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Identification of Filth and Quality Assessment of Some Popular Sundried Fish Available at Some Selected Places of Mymensingh Division of Bangladesh

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Abstract

In the present investigation, the filth, composition and quality aspects of commercially important sun-dried fishes of selected places of Mymensingh division were evaluated by visual examination on the filth, chemical composition, total volatile base- nitrogen (TVB-N), Tri-methyl amine nitrogen (TMA-N) of the samples. Different types of filth were detected in the sun-dried fish samples. In such visual examination/inspection filth was detected in different concentration. The amount of filth ranges from little to insignificant. It was observed that the consumers are not aware of the filth of the sample. Analysis on proximate composition on the sundried samples collected from Trishal Upazilla of Mymensingh district shows that the moisture content (%) of the sundried *Harpadon nehereus*, *Chela cachius*, *Corica soborna*, *Clupisoma atherinoides* and *Ambassis ranga* were 15.65±0.24, 19.15±0.46, 15.64±0.27, 12.52±0.24 and 13.87±0.20 respectively. The protein content (%) of sun dried *Harpadon nehereus*, *Chela cachius*, *Corica soborna*, *Clupisoma atherinoides* and *Ambassis ranga* were 59.73±1.13, 59.33±3.85, 57.08±1.79, 36.60±1.51 and 50.23±0.26 respectively. The lipid content (%) of sun dried *Harpadon nehereus*, *Chela cachius*, *Corica soborna*, *Clupisoma atherinoides* and *Ambassis ranga* were 13.22±0.68, 8.28±0.60, 14.21±0.85, 37.21±0.36 and 13.73±0.31 respectively. The ash content (%) of sun dried *Harpadon nehereus*, *Chela cachius*, *Corica soborna*, *Clupisoma atherinoides* and *Ambassis ranga* were 14.99±0.31, 16.67±0.66, 12.7±3.43, 16.53±0.97, 22.94±0.77 respectively. The overall quality of the samples was in acceptable condition on the basis of TVB-N and TMA-N value. The TVB-N content (mg/100g) of sun dried *Harpadon nehereus*, *Chela cachius*, *Corica soborna*, *Clupisoma atherinoides* and *Ambasis ranga* were 98.42±1.96, 73.19±2.14, 55.68±1.12, 64.46±0.94 and 37.26±1.78 respectively. The TVB-N values of all the samples were within the acceptable limit. The TMA-N content (mg/100g) of sun dried *Harpadon nehereus*, *Chela cachius*, *Corica soborna*, *Clupisoma atherinoides* and *Ambasis ranga* were 8.64±0.86, 9.16±1.06, 6.21±0.78, 6.86±2.10 and 7.92±1.62 respectively. All these values were within the acceptable limit. Similar trend of result was obtained in the sundried fish samples collected from Netrokona Sadar Upazilla. Samples collected from Sadar Upazilla of Netrokona district were Sundried Chela *(Chela cachius)*, Sundried Punti *(Puntius sophore)*, Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Result of this research indicate that the sun-dried fish samples possessed good nutritional composition, chemical examination shows that the quality was also acceptable. But if we consider the survey result the presence of many filth in the sun-dried fish during processing, handling, storage and display makes it aesthetically completely unacceptable.

Keywords: Filth; Proximate composition; Quality; Sun-dried fish

Introduction

Bangladesh is one of the world's leading fish producing countries blessed with many rivers-canals, depressions and oxbow lakes, ponds and floodplains, covering a huge area of water resources of 4.70 million hectares. Besides, there is vast resources of marine fisheries expanding over an Exclusive Economic Zone (EEZ) of 1,66,000 sq. km. since time immemorial. These inland, coastal and marine waters are the main sources of fish. As an agro-based country, the contribution of fisheries sector to national economy has always been important and main source of animal protein, employment opportunities, food and nutritional security, foreign earnings, aquatic biodiversity conservation and socio-economic development. Fisheries sector contributes 3.57% to GDP and 25.30 % to agricultural GDP. Fish supplements to about

60% of our daily animal protein intake. More than 11% of the population depends directly or indirectly on the fisheries sector for their livelihood [1]. The overall fish production is increasing year by year. In 2020-21 the inland open water (capture) fish production has increased 4.23% than the previous year, inland close water (culture) fish production has increased 2.12% than the previous year, Hilsa production has increased 2.68% than the previous year, prawn production has increased 4.43% than the previous year [2].

The most common fish processing techniques in Bangladesh are drying, freezing, salting, fermentation, and to a less extent smoking. Sun drying is one of the most effective low-cost methods of preserving fish, and the commodity is particularly important for providing nutrition to the vulnerable and economically deprived. Fish drying as a means of preservation has been practiced since the time immemorial in Bangladesh [3]. About 20% of the artisanal catch is sun dried and consumed in the domestic market [4,5]. Dry fish ('Shutki' in Bengali language) is the most popular food item in Bangladesh. It is the main protein source in many districts of Bangladesh. Every year a sizeable quantity of sundried fish is exported to the international market where a good number of Bangladeshi people have been living for a long time. Hall [6] mentioned that Fish, processed fish and fishery products play an important role in the nutrition of many nations of the world. Fish, processed fish and fishery products have enjoyed an increase in status in recent years, particularly in rich industrial nations and many supplier countries have used this trend to boost foreign earnings. Competition among suppliers is fierce. Suppliers, able to provide quality, safety, variety economically will survive in such competition. Horner [7] stated that traditional processing techniques particularly 'curing' (salting, drying, smoking) as a means of preserving fish has been practiced perhaps longer than any other preservation technique. Salting, drying, smoking have all continued as preservation techniques virtually unaltered from prehistory to the present day. Modern developments have centered around understanding and controlling the process to achieve the standardized product demanded by today's market. A major exception has been exploitation of the sublimation of ice to dry food so that it resembled the starting material in volume and shape. For all the developments in cure-processing accommodating continuous production line, the time required to achieve a long shelf-life product purely by water removal is much greater than for any other commonly used preservation method.

Dry fish is cheaper dietary protein source and used as a substitute of fish at the scarcity of fresh fish. About 15% of fishes are cured for mass people consumption at the scarcity of fresh fishes in Bangladesh [8]. It is also a very favorite food item among Bangladeshi people and has a good market demand besides fish and seafood products. Some marine fish species are not liked by people as fresh condition but they like to eat dry fish of these species. Moreover, dry fish has a storage life of several years and is a good source of protein, essential amino acids, vitamins and many minerals [9]. So, it is consumed all over the world for its nutritional value, taste, and aroma. Processed fish and fishery products are very popular all over Bangladesh. But the consumers are not aware of what they are eating. As a protein source fish and fishery products are always preferred by the consumer. But the safety, quality and sanitation of the products in handling, processing and storage is not up to the standard. A large number of research have been conducted at home and abroad by researchers related to the present study of which the important ones are Love [10]; Abolude and Abdullahi [11]; Clement and Lovell RT [12]; Chowdhury [13]; Mansur et al. [14]; Rahman et al. [15]; Banu et al. [16]; Huss [17]; Hossain et al. [18], Council Directive, EU [19]; Reza et al. [20]; Reza et al. [21], Mansur et al. [22]; Mansur et al. [23], Mansur et al. [24], Nadia et al. [25]; Han et al. [26]; Jamil et al. [27], Paul et al. [28]. The concept of sanitation appears in the Federal Food, Drug and Cosmetic Act (FD&C Act) (18) of USA. It states that "a food shall be deemed to be adulterated if it consists in whole or in part of any filthy, putrid or decomposed substance, or if it is otherwise unfit for food; or if it has been prepared, packed or held under insanitary condition whereby it may have been rendered injurious to health.

