Bengal, India

Subrato Ghosh

122/1V, Monohar Pukur Road, P.O. Kalighat, Kolkata - 26, Pin: 700026, West Bengal, India

Email: subratoffa@gmail.com



Sun-dried Bombay duck (right) and ribbonfish.

Sun-dried fish: A promising sector in Purba Medinipur

Purba Medinipur District leads West Bengal in almost all areas of fisheries and inland aquaculture. This includes grow-out aquaculture and production of Indian major carps, brackishwater shrimps, giant freshwater prawn, and marine capture fisheries. Culture-based capture fisheries in reservoirs, beel fishery, and sewage-fed aquaculture are not practised in this district. Canal fishery, aquarium fish farming, and air-breathing fish production are carried out by only a few farmers and are not well established. Air-breathing fish culture and the farming of some high-value finfishes are as developed here as in any other district.

Sun-dried marine fish production and trade is another important sector where Purba Medinipur leads West Bengal. Junput-Birampur village, in Contai-1 Community Development (CD) Block, is one of the main sun-dried marine fish ('Shutki machh') production centres in coastal West Bengal. These production sites are known locally as 'Matsya Khoti'. From here, dry fish is transported to markets in north Bengal, Odisha, Assam, Sikkim, Tripura, other north-eastern states, Nepal, Bhutan, and Bangladesh (including Cox's Bazar, Chottogram, Khulna, Barisal, Sylhet, and Chittagong districts). Fresh or frozen marine fish is not available in the cold hill areas of north Bengal and similar regions, so people there rely on sun-dried fish from Purba Medinipur. West Bengal's coast has 59 marine fish landing centres, and Matsya Khotis are located near these.

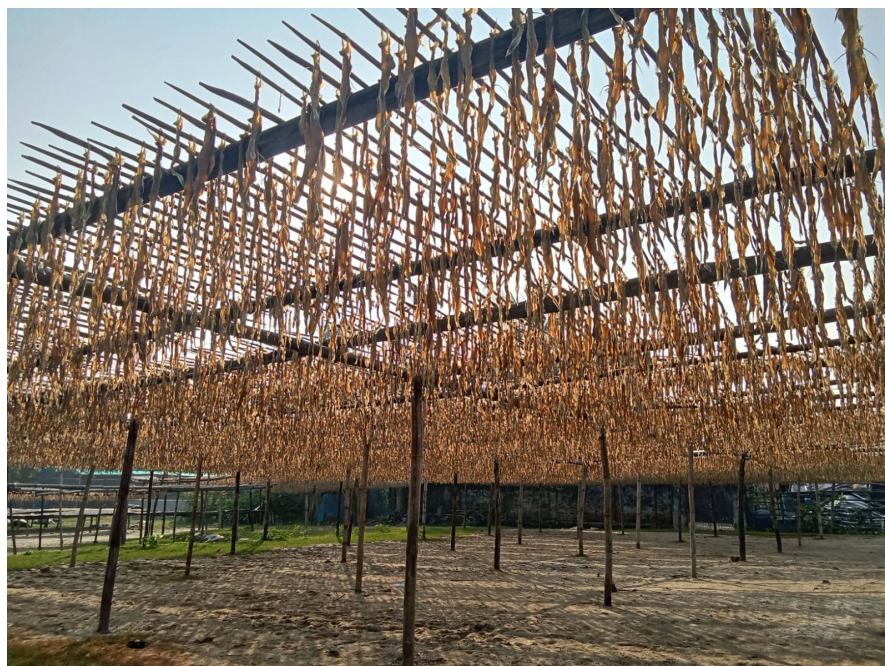
Fish drying is an age-old practice, adopted to preserve fish that cannot be immediately consumed or sold fresh¹. In 1958, scientists from ICAR-CMFRI, Mandapam described three drying processes used in the fish curing industry: natural air drying, open sun drying, and mechanical solar drying². Drying is the least expensive method of food preservation. It has great significance for coastal fishing communities, as dried fish sells well both in India and abroad³. Drying removes moisture first from the surface and then from the interior of the fish⁸. Sun drying requires minimal equipment, skills, and labour. It is accessible to small-scale processors along India's coastline, and transforms low-value fish into higher-value products⁴. Dried fish is generally kept to a moisture content of no more than 15-18%. Salting and drying under strong sunshine reduces water activity in fish muscle from 0.95-1.00 in fresh fish to 0.60-0.65⁶. Removing moisture from small- and medium-sized fish prevents bacterial and enzymatic decay and stops the growth of spoilage bacteria, salt-tolerant bacteria, fungi, and enzymes. In West Bengal's marine fishery, 78% of the catch is sold raw and fresh without ice, 16% in ice-preserved form, and 6% as sun-dried fish. Along the 158 km coastline of Purba Medinipur and South 24 Parganas, fish drying has grown from a traditional practice into a well-established, flourishing business.

