

Fish species used for drying in Sylhet Division

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Abstract. A year-long survey was conducted on fish species used and fish drying activities of greater Sylhet. Data were collected from four upazilas under three districts of Sylhet division namely Sylhet, Moulvibazar and Habiganj. The study revealed that fish drying methods were traditional, undeveloped and unhygienic. A total of 21 freshwater fish species under 12 families and 1 prawn species were identified that were used for sun drying in the study areas 82% of which were small fish. Drying of larger fishes was not common due to the scarcity and high price of raw materials. It was also observed that fishes from Cyprinidae (18%), Bagridae (18%) and Channidae (14%) family were more abundant in the study areas because of the fish availability, price of the fish, easiness of drying and consumer demand. The study revealed that the supply of fish has been decreased over the years which may impact the viability of their business. On the basis of the findings, a number of recommendations have been suggested including training for the people involved in fish drying, value chain, proper institutional and governmental support to thoroughly monitor a number of key species in major ecosystems and locations over successive years.

Key words: Fish species, Fish drying, Fish diversity.

Introduction

Dried fish sector is an intrinsic chapter of life of Bangladeshi people from the time immemorial and plays a momentous role in fulfilling animal protein demand, creating employment, alleviating poverty as well as earning foreign currency. Bangladesh is gratified with diverse aquatic resources. The greater Sylhet region including Sylhet, Sunamganj, Moulvibazar and Habiganj is enriched with vast open water bodies and haor fisheries. As a result, in every year huge amount of large and small sized indigenous freshwater fishes are caught from greater Sylhet. Some local dried fish processors and entrepreneurs come forward to collect these fish for drying considering the demand in the local and transboundary markets which has made greater Sylhet as a significant place for freshwater fish drying. Drying is one of the most popular least expensive methods of fish preservation which is regarded as the basic and traditional method of fish preservation. This traditional method is used for fish preservation especially in rural areas of the country (Chakrabarti and Varma 1999). Drying of marine fish is generally done in the entire coastal areas and drying of freshwater fish is concentrated in greater Sylhet, Mymensingh, Comilla and different northern districts of Bangladesh where modern preservation facilities and good infrastructure for transportation are absent (Hossain *et al.* 2015).

The basic principle of fish drying is that the activity of muscle enzyme and microorganism is waned to a minimum level through removal of moisture content from the fish by sun drying in a traditional way (Banglapedia 2014). Dried fish (locally called *shutki*) is the most delicious food items and is widely consumed by the Bangladeshi people. Dried fish sector has made a strong position in the economy of Bangladesh. The dried fish produced in Bangladesh have good

potential for transboundary markets and exported to various countries such as India, Sri Lanka, Hong Kong, Singapore, Malaysia, United Kingdom, United States of America, and United Arab Emirates (Patterson and Ranjitha 2009). In the fiscal year 2014-2015, Bangladesh exported a total of 2,845 MT of dried fish which nearly earns 360 million taka (local currency) and contributed 1.92% in the total export value of Bangladesh (DoF 2016).

The methods employed for fish drying in greater Sylhet are still traditional and need lots of improvement. Although few scientists worked on fish drying methods, household socio-economics, resource use of dried fish processors and traders (Ahmed *et al.* 1993, DFID 2001). Research works on the ecological and biodiversity aspects especially on species used in fish drying from greater Sylhet areas are very limited. The present work was carried out with the objective to know the species diversity in fish drying at different drying points of Sylhet, Moulvibazar and Habiganj districts.

Materials and Methods

Selection of the study areas: The present study was conducted at fish drying points (locally called “Dangari”) in four upazilas under three districts of Sylhet division namely Sylhet, Moulvibazar and Habiganj during January to November, 2016. The study areas under three districts of Sylhet division are Lamakazi fish drying point in Bishwanath upazila, Sylhet, Varaura fish drying point in Sreemangal upazila, Moulvibazar, Umednagar fish drying point in Habiganj Sadar upazila, Habiganj and Katiara fish drying point in Madhabpur upazila, Habiganj.