Recently quality and safety aspect of all types of food particularly processed fish and fishery products including dried fish is a major concern throughout the world. Large scale production of sundried fish sometimes cannot fulfill the desired sanitation, hygienic practice of the process, cannot prevent infestation etc. As a result, the final product contains some extraneous materials which can cause health injury. Although considerable improvement has been achieved in the process of sun-drying of fish in the last two decades the process is still slightly faulty in many places of Bangladesh. Raw fishes are not washed perfectly instead kept on the clay of the bank of the river and landing centre, equipment and utensils are not washed perfectly, drying in open place without protection from infestation, drying fish on sand, land are the example of such fault. Moreover, warehouse or go-down for storage of sundried fish is not always up to the standard. The sun drying process for fish drying is still slightly ancient process. As a result, different types of filth deposit on the surface of sun-dried fish. Such filth can cause health injury particularly gastrointestinal problem and some chronic problem in stomach. All these reasons cause loss of quality and safety of sun-dried fish as a human food. Filth in food is a major concern throughout the world particularly USA, UK, EU, Japan etc. In Bangladesh people are not aware of filth and its harmful effect that usually present in sundried fish.

The Food, Drug, and Cosmetic Act protects the public health from the presence of filth, putrid or decomposed material in food products, and those products that may have been exposed to insanitary conditions that may contaminate the product with filth or render it injurious to health. The terms filth, foreign material, or extraneous material are used interchangeably. Filth is any type of matter that obviously does not belong to a food product. Representative examples of filth in food products include but are not limited to rodent excreta, insects, parasites, and extraneous materials such as metal and glass shards. (US-FDA).

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In EU, once filth meant antibiotic, unwanted chemicals, histamine detected in fish and fish products. Now-a-days filth includes the extraneous materials too. In dried fish usually filth is sand particle, dust particle, fly, broken part of insects, broken parts of grasshopper, dead insect, parasites and larva, fur from rat, cat, dog, feather of birds, even stools (excreta) of many animals. Such filth usually causes gastrointestinal diseases and sometimes carry causative agent of some contagious diseases. European Union has introduced the Council Directive [19] laying down the health conditions for the production and placing on the market of fishery products.

Filth and extraneous materials that are present in food products can be grouped into three regulatory action categories using the action criteria profiles. The profiles for category 1 (health hazards) and category 2 (indicators of insanitation) are contaminant specific. Each profile describes a type of contaminant. The regulatory action criteria for category 3 (natural or unavoidable filth) contaminants are product specific. Each category represents a different application of sections 402(a) (1), 402(a) (3), or 402(a) (4) of the FD&C Act (Olsen et al.). The present study was undertaken with the following objectives:

a) To identify the filth present in some popular sundried fish at the markets of Trishal upazilla of Mymensingh district and Sadar Upazilla of Netrokona district.

b) To analyze the proximate composition (protein, lipid, ash and moisture) of sundried *Harpadon nehereus*, *Clupisoma atherinoides*, *Corica soborna*, *Chela cachius* and *Ambasis ranga*.

c) To assess the overall quality by evaluating the Total Volatile Base Nitrogen (TVB-N) and Tri-Methyl Amine Nitrogen (TMA-N).

Materials and Methods

The study was conducted by visual examination, survey, collecting samples and studying various chemical and biochemical parameters. Survey, sample collection, proximate composition analysis (protein, lipid, ash and moisture) were done according to the methods described below:

Survey

Survey was conducted in accordance to prepared questionnaire (Tables 1 & 2) in different wholesale and retail shop the survey was conducted and samples were collected from them (Figure 1).

Figure 1: Conducting Survey.

Collection of sample

Five dried fish species were purchased from Trishal bazar of Mymensingh district. Sun dried Bombay duck *(Harpadon nehereus)*, Kachki *(Corica soborna)*, Chela *(Chela cachius)*, Chanda *(Ambasis ranga)*, Batasi fish *(Clupisoma atherinoides)*, were collected from the dried fish market of Trishal bazar under the district of Mymensingh. Collected samples were packed carefully in plastic jars. It was known from the traders that they purchased the marine *(Harpadon nehereus)* sun-dried fish from Cox's Bazar and Chittagong, the rest four freshwater species of sun-dried fishes were purchased from Kishoreganj. That means the sundried fishes of the present study were not prepared in Trishal Upazilla of Mymensingh instead the traders bought from other places and usually in Trishal Bazar.

Similarly, five sundried fish samples were collected from Netrokona Sadar Upazilla. The dried fish samples from Netrokona Sadar Upazilla were Sundried Chela *(Chela cachius)*, Sundried Punti *(Puntius sophore)*, Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Samples collected from Netrokona Sadar Upazilla were carefully packed in plastic jars for transportation to the laboratory of Bangladesh Agricultural University, Mymensingh.

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Transportation to the BAU laboratory

The collected sundried fish samples were then transported to the Fish Processing and Quality Control Laboratory of the Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh in a carton covered by polyethylene sheet.

Identification of filth

There are 3 (three) types of undesirable hazards:

a) Physical

b) Chemical

c) Biological

Filth was detected and identified by visual examination in the laboratory of the Fish Processing and Quality Control Laboratory of the Department of Fisheries Technology, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh. In each case the questionnaire and the matters formatted/stated in tables 1 & 2 was followed for detection and identification of filth in the dried fish samples. Visual investigation was done according to the above criteria. Knowledge about filths and their impacts were investigated from the traders. The criteria also indicate whether the filth is hazardous or not (Figure 2)

Figure 2: Sun dried samples.

Storage of experimental material

The samples were packed in polythene packets separately as per the number of samplings to be done for each sundried fish and stored in room temperature, until laboratory experiment was done.

Sampling procedure

Collected sundried fish samples were stored in the laboratory and these stored sundried fishes were used for chemical and biochemical analyses to estimate the proximate composition (Protein, Lipid, Ash and Moisture) and overall quality (TVB-N and TMA-N). Stored sun-dried Bombay duck *(Harpadon nehereus)*, Kachki *(Corica soborna)*, Chela *(Chela cachius)*, Chanda *(Ambasis ranga)*, Batasi fish *(Pseudeutropius atherinoides)*, were used for the laboratory analyses. Dried fish muscle was cut by sharp knife then the muscle was chopped and ground with a blender for homogenous mixture.

Sensory quality

Sensory quality was assessed by organoleptic examination according to the method of Howgate et. al. [29]. The sensory characteristics of sun-fried fishes e.g., colour, flavor, odour, Texture, Broken piece were assessed by organoleptic method and overall sensory quality was estimated/determined.

Chemical and Bio-chemical analysis

AOAC [30] and AMC [31] methods were followed for the determination of proximate composition (Protein, lipid, ash and moisture) and TVB-N, TMA-N of the sundried fishes. All the determinations were done in triplicate and the average value was reported. The methods are briefly described below:

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Protein

Standard Macro-Kjeldahl method was followed for the estimation of protein content of sundried fish samples. This method was chosen because of its simplicity, easy and accuracy.