About 200 dry fish producers work directly at Digha Mohona Matsya Khoti, with approximately 5,000 more people indirectly involved in related activities. Today's producers at this Khoti, aged around 30-32, are in their second or third generation in the trade. Dried fish is exported to Bangladesh and Japan from this Khoti. The people who depend on this trade come from coastal villages around Digha Mohona, including Maitrapur, Shankarpur, Purba Mukundapur, Dasondapur, Dahadia, and Alankarpur (Source: News 18 Bangla, 30/8/2025).

More than 50,000 marine and coastal fishermen in the Digha Mohona, Mandarmoni, and Junput regions are directly or indirectly involved in Shutki machh production and trade for their livelihoods. From Mandarmoni Matsya Khoti alone, 40-50 large vehicles loaded with dry fish supply markets across eastern India each year (Source: TV 9 Bangla, 8/3/2025). According to an elderly dry fish producer at Junput-Biramput, there are 32 Matsya Khotis



Spreading fishes to be dried on raised split-bamboo platform.



Bombay duck drying on bamboo scaffolds.



Leiognathus sp. dried in the sun.

along the Purba Medinipur coast; published literature cites a slightly higher figure of around 427. At major Khotis, fish is also brought from Paradeep fishing harbour in Odisha for drying. Some 25% of dry fish from Purba Medinipur goes to markets in Siliguri, Darjeeling, and Jalpaiguri districts in north Bengal.

Well-known recipes and a brief history of dried fish in West Bengal

When catches from open marine waters exceed what can be sold fresh - particularly small, low-value fish - the surplus is dried and salted to prevent waste. Small and medium-sized dried marine fish are widely eaten by tribal and non-tribal communities across north Bengal, the Tarai and Dooars regions of Darjeeling, Sikkim, and the north-eastern states. Like recipes using aquatic molluscs, dry fish dishes are no longer just village food for the poor. Every well-known dried fish recipe was developed through the experiments of wise elderly women long ago, a culinary tradition passed down through the generations.

Shutki machh is cooked with seasonal vegetables such as tomato, brinjal, papaya, or squash, as either a dry spicy vegetable dish or a spicy curry. Another preparation combines the innermost core of banana stem with onion, green chilli, and coriander leaves. Dried fish can also simply be roasted with onion, garlic, and chilli, then mashed (The Indian Express, 23/12/2018). A popular thick curry is made from sun-dried Bombay duck with amaranth stems, sweet pumpkin, and jackfruit seeds. Noted Bengali food historian Smt. Pritha Sen notes that Shutki machh in its preserved form - sun-dried and fermented - has long been eaten by people from Sylhet and Chittagong in Bangladesh. Recipes using red chilli powder, garlic, and other spices produce distinctive flavours. Popular dishes include chutneys (made with dry fish, sugar, vinegar, and spices), pickles, and dry fish curries, all considered delicacies.