Preparation of survey schedules: A set of survey schedule for dried fish producers was prepared in such a way that all the information could satisfy the objectives.

Target group and sample size: The dried fish producers were selected as target groups. A total of 20 dried fish producers were selected for questionnaire interviews in three districts of Sylhet division.

Data collection: For questionnaire survey, dried fish producers were selected through simple random sampling methods. The questionnaire was in English but they were asked in Bengali and in their local language as much as possible. Interviews were conducted at the fish drying points during processing. Focus group discussions (FGDs) were conducted with intermediaries in dry fish processing and trading sites for collecting both qualitative and quantitative data. The specific aim of the discussions was to collect information on mechanism of wet fish collection, transport, fish drying mechanism, transboundary trading, pricing of dried fish at different levels and a number of cross cutting issues – health and safety, gender, wages, migration, social, economic and ecological issues. Cross-check interviews were conducted with key informants such as local leaders, Upazila Fisheries Officer (UFO) and relevant NGO workers. They were especially knowledgeable on particular topic and were expected to be able to provide facts against any ambiguity of information.

Data processing and analysis: In order to minimize error, data were collected in local units and later converted into standard units. Data were processed and analyzed in Microsoft Excel 2007, and finally presented in the form of bar diagrams and pie chart.

Results

Species used in fish drying purpose: Various types and sizes of freshwater fishes were used for sun drying in study areas. Generally, small fishes were selected for drying more than the larger ones. Fishes from Cyprinidae, Bagridae and Channidae family were abundantly used for drying compared to other families (Fig. 1). A list of major species used for sun drying in different fish drying points with their drying duration is given in Table I.

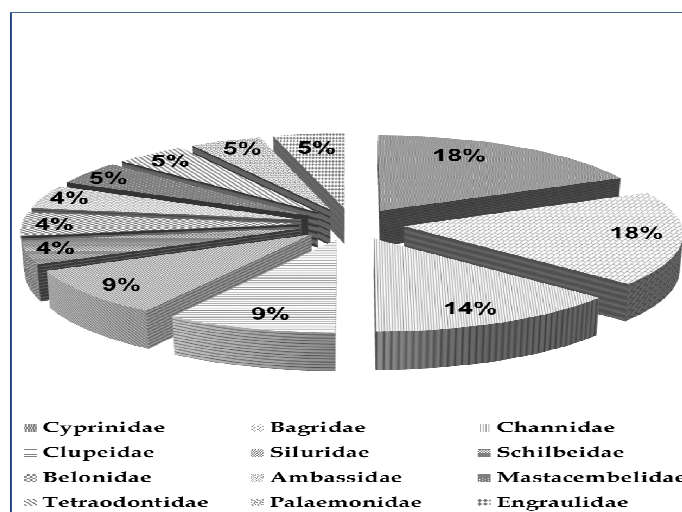


Fig. 1. Species percentage used for drying from 12 families in the study areas.

Fish drying activities in the study areas: In greater Sylhet, sun drying was carried out mainly on commercial basis and at times for household consumption (Fig. 2). Fish drying points were situated near the fish market or highway for easy communication. There were 8, 1, 6 and 5 drying points observed in the Lamakazi, Varaura, Katiara and Umadnagar village area, respectively in greater Sylhet. Among them, Lamakazi was the largest fish drying area. Both bamboo-made mat and rack were used for drying purpose. The hygienic conditions of those areas were not satisfactory. The drying season varied slightly from site to site. In Lamakazi, fish drying generally started in mid-October and ended in mid-March. However, in Varaura, drying season started in December and ended in February. Fish drying operations in Katiara ran from September to December. In Umadnagar, drying season started in mid-October and continued until December. Dried fish producers were engaged every day in fish drying from 6:00 am to 4:00 pm in the study areas. In Lamakazi, Katiara and Varaura areas, dried fish producers did not use any type of pesticide for long term storage of dried fish. However, in Umednagar a few producers used DDT powder for long time storage to prevent blow flies infestation in dried fish.