There are four steps:

a) Sample preparation and digestion

b) Cooling

c) Distillation

d) Titration

a) Sample preparation and digestion

Six dried fishes were chopped and finely homogenized by a Waring Blender. Accurately weighed 1g homogenized sample was taken in a Macro-Kjeldahl flask. 4g digestion mixture was added to this flask. Digestion mixture wass prepared by mixing 100g copper sulphate ($CuSO_4$), 10g sodium sulphate (Na_2SO_4) and 1g selenium powder. 25ml Concentrated sulphuric acid (H_2SO_4) was added to this flask. The content of this flask was then heated at 70°C in the electric heater of the digestion unit of Kjeldahl Apparatus. Digestion was continued until clear solution appeared which took 3-4 hours.

b) Cooling

The content of the Kjeldahl flask was cooled in a fume hood at room temperature for an hour. Care was taken to avoid any accident during this step. During this time exhaust fan was used to remove any acid fume.

c) Distillation

Into the Kjeldahl flask 100ml distilled water was carefully added. 25ml of 8 % $Na_2S_2O_3.5H_2O$ was added into the Kjeldahl flask.120ml of 40% NaOH was also added into the Kjeldahl flask. Then the flask was placed on the distillation chamber of the Kjeldahl apparatus and distilled at 70°C. The distillate was collected into 4% Boric acid (H_3BO_4, 25ml) with 2 drops of mixed indicator. Distillation was continued for 45 minutes or until the volume of distillate was at least 75ml.

d) Titration

The distillate was titrated against 0.1N HCl. The end point was light pink which persists at least 30 seconds. A blank determination and three determinations with sample was conducted for a better and acceptable result.

e) Calculation

The percent nitrogen was calculated from the following formula:

$$\%N_2 = \frac{(S-B)\times 0.014\times 100\times N}{W}$$

$$\%\ Crude\ \ \text{Pr}otein = \%N_2(Nitrogen)\ \times\ 6.25$$

where,

B is Titration value for the blank

S is Titration value for the sample

N is Normality of titrant

W is Weight of sample in g

0.014 is milliequivalent of Nitrogen

6.25 is protein conversion factor for fish protein

Lipid

Lipid content was determined by Soxhlet apparatus using acetone as solvent. Prepared sundried fish sample was weighed and taken in a paper thimble and placed it inside the Soxhlet apparatus. Sufficient amount of acetone was poured into the round bottom flask of the Soxhlet apparatus and heated on water bath at 70°C for 1-1.5 hours. The solvent evaporates upon heating but allowed to drop slowly after condensing on the sample inside the thimble until the entire lipid in the sample was extracted. Finally, the solvent containing lipid was transferred to a pre-weighed beaker. The residual lipid content was obtained after removal of solvent by evaporating on heating on water bath. Lipid content (%) was calculated from the following formula:

$$Lipid\ content\ (\%)\ =\ \frac{w2}{w1}\times 100$$

Here,

W2 = Weight of lipid after extraction with acetone

W1 = Sample weight

Moisture

Six dried fishes were chopped and finely homogenized by a Waring Blender Moisture content of fish muscle was estimated by placing an accurately weighed representative (about 5g) amount of sample in a pre-weighed porcelain crucible in an electric oven at 105°C until constant weight was obtained (24 hours). The percent loss in weight was reported as percent moisture content.

The moisture content was calculated by following equation:

$$Moisture\ content\ (\%)\ =\ \{(m2\text{-}m1)\text{-}m3\}\ /\ (m2\ -\ m1)\times 100$$

Here,

m1 = mass of crucible

m2 = mass of crucible with sample

m3= mass after heating at 105°C

Ash

Six dried fishes were chopped and finely homogenized by a Waring Blender Accurately weighed sample (about 5g) was taken in porcelain crucible and heated at 100°C until water was expelled. A few drops of olive oil was added and the sample was again heated on an electric heater until swelling stopped. The

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crucible was then placed in a muffle furnace at 550°C for 6 hours. The crucible was then cooled in a desiccator. After weighing, the sample was re-ashed in muffle furnace at 550°C to find a constant weight. The average percentage of each sample of the remaining material is taken as ash.

Formula for Ash estimation:

$$Ash\ content\ (\%) = \frac{w2}{w1} \times 100$$

Here,

w1 = Weight of sample

w2 = Weight of ash

TVB-N and TMA-N

Sample Preparation

Six dried fish were finely homogenized in a homogenizer. 100g of homogenized sample was blended with 300ml of 5% (m/v) TCA. The homogenate was filtered through Whatman No. 1 filter paper to obtain a clear extract.

Distillation

Using a pipette, 5.0 ml of the extract was transferred into the semi-micro distillation apparatus, and 5 ml of 2 M NaOH solution was added. The liberated base was steam distilled into 15ml of 3% Boric acid in a conical flask. Distillation was continued for 15 minutes after which time, the total volume in the flask was 20-25 ml. Four drops of indicator solution (mixed indicator) were added.

Titration

Then titrated to a pale-pink end point with 0.01N HCl. Exactly 1ml of 16% m/v neutralized formaldehyde was added for every 10ml of liquid in the titration flask. The liberated acid was titrated with 0.01M NaOH solution to the same end point.

The first titration is for the determination of TVB-N.

The second titration is for the determination of TMA-N.

Calculation

The TVB-N and TMA-N were calculated from the following Formula:

$$TVB\text{-}N = \frac{14\ (300 + W) \times (15 - V_1)}{500}\ mg/100g$$

$$TMA\text{-}N = \frac{14\ (300 + W) \times V_2}{500}\ mg/100g$$

Where,

V_1 is the volume of standard acid consumed, as indicated by first titration.

V_2 is the volume of acid released, as indicated by the second titration.

W is the water content of the sample (g/100g).

Results and Discussion

After conducting the survey, dry fish species were purchased from a dry fish market of Trishal Upazila. 5 popular dried fish species (Kachki, Loittya, Chela, Chanda and Batasi) were collected and brought to the laboratory of Fisheries Technology Department, Bangladesh Agricultural University, Mymensingh with polybag wrapped box. The results are shown below: In the same way five sundried fish samples were collected from Netrokona Sadar Upazilla. The dried fish samples from Netrokona Sadar Upazilla were Sundried Chela, Sundried Punti, Sundried Chapila, Sundried Kachki, Sundried Tengra. Samples collected from Netrokona Sadar Upazilla were carefully packed in plastic jars for transportation to the laboratory of the Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh. Result of laboratory analysis are stated below.

Detection and identification of filth

Different types of filths were detected in the sun-dried fish samples despite these samples were looking attractive and good sensory condition. The results of visual inspection are presented in tables 3 & 4. Data collected during this research study at Trishal Upazilla under the district of Mymensingh and Netrokona Sadar Upazilla under the district of Netrokona reveal that the sun-dried fish contain some filth which can cause health injury to the consumers. The reason of such filth in sun-dried fish is the ancient processing method (traditional drying) and lack of knowledge on modern fish drying. Improper hygiene, insufficient sanitation, ordinary packaging and storage, transportation, distributiondisplay in market or shop etc. are also responsible for such filth. Polluted/impure water, unclean utensil, equipment, mat used for sun-drying of fish are not up to the standard at all. These findings will be helpful to develop an effective quality assurance plan or programme for producing safe and best quality sun-dried fish product for domestic consumption as well as for export to international market. During sun-drying and subsequent storage in traditional process sun-dried fishes are kept indiscriminately without covering net, cover sheet, without maintaining sanitary condition. As a result, the undesirable materials are deposited on the sun-dried fish. Sometimes sun-dried fishes are covered with dust, sand and other undesirable materials. These undesirable materials are filth. Filth detected and identified in sun-dried fishes of Trishal Upazilla of Mymensingh district are listed in table 3. The identified filth was sand particle, excreta of insects, birds, dead fly, insect part, broken wings of fly are main. According to HACCP and legislation/provision of many countries, mainly EU, presence of such filth makes fish and processed fish unacceptable for consumption. Such filth is hazardous to health but surprisingly the buyers i.e., consumers even traders are not aware, and they do not care the matter but indeed the consumers are being affected which gradually cause some gastrointestinal diseases.