People in West Bengal did not traditionally eat dried fish. Following the Bangladesh Liberation War of 1971, refugees from East Bengal ('Purbo Bangal') settled in West Bengal, bringing their food habits with them. Their recipes for hot, oily, spicy, garlicky sun-dried Bombay duck were gradually adopted by the local population. Purbo Bangals are Bengalis from the region that is now Bangladesh. Most dry fish recipes use red chilli powder, black cumin seeds, onion, tomato, green chilli, turmeric, salt, and garlic. Many people find the strong smell of raw dried fish unpleasant, but the cooked dishes are considered delicious. Soaking the fish in warm water for 30 minutes before cooking removes the smell.

General activities at a Matsya Khoti

In the coastal community development blocks of the two coastal districts, hundreds of thousands of people living along the coast depend on fish from nearshore, estuarine, and open marine waters for their livelihoods. Sea-going fishermen operate motorised and mechanised trawlers, catching commercially important marine fish within India's Exclusive Economic Zone and delivering them fresh and chilled to landing centres and harbours. Small-scale coastal fishermen use motorised boats to catch pelagic fish in estuarine and



Fish spread out to dry on a cement slab.



O. tardoore drying under the sun.

nearshore waters. They supply much of the surplus low-value catch to Matsya Khotis in raw, fresh condition. At each Khoti, local people involved in the marine fish trade work together to prepare sun-dried fish hygienically on a commercial scale. A group of dry fish producers in one area forms a Matsya Khoti.

Dried fish production and trade involves many steps. Fishermen catch fish, separate the catch from the nets, and transport it to the Matsya Khoti in rectangular plastic crates. There, workers sort the fish by species and size, clean them in freshwater, and remove operculum bones where needed. Fish are then spread evenly on raised split-bamboo platforms in the drying yard and turned regularly to ensure even drying. In winter evenings, workers cover the fish with black polythene sheets to protect them from heavy dew. Where

required, fish are salted in cement tanks before or after drying. Finally, the dried fish is packed into sacks and moved to storage rooms at the producers' homes. The wealthier fish traders at each Khoti hire young men and elderly women from poor coastal households, both nearby and further away. Thousands of marginalised people, both men and women, gain employment and income through this work.

Matsya Khoti at Junput-Birampur

Commercial fish drying at Junput-Birampur Matsya Khoti began about 70-75 years ago. I spoke with several leading dry fish producers here between November 2025 and January 2026, as the Khoti is close to my current workplace and residence. Junput-Birampur village is 10 km from Contai town towards the Bay of Bengal. The Khoti lies 500m inland from the Junput coastline. Other Matsya Khotis in coastal Purba Medinipur are at Soula, Kadua, Petuaghat, Haripur, Junput, Boguran, Digha Mohona, Jaldha, Khorpai, Jalpai, Shankarpur, Dadanpatrabar, Mandarmoni, and Gopalpur - all coastal fishing villages. Dried fish production at Junput-Birampur is most active from late autumn through to spring. Today, 550-600 dry fish producers make up this Khoti, known locally as 'Sowdagori'. Local residents live in earthen huts, while non-residents stay in single-storey pucca houses. Some producers own their own trawlers or fishing boats and catch their own fish at sea⁵. According to published sources, the Khoti operates from the beginning of June to the end of February. Fish is brought here by trawlers from Digha, Digha Mohona, and Shankarpur fish landing centres⁹.

Digha Mohona is the largest marine fish landing centre in eastern India. Between October and February, fish of all kinds - from shallow coastal and deeper waters, both commercially important and less so - are available in large quantities. Fishermen travel up to 22-60 km from shore. This abundance benefits dry fish producers at Junput-Birampur, who can buy the species they need in large quantities at fair prices. During this period - from the third week of September to mid-February - large quantities of good-quality sun-dried fish are produced, free from medicines and insecticides. Market prices are strong during this season, and producers earn good profits.