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Table I. The name and conservation status of fish used for sun drying in Lamakazi, Varaura, Katiara and Umednagar fish drying points of greater Sylhet

Family	Sl. No.	Local Name	Scientific Name	Conservation status (*)	Drying Duration (Days)
Cyprinidae	01	Tit Punti	<i>Puntius ticto</i>	VU	3-5
	02	Mola	<i>Amblypharyngodon mola</i>	LC	2-3
	03	Chela	<i>Chela cachius</i>	VU	2-3
	04	Dhela	<i>Osteobrama cotio</i>	NT	2-3
Bagridae	05	Golsa tengra	<i>Mystus bleekeri</i>	LC	3-4
	06	Kalo buzuri	<i>Mystus tengara</i>	LC	2-3
	07	Tengra	<i>Mystus vittatus</i>	LC	3-4
	08	Rita	<i>Rita rita</i>	EN	7-8
Channidae	09	Taki	<i>Channa punctata</i>	LC	2-3
	10	Shol	<i>Channa striata</i>	LC	5-6
	11	Gozar	<i>Channa marulius</i>	EN	5-6
Clupeidae	12	Chapila	<i>Gudusia chapra</i>	VU	3-4
	13	Kachki	<i>Corica soborna</i>	LC	2-3
Siluridae	14	Boal	<i>Wallago attu</i>	VU	6-7
	15	Kani pabda	<i>Ompok bimaculatus</i>	EN	3-4
Schilbeidae	16	Batasi	<i>Pseudeutropius antherinoides</i>	LC	2-3
Belonidae	17	Kakila	<i>Xenentodon cancila</i>	LC	3-4
Ambassidae	18	Chanda	<i>Chanda nama</i>	LC	3-4
Mastacembelidae	19	Guchi baim	<i>Mastacembelus pancalus</i>	LC	5-6
Tetraodontidae	20	Potka	<i>Tetraodon fluviatilis</i>	LC	4-5
Engraulidae	21	Phasa	<i>Setipinna phasa</i>	LC	2-3
Palaemonidae	22	Chingri	<i>Macrobrachium rosenbergii</i>	LC	2

• EN= Endangered, VU=Vulnerable, NT= Near Threatened, LC= Least Concern (IUCN Bangladesh, 2015)

Mean monthly production of dried fish from Lamakazi, Varaura, Katiara and Umednagar fish drying points of greater Sylhet ranged from 1,500 kg to 2,521 kg (Fig. 3). In Lamakazi, Varaura, Katiara and Umednagar areas, many people were engaged in drying. The average seasonal income of dried fish producers in four study areas ranged from 10,000 -7, 00,000 Tk (Fig. 4). The labours of drying points received their wages on the daily basis. Both male and female workers were involved in drying activities. Their wages varied from drying points to drying points. The average daily wages of male and female labours in the study areas were Tk. 260 and Tk. 150, respectively which indicates gender discrimination.

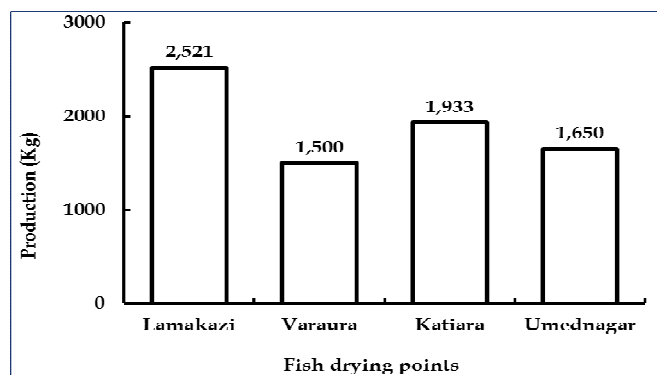


Fig. 3. Mean monthly production of dried fish in four drying points of greater Sylhet.