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Table 1: Survey form.

Brief description of product	Example of filth	Types of filth	Intensity	Probable Source
Sun-dried fish Sun-dried Loittya *(Harpadon nehereus)* Sun-dried Chela *(Chela cachius)* Sun-dried Kachki *(Corica soborna)* Sun-dried Batasi *(Clupisoma atherinoides)* Sun-dried Chanda *(Ambasis ranga)*	a) Sand particle b) Dust particle c) Insect part d) Fly part e.g broken wings, broken legs etc. e) Fibre from gunny sac f) Feather from birds g) Stools and excrete from animals, birds	Physical Biological Others	a) Intensity: Heavy Medium Little Insignificant b) Probable source Hazardous to consumers' health: Yes/No	Air, Environment Water Utensil Infestation Faulty drying method

Table 2: Questionnaire.

	Name and address: **Product type:**	
Upazilla:	**District:**	**Division:**
	Date and time:	

Questions:

1. How long have you been doing this trade?
2. How much do you know about, hygiene, cleanliness, sanitation, quality and safety of of these sundried fish above all the infestation by insects in the sundried fish?
3. Do you know what is filth?
4. Do you have any idea on infestation of insects in your products?
5. Do you know how you can retain the quality and keep the sundried fish safe for consumption?
6. Do you have any idea on how you can protect your sundried fish from filth?
7. Have you ever attempted to detect filth in these sundried fish?
8. Do you believe that these sundried fish products may contain sand particle, st dust particle, insect, broken part of insect, excreta of birds, feather of birds?
9. Do you find any complain from customers about filth? Are they aware of it?
10. Are you feeling disturbed or discomfort that we are conducting this survey?

Table 3: Visual inspection of five (5) selected sundried fish for detection of filth in Trishal Upazilla of Mymensingh district.

Sample	Filth Present in the Sample	Types of Filth	Intensity	Probable Source
Sun-dried Loittya *(Harpadon nehereus)*	Sand particles	Physical	Insignificant	Air, Environment
Sun-dried Chela *(Chela cachius)*	Sand particles	Physical	Little	Air, environment, insect and lizards
	Stools, excreta of insect, bird	Biological	Insignificant	
	Fly, /insect parts	Biological	Little	
Sun-dried Kachki *(Corica soborna)*	Sand particles	Physical	Little	Air, environment, insect, storage and transport
	Broken wings of insect	Biological	Insignificant	
	Fibre of gunny sack	Physical	Insignificant	
Sun-dried Batasi *(Clupisoma atherinoides)*	Sand particles	Physical	Insignificant	Air, environment, insect
	Fibre	Physical	Insignificant	
	Insect part	Biological	Insignificant	
Sun-dried Chanda *(Ambasis ranga)*	Sand particles	Physical	Little	Air, environment and insects
	Insect part	Biological	Little	

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Table 4: Visual inspection of five (5) selected sundried fish for detection of filth of Sadar Upazilla.of Netrokona district.

Sample	Filth present in the sample	Types of filth	Intensity	Probable source
Local Name: Chela Scientific Name: *Chela cachius*	Sand particles	Physical	Insignificant	Air, environment
	Fibre	Physical	Little	
Local Name: Punti Scientific Name: *Puntius sophore*	Sand particals	Physical	Little	Air, environment and insect
	Fly/ insect parts	Biological	Little	
Local Name: Chapila Scientific Name: *Gudusia chapra*	Sand particles	Physical	Little	Air, environment, insect, storage and transport
	Fibre	Physical	Insignificant	
Local Name: Kachki Scientific Name: *Coricab soborna*	Sand particles	Physical	Insignificant	Air, environment, insect, storage and transport
	Fiber	Physical	Insignificant	
	Broken wings	Biological	Insignificant	
Local Name: Tengra Scientific Name: *Mystus vittatus*	Sand particles	Physical	Insignificant	Air, environment, insect, storage and transport
	Insect part	Biological	Little	
	Birds feather	Biological	Little	

Sensory quality

Sensory quality assessment by organoleptic examination of the sun-dried fishes is presented in tables 5 & 6. Colour, flavor, texture, broken piece /part of the dried fishes were assessed by organoleptic examination. Almost all species of fishes of this research were of light brown to deep brown colour. Most of the samples possessed characteristic flavor of sun-dried fish. In the container of some species of the sun-dried fishes broken piece was observed but in the container of other species of sun-dried fishes broken piece was not observed. Most of the containers of Sundried Chela *(Chela cachius)*, Sundried Kachki *(Corica soborna)*, and Sundried Chanda *(Ambassis ranga)* contained broken pieces. Comparatively the container of sundried Chela *(Chela cachius)* contained less broken piece. But the container of Sundried Loyitta *(Harpadon nehereus)* and Sundried Batasi *(Clupisoma atherinoides)* did not contain any broken piece. On the basis of the organoleptic examination for sensory quality evaluation sundried Loyitta *(Harpadon nehereus)*, sundried Chela *(Chela cachius)*, and sundried Batasi *(Clupisoma atherinoides)* were excellent and acceptable. The other two species sundried Kachki *(Corica soborna)* and sundried Chanda *(Ambassis ranga)* were good and acceptable. It was reported by the traders that they do not process fish for sun-drying instead they receive the sun-dried fish (freshwater fish) from middlemen from Kishoreganj and sun-dried sea fish from Cox's Bazar. Whole seller, retailer, shopkeepers claim that filthing in fish may took place in the origin. Despite the praiseworthy improvement of sun-drying process in selected places of Bangladesh the overall situation is not at desired level all over the country which we have reported in our previous publication [23].

Table 5: Sensory Quality (Physical and Organoleptic Characteristics) of Dried Fish products of Trishal Upazilla of Mymensingh district.

Dried Fish sample	Color	Flavor	Texture	Broken parts	Overall Quality
Sundried Loyitta *(Harpadon nehereus)*	Deep brown	Characteristics flavor	Mostly firm and elastic	No broken parts	Excellent and acceptable
Sundried Chela *(Chela cachius)*	Deep brown	Characteristics flavor	Firm and elastic	Broken parts were present slightly	Excellent and acceptable
Sundried Kachki *(Corica soborna)*	Light brown	Characteristics flavor	Firm and elastic	Broken parts were present	Good and acceptable
Sundried Batasi *(Clupisoma atherinoides)*	Brown	Characteristics flavor	Mostly firm and elastic	No Broken parts	Excellent and acceptable
Sundried Chanda *(Ambassis ranga)*	Light brown	Characteristics flavor	Firm and less elastic	Broken parts were present	Good and acceptable

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Table 6: Sensory Quality (Physical and Organoleptic Characteristics) of Dried Fish products of Sadar Upazilla.of Netrokona district.