In the 1980s, commercial fish drying at this Khoti ran for only four months - October to February. Today, it runs for ten months, from June-July to mid-March, typically ending on Holi (Dol Purnima). Merchant agents wait at the Digha-Odisha border and the Petrapole-Bangladesh border to collect dry fish from both districts. They also buy at Balighai dry fish wholesale market.

General method of dried fish preparation at Junput-Birampur Matsya Khoti

After the West Bengal Fisheries Department's two-month ban on marine fishing, motorised fishing boats and larger motorised-mechanised trawlers leave from the Purba Medinipur coast from the third week of June. Fishing continues until the end of March the following year. In the early morning, most of the fish bought for drying is brought



Containers for salting and washing fish.



Lutjanus johnii being salted in a cement tank.

from Digha Mohona fish landing centre, 38 km away. Smaller amounts come from the nearby Haripur (2.5 km) and Junput landing centres, where local fishermen work in 0-5 km coastal waters using two-cylinder motorised boats known locally as 'Bhutbhuti'. Fishing boats arrive at Junput landing centre via a canal extending 300-350m inland from the sea, entering on the high tide. The unloaded fish - mostly small-sized and

small shrimps - are washed immediately in clean sea water and taken to the Khoti. In total, 85-90% of the raw fish comes from Digha Mohona and 10-15% from Junput.

In India, fish drying is mainly carried out by open sun drying². A brief 15-20 minute salt treatment before drying is not needed in winter but is required at other times of the year to kill harmful microorganisms. The operculum bones ('Galsa' in local dialect) are removed from some species using a sharp knife:

- Before sun-drying, operculum bones are removed from *Gudusia chapra*, *Anadontostoma chakunda*, and the already-salted *Lutjanus johnii* and *Dendrophysa russelii*.
- Raw *L. johnii* and *D. russelii* are salt-treated in small cement chambers (250 kg fish to 50 kg salt) for 72 hours before operculum bones are removed and drying begins.
- *Pellona ditchela* and *Carangoides malabaricus* are salt-treated in the same way, but operculum bones are not removed.
- *G. chapra* and *A. chakunda* are sun-dried in both salted and unsalted forms, depending on market demand.

After salting *P. ditchela*, 6-8 deep lateral cuts are made with a knife before drying, as preferred by buyers in Meghalaya and Assam. After salting and before drying, fish are rinsed in freshwater. For saltwater treatment (32-40% salt solution), 8-10 kg of common salt is added to every 25 litres of freshwater. The fish (100 kg) are left to soak overnight, then washed in freshwater and dried. At this Khoti, none of the species are gutted - no incisions are made in the abdomen, and viscera and gills are not removed. Table 1 lists the species sun-dried at this Khoti.

Fish are spread on specially built split-bamboo platforms 1.2 m wide and dried in the open air under sunlight. Workers turn them periodically with a lightweight plastic dustpan or flat iron blade to ensure even drying. In winter, black polythene sheets are placed over the fish on each platform as soon as the sun sets. To preserve their natural colour, Bombay duck and ribbonfish are hung on bamboo scaffolds or horizontal wooden poles supported by vertical poles driven into the ground. Bombay duck is sometimes hung in pairs by interlocking jaws, but at this Khoti, 14-15 fish are hung individually by inserting their lower jaws into a 1m split-bamboo stick called a 'Khanchi'. Ribbonfish are hung in bunches of 6-8 with heads pointing downward. Most small-sized fish are sun-dried for 3-5 continuous days, each species separately. *Harpodon nehereus*, *Lepturocanthus savala*, and *Trichiurus lepturus* require more time (Table 2). Body oil is released from *H. nehereus* during drying. Its high moisture content makes it prone to spoilage, so it is processed as quickly as possible. Currently, almost 90% of landed *H. nehereus* is dried¹⁰.