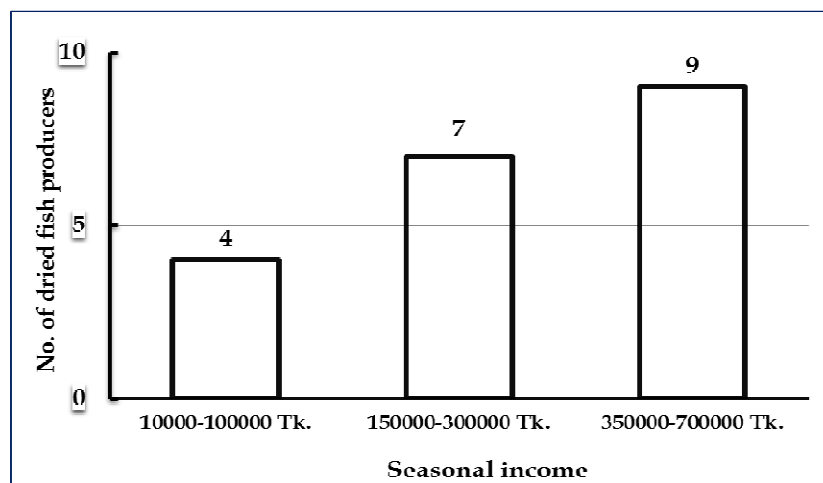


Fig. 4. Mean seasonal income of dried fish producers in four study areas

Ecological impact of fish drying on fish diversity: The number of entrants into the fishery is increasing, due in part to population growth and the breaking down of traditional social norms governing participation in fisheries. In tandem, these pressures are resulting in increasing pressure on fisheries resources. Consequently, catch per unit effort (CPUE) is generally falling and a stock of several species of fish is in decline. Extensive use of destructive fishing methods and gears and the growing tendency to fish indiscriminately, irrespective of size and species may have ecological impact.

Discussion

A total of 20 fish drying points were observed in the Lamakazi, Katiara, Umednagar and Varaura village areas in greater Sylhet. Among them, Lamakazi was the largest fish drying area. Present study revealed that in greater Sylhet, sun drying was mainly done for business and at times for household consumption. The fish drying points were located near the fish market or highway for easy communication. Bamboo made mat and rack was used for drying purpose. Basu *et al.* (1987) and Marine *et al.* (2015) reported that sun drying of fish on different surfaces namely cement platform, leaf mat, aluminum trays and stretched net were equally effective.

In the study areas, it was observed that the hygienic conditions were not satisfactory. Although the fish drying points were separated from the locality, the stench of dried fish could cause serious health hazard and also pollute the environment. The hygienic and nutritional qualities of the fish that were dried by using rack were better than fishes that were dried by using mat directly on the ground. Reza *et al.* (2005) conducted a study on traditional drying of marine fishes of Bangladesh where commercial drying was carried out in sandy beaches of Cox's Bazar region, where fishes were contaminated with sand, blow flies and microorganisms. From the present survey, it was marked that peak drying season of fish generally started in October and ended in January. Sufficient sunlight, raw materials availability, less wind, less moisture content and market demand which enabled proper drying of fish. The fish drying

period could be however, extended from October to March (Pervin 2004) or July to March (Flowra *et al.* 2012).

A total of 21 freshwater fish species and 1 prawn species were used for sun drying in the study areas. Among them, 20 species were recorded from Lamakazi, 8 species from Varaura, 12 species from Katiara, and 6 species from Umednagar areas. Small fishes were used for drying more than larger one. Drying of larger fishes was not common due to the scarcity and high price of raw materials. It was also observed that fishes from Cyprinidae (18%), Bagridae (18%) and Channidae (14%) family were more abundant in the study areas because of the fish availability, price of the fish, easy of drying and consumer demand. In most cases, it was observed that low quality damaged raw fishes were collected by the dried fish producers from local fish market or directly from adjacent rivers, haors and beels of greater Sylhet and transported by non-mechanized van, rickshaw, bicycle or by head load or shoulder load by the labours. This type of transportation of raw fishes for drying was observed by some other researchers (Azam 2002).