Sample	Organoleptic Quality (Physical Characteristics)	Defect Point	Overall Quality
Sun dried Chela *(Chela cachius)*	Not so fresh, dark appearance, soft texture with characteristics of fresh odor	2.5	Good/Acceptable
Sun dried Punti *(Puntius sophore)*	Not so fresh, dark appearance, slightly broken, soft texture with characteristics of fresh odor	2.3	Good/Acceptable
Sun dried Chapila *(Gudusia chapra)*	Firm and flexible, characteristic odor, slightly broken	2.5	Good/Acceptable
Sun dried Kachki *(Corica soborna)*	Charcteristic odor, firm and flexible, slightly broken	2.5	Good/Acceptable
Sun dried Tengra *(Mystus vittatus)*	Brownish to yellowish, characteristic odor, slightly broken, firm and flexible	1.75	Excellent/Acceptable

Proximate composition of sundried fish samples

Proximate composition of fish depends on some factors of which size, age, season, geographical distribution, feed availability is main. So, the proximate composition of processed fish and fishery products are also influenced by these factors and composition of raw fish from which processed fish and fishery products are prepared. Proximate composition of samples collected from Trishal Upazilla e.g sundried Loittya *(Harpadon nehereus)*, Chela *(Chela cachius)*, Kachki *(Corica soborna)*, Batasi *(Pseudeutropius atherinoides)* and Chanda *(Ambasis ranga)* and samples collected from Sadar Upazilla of Netrokona district e.g. Sundried Chela *(Chela cachius)*, Sundried Punti *(Puntius sophore)*, Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*.were estimated in the laboratory. The results of proximate composition are stated in tables 7 & 8 and figures 3-10.

Table 7: Proximate composition of sun dried fishes of Trishal Upazilla of Mymensingh district.

Sample	Moisture (%)	Protein (%)	Lipid (%)	Ash (%)
Sun-dried Loittya *(Harpadon nehereus)*	15.65±0.24	59.73±1.13	13.22±0.68	14.99±0.31
Sundried Chela *(Chela cachius)*	19.15±0.46	59.33±3.85	8.28±0.60	16.67±0.66
Sundried Kachki *(Corica soborna)*	15.64±0.27	57.08±1.79	14.21±0.85	12.7±3.43
Sundried Batasi *(Clupisoma atherinoides)*	12.52±0.24	36.60±1.51	37.21±0.36	16.53±0.97
Sundried Chanda *(Ambasis ranga)*	13.87±0.20	50.23±0.26	13.73±0.31	22.94±0.77

Table 8: Proximate composition of five (05) sun dried fish species of Sadar Upazilla of Netrokona district.

Fish Species	Moisture (%)	Protein (%)	Lipid (%)	Ash (%)
Sundried Chela *(Chela cachius)*	25.82±0.35	43±0.40	6.6±0.14	15.83±0.59
Sundried Punti *(Puntius sophore)*	19.48±0.21	50.4±0.31	5.3±0.12	16.12±0.11
Sundried Chapila *(Gudusia chapra)*	26.10±0.23	51.28±0.12	9.31±0.15	13.25±0.24
Sundried Kachki *(Corica soborna)*	20.17±0.25	35.12±0.13	5.02±0.22	11.21±0.18
Sundried Tengra *(Mystus vittatus)*	18.02±0.11	54.01±0.10	6.8±0.15	12.02±0.3

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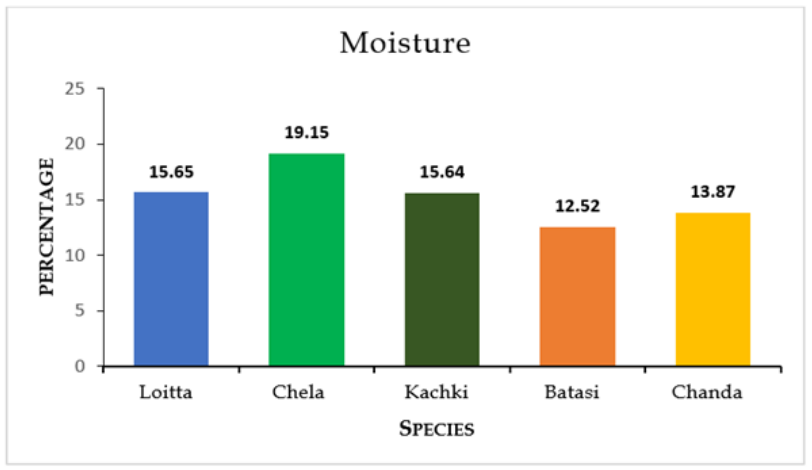

Figure 3: Moisture content (%) of sun dried fishes of Trishal Upazilla of Mymensingh district.

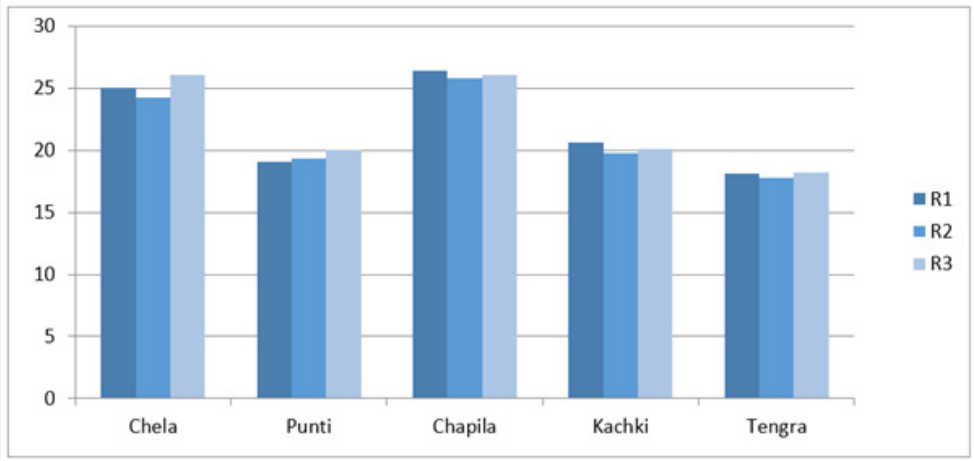

Figure 4: Moisture content (%) of sun dried fishes of Sadar Upazilla of Netrokona district.

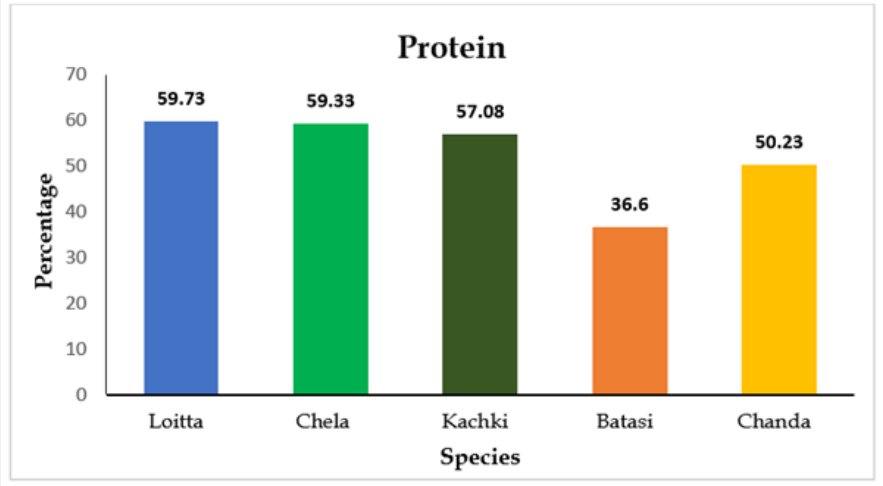

Figure 5: Protein content (%) of sundried fish species collected from Trishal upazilla of Mymensingh district.