Sun-dried fish are packed into jute sacks using a spade. These sacks cost INR 28 and INR 60, holding 32-35 kg and 65k g of dry fish respectively. A sack designed for 50 kg of rice holds 35 kg of dry fish. Sri Tapas Jana, Sri Sanjay Giri, Sri Joydeb Jana, and one other person are the four leading 'Aratdars' - local dry fish traders and wholesalers - who own the four large dry fish warehouses at this Khoti. They buy the dried product from producers, store it briefly, then sell and transport it to merchant agents in other states and north



Removing operculum bones.



Lutjanus johnii with operculum removed after salting.

Bengal. The Aratdars have become wealthy despite having little formal education. Large quantities of dry fish are held in their warehouses.

Dried fish transport from Junput-Biramput Matsya Khoti

Dry fish from the Shankarpur, Kadua, Petuaghat, Tamulpuria, and Junput-Biramput Khotis is assembled here. 407 pick-up trucks carry up to 6 tonnes per trip over short distances of 30-200 km within and outside the district. Ten- to twelve-wheel vehicles carry 11-16 tonnes, and six-wheel trucks carry 6-8 tonnes directly to distant markets 650-900 km or more

away. Large trucks depart for Bangladesh and Tripura on Mondays and Tuesdays, and for north Bengal and Assam on Wednesdays, Thursdays, and Saturdays. During peak season, 8-12 large trucks leave the Khoti each week, in addition to smaller vehicles. Smaller Mahindra Bolero pick-up trucks carry 2-3 tonnes of dried fish packed in 45-70 kg sacks to Balighai wholesale dry fish market, 30-32 km away by road. Balighai is a major and well-known wholesale market in West Bengal. From loading to destination, road transport takes no more than 24 hours. North Bengal and the north-eastern states are also supplied from Balighai, where merchants from other states buy directly. Sun-dried *H. nehereus*, *Opisthopterus tardoore*, *T. lepturus*, *Trachipterus* sp., *Stolephorus* sp., and *Thryssa* sp. are mainly exported to Bangladesh.

On the wide sandy beaches at Junput and Haripur, I found large pieces of flat nylon netting (similar to mosquito netting) pegged to the ground at the corners. Low-value small marine shrimps are spread evenly on these nets and dried in the sun. Women manage this small-scale operation. The drying shrimps are turned regularly with a steel shovel, swept up after drying, graded by sieving through locally made rectangular galvanised iron strainers with specific mesh sizes, and packed.



Dry fish sacks are weighed before loading.



Truck loaded with dry fishes ready to leave Matsya Khoti.



Sun-dried *L. johnii* loaded on motor cycle van.

Earnings of women as casual workers at Junput-Birampur Matsya Khoti

Women are paid INR 25-30 to remove the operculum bones and gills from 600-750 fish of *G. chapra* and *A. chakunda*, a task completed in 20-25 minutes. For hanging 15-16 *H. nehereus* per Khanchi across 100 Khanchis, each woman earns INR 60; the task takes about an hour. Women are paid INR 20 to remove the operculum bones from every 15-20 kg of *L. johnii* and *D. russelii*. For hanging every ten groups of ribbonfish *T. lepturus* and *L. savala* (each group of six fish) on bamboo scaffolding after salt treatment, a woman is paid INR 0.40-0.60. For daily tasks - sorting fish by species and size at the landing centre, spreading fish on platforms, turning them for even drying, packing dried fish, and other work - women are paid INR 200 per day including an afternoon meal, or INR 250 without a meal. Women work daily at each production unit from 7am to 5pm.

Use of solar fish dryers

In February 2011, the Department of Fisheries, Government of West Bengal, provided six solar fish dryers to the Junput Mohila Sebika Matsya Samabaay Samity Limited, an active



Worker at a dry fish yard.

Table 1. Features of small- to medium-sized marine fish species sun-dried at Junput-Biramput Matsya Khoti.