From the study areas, it was observed that scaling and gutting were not common. Dressing and splitting was observed for larger fishes which were done for uniform drying of all parts of muscle. Whole small fishes were directly dried under the sun without dressing. The information obtained from the present work agreed with those of Samad *et al.* (2009). In the study areas, it was observed that all the dried fish producers (100%) used non-brand commercial salt for salting because of high price of brand commercial salt. After salting, dried fish producers washed their raw fishes in river and tube well water for the removal of salt. In most cases, water containing plastic drums was used for washing of salted fish. The waste water was dumped in the nearby areas and the remaining salts in the waste water were strained for further salting in fresh fish. The present finding is agreed partially with Flowra *et al.* (2012).

Present study revealed that in commercial fish drying, bamboo made rack of 1.5-3.0 feet high from earth was used in Lamakazi, Varaura and Katiara fish drying points. Bamboo splits made mat was used on the rack over which raw fishes were spread for drying. In Umednagar fish drying point, fishes were spread on mat directly on earth without using any bamboo rack. It was also found that drying of larger fishes was not common due to the scarcity of raw materials. Drying rate depends on relative humidity, air velocity, air temperature and surface area of fish. Generally 2-8 days were required for drying. The finding agreed with the findings of Samad *et al.* (2009). It was marked that sorting of fish was not common before drying. After drying, the dried fish producers separated the small, large, fresh and rotten dried fish according to species, quality and size. Mainly female workers were engaged in this purpose. Flowra *et al.* (2012) reported that sorting of dried fish was not common in Chalan Beel areas of Bangladesh but it was only performed after collection of raw fishes for drying.

In Lamakazi, Varaura and Umednagar fish drying points, it was observed that dried fish were transported from drying points to wholesale markets by non-mechanized van, rickshaw, bus and boat. Pickup van and truck were also used to transport dried fish into distant areas. But in Katiara fish drying points, some dried fish were transported via boats. This result coincides with that of Samad *et al.* (2009). In Lamakazi, dried fish producers sold their products to the Aratdars of Shorarpar, Mahajanpur, Machimpur, Madhabpur, Habiganj, Kuliar char and Lalpur dried fish markets. In case of Varaura, dried fish producers sold their products to the aratdars of

Notun Bazar and Kishoreganj dried fish markets. In Katiara and Umednagar areas, they sold their products to the Aratdars of Madhabpur, Habiganj, Kuliar char and Lalpur dried fish markets.

Total seasonal dried fish production from Lamakazi fish drying points was higher than others due to raw materials availability, easy communication, less price of fish, easy of drying and consumer demand. The data revealed that only nearly half of the dried fish producers (8 from Lamakazi and 1 from Varaura fish drying points) had the handsome earnings than the Katiara and Umednagar dried fish producers. The difference in income range might be due to the scale of drying activities, raw materials availability and consumer preference about dried fish. The women workers were engaged in fish processing activities in the study areas mainly for dressing of larger fish and sorting out the mixed dried fish according to the species, size and quality of the dried fish. The present finding is supported by Rabbanee *et al.* (2012). The number of fish drying points in most of the major fish drying sites is growing, in addition to which, more freshwater dried fish is now produced. All the wholesalers, retailers and consumers interviewed confirmed that dried fish are now consumed in greater quantities in Sylhet region. Large quantities of dried fish are also exported. All these trends are increasing fishing pressure on the fish species from which dried fish are produced. The most commonly held view among the interviewees was that fish supply had decreased over the years. A number of interviewees stated that not only the total volume of catch decreased but also there had been a marked decline in catch per unit effort over the last ten years. The owner of fish drying points complained that decrease in fresh fish supply was resulting in much lower dried fish production now-a-days compared to the past and a sharp drop in the manpower employed in the dried fish sector. Some dried fish wholesalers stated that they were worried about the future viability of their business as the volumes of fish were dwindling.

Usually, traditional fish drying operations do not have serious impacts on species and ecosystem biodiversity. In recent times, however, biodiversity loss has occurred and gradually becoming more visible and it should therefore, not be ruled out. Possible effects on fish resources and environmental pollution should be taken into account by the dried fish producers and extension workers when considering processing techniques, particularly when they will result in a greater throughput of raw material. Full-industrial and semi-industrial scale fish drying can have a devastating effect on fish resources and as this has already been started, the effect on the environment and the population traditionally dependent on the fish resources must be thoroughly and carefully evaluated.

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