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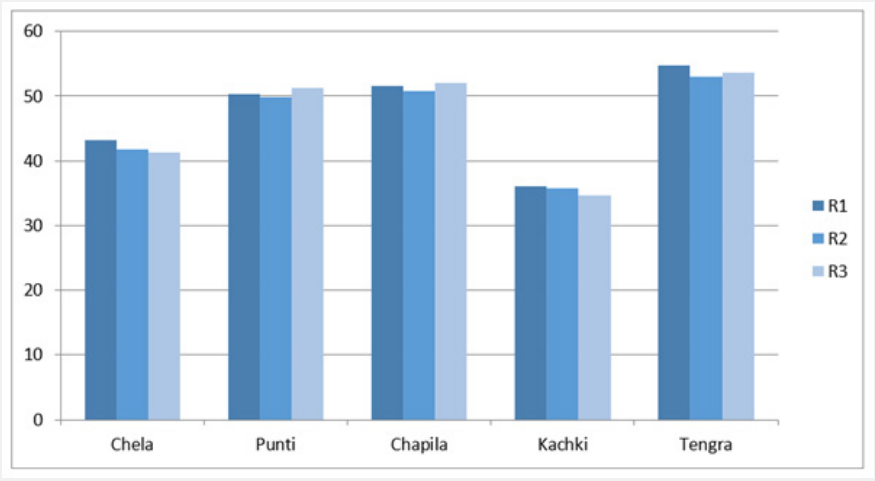

Figure 6: Protein content (%) of sundried fish species collected from Sadar upazilla of Netrokona district.

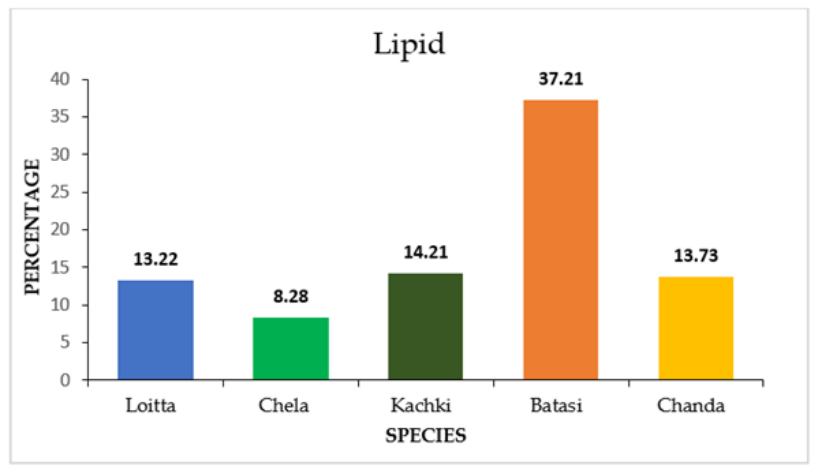

Figure 7: Lipid content (%) of sundried fish species collected from Trishal upazilla of Mymensingh district.

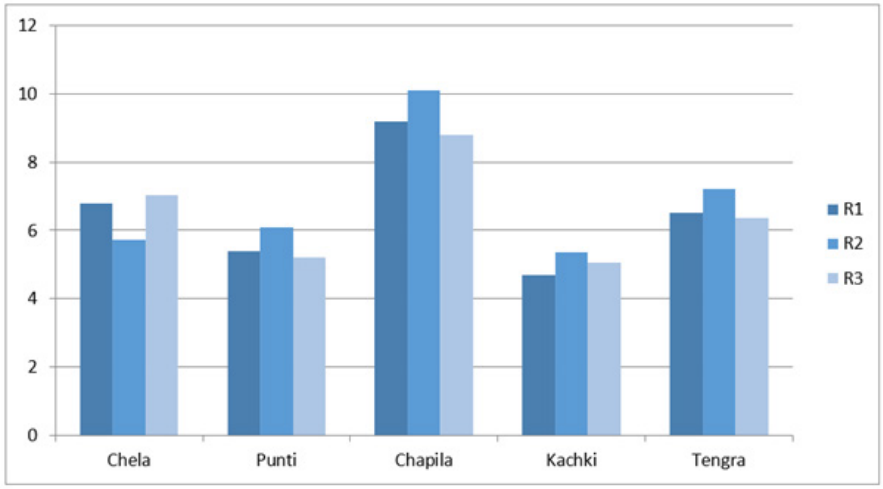

Figure 8: Lipid content (%) of sundried fish species collected from Sadar upazilla of Netrokonadistrict.

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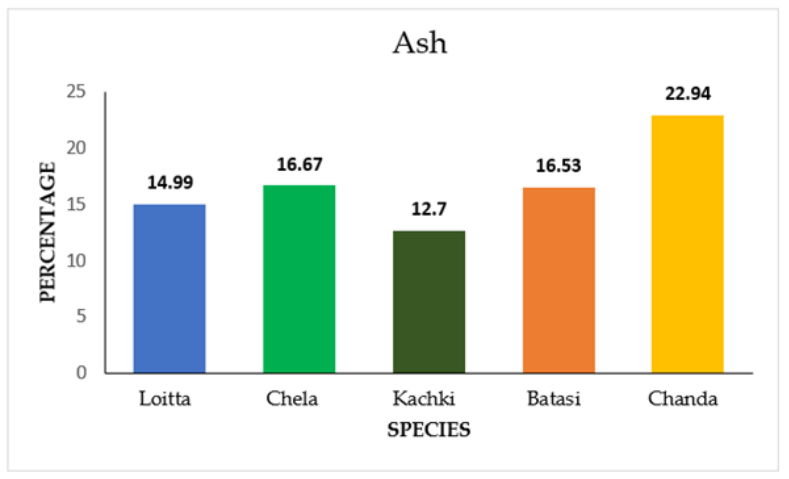

Figure 9: Ash content (%) of sundried fish collected from Trishal upazilla of Mymensingh district.

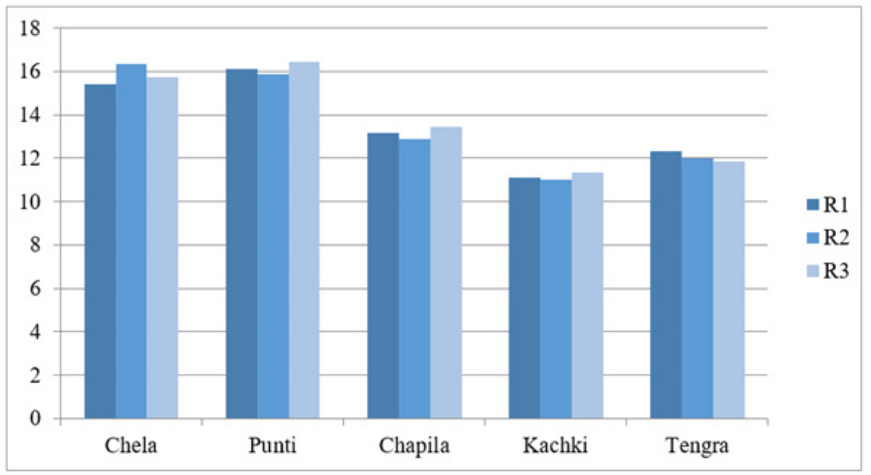

Figure 10: Ash content (%) of sundried fish collected from Sadar upazilla of Netrokona district.