Name of fish species	Local name	Raw bought @	Dry sold @	Fresh fish to produce 1 kg dry
<i>Coilia reynaldi</i> <i>C. ramkarati</i>	Olua	30 / kg	100-130 / kg	2.5 kg
<i>Harpodon nehereus</i>	Loite / bomla / babla	40-65 / kg (max 90-95 / kg)	300-400 / kg (max 450-500 / kg)	6 kg
<i>Chrysochir aureus</i>	Modhu bhola	50-60 / kg	140-150 / kg	2.0-2.5 kg
<i>Glossogobius giurris</i> <i>Sillaginopsis panijus</i>	Somudrer bele / balkura (mostly consumed fresh)	150 / kg	250-300 / kg	3.5 kg
<i>Opisthopterus tardoore</i>	Tel tapri / tapra / lalpata	120 / kg (max)	300-400 / kg (max)	2.5 kg
<i>Coilia dussumieri</i>	Amudi / Ruli	25-30 / kg	60-65 / kg (120 / kg (max))	3.2 kg
<i>Trichiurus lepturus</i> <i>Trachipterus sp</i>	Patiya / fitey / fita	40 / kg	140-160 / kg	3.5 kg
<i>Sillago sihama</i>	Shila	70-80 / kg	200 / kg	3-4 kg
<i>Liza sp</i>	Parse / khosla (dried in small quantity)	20-25 / kg	60-70 / kg	2.25 kg
<i>Escualosa thoracata</i>	Gang mourola	30 / kg	150 / kg	2.5-3.0 kg
<i>Pellona ditchela</i>	Choklet / pankha / pankhai	20-25 / kg (max 60 / kg)	50-60 / kg (max 140 / kg)	2 kg
<i>Lutjanus johnii</i> <i>Dendrophysa russelii</i> (15-25 pieces / kg)	Bhola ("entee" after operculum removed)	38-45 / kg	70-95 / kg	2.5 kg
<i>Cynoglossus sp.</i> <i>Paraplagusia bilineata</i>	Kalopata / banspata	30-35 / kg	120-130 / kg	4 kg
<i>Leiognathus sp</i> <i>Eubleekeria splendens</i>	Somudrer chanda / koyen	50 / kg	150-200 / kg	2.8 kg
<i>Gudusia chapra</i> <i>Anadontostoma chakunda</i>	Chira khoira	28-30 / kg	60-150 / kg	2.7 kg (unsalted) 2.2 kg (salted fish)
<i>Carangoides malabaricus</i>	Para	50-55 / kg	100-110 / kg	2 kg
<i>Odontamblyopus rubicundus</i> <i>Taeniidae sp</i> <i>Pseudapocryptes elongatus</i>	Lal cheknno / lal chewo	15-20 / kg	25-35 / kg	2.0-2.5 kg
<i>Scatophagus argus</i>	Bhaja chauli	60-150 / kg (limited supply)	200 / kg	2.5-3.0 kg
<i>Secutor sp</i>	Gang chanda	30-50 / kg	120-140 / kg	2.5 kg
<i>Setipinna sp, Raconda</i> <i>russeliana, Ilisha filigera</i>	Phesa	60 / kg	150 / kg	3 kg
<i>Metapenaeus monoceros</i> <i>Metapenaeus affinis</i> <i>White Acetes indicus</i>	Somudrer kucho chingri / Kori / goghua	20 / kg	80-100 / kg	5 kg
<i>Stolephorus sp</i>	Keripata / chira thikri	60 / kg	120-150 / kg	2 kg
<i>Lepturacanthus savala</i>	Chhuri (small) Chhuri (big)	35-40 / kg 60-80 / kg	140 / kg 200-275 / kg	3.5 kg
<i>Pama pama</i>	Poa bhola / tula bhola	60 / kg	160-180 / kg	3 kg
<i>Corica soborna</i>	Gura / chauli / kagja / Kechki	100 / kg	300 / kg	2.5 kg
<i>Polynemus paradiseus</i>	Topse	100 / kg (limited supply)	200-250 / kg	3.0-3.5 kg
<i>Nemipterus japonicus</i>	Chomchom	30 / kg	120 / kg	3 kg
<i>Kurtus indicus</i>	Bukdhuli	50-80 / kg	250-300 / kg (max 350 / kg)	3.0-3.2 kg
<i>Thryssa sp</i>	Modhu / chorki	25-30 / kg	70-80 / kg	2 kg
<i>Sardinella sp</i>	Chhoyna	28-30 / kg	70-75 / kg	2.5 kg
<i>Dussumieria sp</i>	Doth	32-35 / kg	85-90 / kg	2.3 kg