Moisture content

Moisture content (%) of the sundried fishes are mentioned in tables 7 & 8 also in figures 3 & 4. Tables and figures show the moisture content of the sundried fishes collected from Trishal Upazilla of Mymensingh district and samples collected from Sadar Upazilla of Netrokona district. Sundried *Harpadon nehereus* (15.65±0.24), sundried *Chela cachius* (19.15±0.46) and *Corica soborna* (15.64±0.27) which shows they are dried well. But *Clupisoma atherinoides* (12.52±0.24) and *Ambassis ranga* (13.87±0.20) are slightly over dried. The result indicates that the moisture content was lower than the fresh fish which favors proper packaging and good storage.

The moisture content of dried Bombay duck and Silver pomfret collected from different area were found in the range of 19.08 to 25.86% by Enamul Haque et al. [32]. Pravakare et al. [33] found moisture content in sun dried Chinese pomfret, Bombay duck and Ribbon fish as 19.65±0.60, 23.94±0.2 and 27.19±0.27% respectively. Moisture content of five dried fish species eg. Tengra *(Mystus vittatus)*, Taki (Channa punctatus), Chanda *(Ambasis nama)*, Kachki *(Amblypharyngodon microlepin)* and Churi *(Trichuirus haumela)* ranged from 14.06 to 24.58% found by Flowra et al. (2013). Siddique and Aktar [34] found the moisture content of Three Marine Dry Fishes *(Johnius dussumieri*, *Harpadon nehereus* and *Lepturacanthus savala)* during storage as 32.65, 34.99, and 20.50% respectively. The result of the present study is more or less similar to the previous studies by other research with a little difference.

Figure 4 shows the moisture content of the sun-dried fish samples collected from Sadar upazilla of Netrokona district. The species were Sundried Chela *(Chela cachius)*, Sundried Punti

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(Puntius sophore), Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Table 8 indicates the mean value with standard deviation of three replications whereas the Figure 4 shows the values for replication 1, 2 and 3 for each species.

Protein content

Protein content (%) is one of the most important constituents from nutritional point of view. The protein content (%) of sundried fishes collected from Trishal Upazilla of Mymensingh district and Sadar Upazilla of Netrokona district are mentioned in tables 7 & 8 also in figures 5 & 6. The lowest value was found in sundried Batasi *(Clupisoma atherinoides)* which is 36.60±1.51 and the highest value in sundried Loittya *(harpadon nehereus)* which is 59.73±1.13.

Fish are good source of protein. Protein is the most important nutrient of fish. Fish contributes 60% of animal protein requirement of people of Bangladesh [35]. Dried fish contain high amount of protein compared to wet fish. According to protein value dried fish is cheaper than wet fish. Dried fish are available and reasonable in price. That's why poor people can fulfill their protein requirement by consuming low priced dried fish. Also, the selected five (5) dried fishes are good source of protein that can fulfill protein demand and also commercially very important due to their availability. The variation may occur due to habitat, season, sex, and storage condition and water quality. The protein of some sun-dried species found in the present study was more or less similar to the result of previous studies by Pravakar et al. [33], Siddique and Aktar [34].

Figure 6 shows the protein content of the sun-dried fish samples collected from Sadar upazilla of Netrokona district. The species were Sundried Chela *(Chela cachius)*, Sundried Punti *(Puntius sophore)*, Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Table 8 indicates the mean value with standard deviation of three replications whereas the figure 6 shows the values (protein) for replication 1, 2 and 3 for each species.

Lipid content

The lipid content (%) of sundried fishes collected from Trishal Upazilla of Mymensingh district and Sadar Upazilla of Netrokona district are mentioned in tables 7 & 8, also in figures 7 & 8. The lowest value was found in sun dried Chela *(Chela cachius)* and the highest value in sun dried Batashi *(Clupisoma atherinoides)*. Mansur et al. [36] studied lipid content in different processed fish where the lipid content was between 2.15 % to 20.09%. Result of the present study is within the rage found by them. Pravakar et al. [33] found lipid content in sun dried Chinese pomfret, Bombay duck and Ribbon fish as 11.92±0.33, 10.48±0.22 and 11.45±0.16% respectively. Siddique and Aktar [34] found the lipid content of 2 years stored three marine dry fishes (*Harpadon nehereus*, *Johnius dussumieri* and *Leptura-canthus savala*) as 1.92, 0.67 and 1.13% respectively. Result of the present research is supported by the result of the previous studies by the researchers mentioned in this paragraph.

Figure 8 shows the lipid content of the sun-dried fish samples collected from Sadar upazilla of Netrokona district. The species were Sundried Chela *(Chela cachius)*, Sundried Punti *(Puntius sophore)*, Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Table 8 indicates the mean value with standard deviation of three replications whereas the figure 8 shows the values (lipid) for replication 1, 2 and 3 for each species.

Ash content

The ash content (%) of sundried fishes collected from Trishal Upazilla of Mymensingh district and Sadar Upazilla of Netrokona district are mentioned in tables 7 & 8, also in figures 9 & 10. The lowest value was found in Kachki *(Corica soborna)* and the highest was found in Chanda *(Parambassis ranga)*.

Mansur et al. [36] reported ash content (%) in different processed fish where the result ranges between 1.24% to 19.07%. Pravakar et al. [33] found ash content in sun dried Chinese pomfret, Bombay duck and Ribbon fish as 7.21±0.18, 20.06±0.36 and 11.05±0.69% respectively. Siddique et al. [34] observed that the ash level of three marine dry fishes (*Harpadon nehereus*, *Johnius dussumieri* and *Leptura-canthus savala*) was varied from the result of storage period Siddique and Aktar [34] reported the ash content of 2 years stored three marine dry fishes (*Harpadon nehereus*, *Johnius dussumieri* and *Leptura-canthus savala*) as 4.76 ± 0.16, 4.89 ± 0.29 and 4.64 ± 0.38% respectively. Clement and Lovell [12] found that the 20.3% protein, 5.7% fat, 2.3% ash and 75.3% moisture for tilapia fillets. The composition varies with the species, nutritional state, seasonality, age and gonadal conditions. The mineral composition of *T. mossambica* fish are presented in the concentrations of Zn, Fe, Pb, Mn ranged between 1.00 to 2.10, 1.56 to 3.46, 0.01 to 0.11 and 0.89 to 2.42mg/100g respectively. This similar observation has been observed.

Ash content of the samples collected from Sadar upazilla of Netrokona district are stated in table 8 as well as in figure 10 like the other parameters (Figure 10).

Figure 10 shows the ash content of the sun-dried fish samples collected from Sadar upazilla of Netrokona district. The species were Sundried Chela *(Chela cachius)*, Sundried Punti (Puntius sophore), Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Table 8 indicates the mean value with standard deviation of three replications whereas the figure 10 shows the values (ash) for replication 1, 2 and 3 for each species.