Table 2. Time required to produce four major sun-dried fishes from raw state at Junput-Biramput Matsya Khoti.

Name of fish species	Time for complete drying one batch of fish
<i>Gudusia chapra, Anadontostoma chakunda</i>	3-5 days
<i>Lutjanus johnii</i> and <i>Dendrophysa russelii</i> (15-20 pieces / 1 kg)	3-5 days
<i>Trichiurus lepturus</i> and <i>Lepturacanthus savala</i>	5 days
<i>T. lepturus</i> and <i>L. savala</i> (both larger in size)	5 days
<i>Harpodon nehereus</i>	5-7 days



Sun-dried fishes sold in a retail shop.

women-led Primary Fishermen Cooperative Society based at Junput-Birampur. The Society produces sun-dried marine fish and value-added processed products from small marine shrimps. Each dryer has six plate-like fish drawers with a glass cover on top. In 80 m² of open space owned by the Society, a total of 36 kg of marine fish can be dried in each dryer within 24 hours of sunlight. The dryers have instruments to measure moisture content in the fish, and can also use electric heating when sunlight is insufficient. An exhaust fan in each dryer draws out moisture-laden air. When in use, both the glass cover and the internal plates heat up. Each dryer has three solar panels.

End note: the problem of insecticide use

The continental shelf along India's north-east coast, covering West Bengal and Odisha, is less steep than that of the south-west and north-west coasts, and the deep sea is further from shore. As a result, small- and medium-sized lean pelagic fish suitable for drying are more abundant along the north-east coast each year.

In winter, low humidity, dry weather, and cold north winds mean fish dry quickly in strong sunshine. A species that dries in two days in winter may need 3-5 days at other times of the year. Sun-dried fish and shrimps produced at Junput-Birampur Matsya Khoti are free from dirt and sand. Good-quality freshwater is available at every producer's drying yard. Fish are not dried on open sandy beaches. Fish are packed promptly and not left heaped on the ground. Women workers regularly maintain and clean the drying platforms. At this Khoti, fish are not dried on coir matting, bamboo mats, cement platforms, or jute sacks. A few producers have a concreted outdoor area of 40-80 m² adjacent to their homes. Fish meal is not produced here. Heavy monsoon rains disrupt the drying process. At times, demand from distant markets is high and prices are good, but insufficient drying delays supply (Source: News 18 Bangla, 30/8/2025).



Close view of sun-dried ribbonfishes and Bombay duck.

Producers monitor the drying fish to protect them from rodents. Some elderly dry fish producers at Junput-Biramput report that during monsoon and summer months, the blowfly *Lucilia cuprina* infests drying fish and lays eggs in the gill lamellae. The larvae feed on the fish, significantly reducing its quality and texture. Producers admit to using broad-spectrum vegetable crop insecticides at the recommended dose to control infestations of brown plant hoppers, painted bugs, nematodes, and other sucking and chewing insects. Fish treated with these insecticides may pose a slow-acting health risk to consumers within and outside West Bengal. At the same time, producers say they currently have no other effective means to control insect pests. Use of insecticides is kept to a minimum during the peak pre-winter and winter season. From my conversations with producers, I found that many have recognised the problem, reduced their use of insecticides, and are advising others to do the same - aware that insecticide-treated dry fish may become unacceptable in both local and distant markets. Scientific attention to this issue is needed to sustain this long-established industry and tradition.

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Dried fish products for retail sale.