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Total Volatile Base- Nitrogen (TVB-N)

TVB-N value of the sundried fishes collected from Trishal Upazilla of Mymensingh district and Sadar Upazilla of Netrokona district are mentioned in tables 9 & 10; also in figures 11 & 12. The TVB-N content of sun dried Loittya *(Harpadon nehereus)*, Chela *(Chela cachius)*, Kachki *(Corica soborna)*, Batasi *(Clupisoma atherinoides)* and Chanda *(Ambasis ranga)* were 98.42±1.96, 73.19±2.14, 55.68±1.12, 64.46±0.94 and 37.26±1.78 respectively (Tables 9 & 10) (Figures 11 & 12). The lowest value was found in sun dried *Parambassis ranga* and the highest value was in sun dried *Harpadon nehereus*.

Table 9: TVB-N content of five (5) selected dried fish of Trishal Upazilla of Mymensingh district.

Sample	TVB-N Value (mg/100g sample)
Sundried Loitta *(Harpadon nehereus)*	98.42±1.96
Sundried Chela *(Chela cachius)*	73.19±2.14
Sundried Kachki *(Corica soborna)*	55.68±1.12
Sundried Batasi *(Clupisoma atherinoides)*	64.46±0.94
Sundried Chanda *(Ambasis ranga)*	37.26±1.78

Table 10: TVB-N content of five (05) selected sun dried fish species of Sadar Upazilla of Netrokona district.

Name of Sample	Average of TVB-N Value (mg/100gm value)
Chela *(Chela cachius)*	35.86±1.20
Punti *(Puntius sophore)*	34.82±0.5
Chapila *(Gudusia chapra)*	32.92±0.7
Kachki *(Corica soborna)*	37.75±0.35
Tengra *(Mystus vittatus)*	17.61±0.41

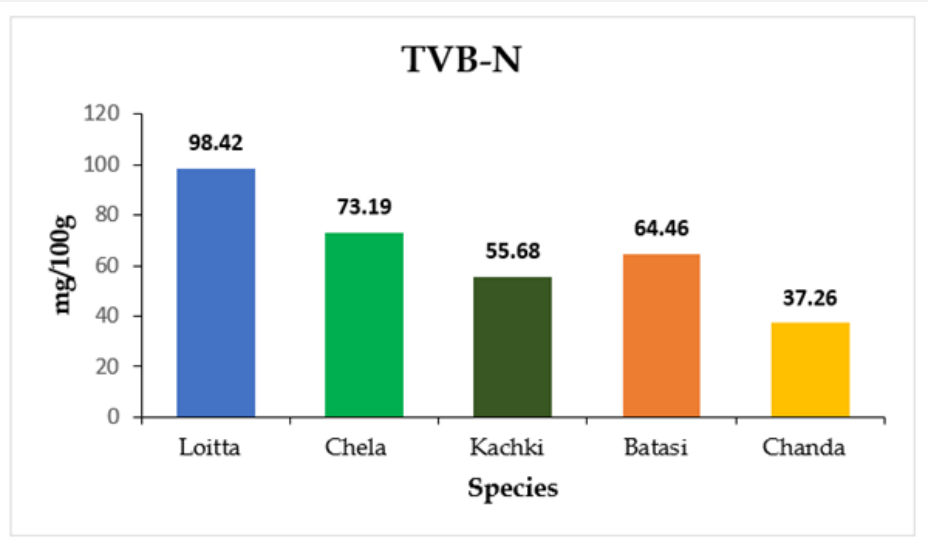

Figure 11: TVB-N content (mg/100g sample) of selected sun dried fish available at Trishal Upazilla of Mymensingh district.

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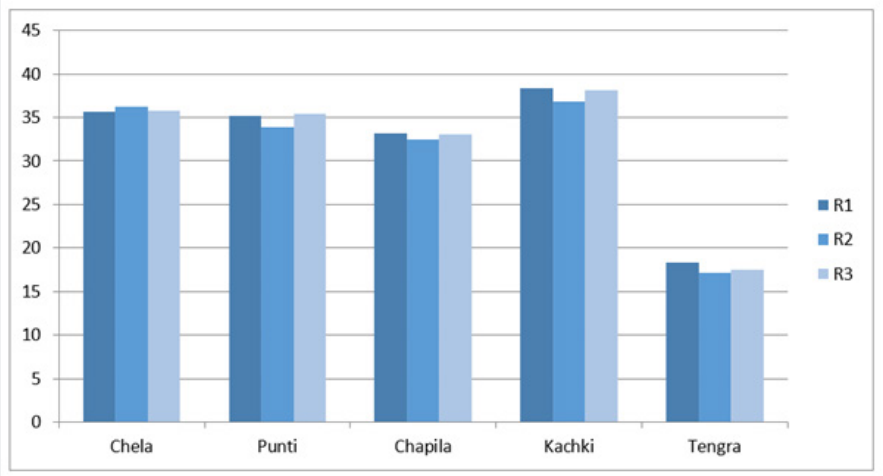

Figure 12: TVB-N content (mg/100g sample) of selected sun dried fish available at Sadar Upazilla of Netrokona district.

Figure 12 shows the TVB-N content of the sun-dried fish samples collected from Sadar upazilla of Netrokona district. The species were Sundried Chela *(Chela cachius)*, Sundried Punti *(Puntius sophore)*, Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Table 10 indicates the mean value with standard deviation of three replications whereas the figure 12 shows the values (TVB-N) for replication 1, 2 and 3 for each species.

Pravakar et al. [33] found Total Volatile Base Nitrogen (TVB-N) content in sun dried Chinese pomfret, Bombay duck and Ribbon fish as 17.55±0.88, 11.51±0.86 and 20.37±0.71 mg/100g respectively. According to Connell [37] the TVB-N content should not greater than 100-200mg/100g for a variety of salted and dried fish products. Mansur et al. [38] reported that the Total Volatile Base Nitrogen (TVB-N) content of fresh Herring *(Clupea harengus)* and Mackerel *(Scomber scombrus)* were 7.48±0.86 (mg/100g) and 9.0±0.90 (mg/100g) and the TVB-N content in salted *Clupea harengus* and *Scomber scombrus* were 74.87±1.62 (mg/100g) and 16.0±1.14 (mg/100g) check again. Therefore, it is concluded that the TVB-N content of the fish is variable and dependent upon the method of extraction during determination TCA extract and Perchloric acid extract produce different result by same method. The findings of the study are very close to the previous studies and it is within the acceptable limit.

Tri-Methyl Amine Nitrogen (TMA-N)

TMA-N value of the sundried fishes collected from Trishal Upazilla of Mymensingh district and Sadar Upazilla of Netrokona district are mentioned in tables 11 & 12; also in figures 13 & 14. The TMA-N content of sun dried Loitta *(Harpadon nehereus)*, Chela (*Chela cachius*), Kachki (*Corica soborna*), Batasi (*Clupisoma atherinoides*) and Chanda *(Ambasis ranga)* were 8.64±0.86, 9.16±1.06, 6.21±0.78, 6.86±2.10 and 7.92±1.62 respectively (Tables 11 & 12) and (Figures 13 & 14). The lowest value was found in sundried *Corica soborna* and the highest value was in sundried *Chela cachius*.

Table 11: TMA-N value of five (5) selected sundried fishes of Trishal Upazilla of Mymensingh district.

Sample	TMA-N Value mg/100g sample)
Sundried Loitty*a* *(Harpadon nehereus*)	8.64±0.86
Sundried Chela *(Chela cachius)*	9.16±1.06
Sundried Kachki *(Corica soborna)*	6.21±0.78
Sundried Batasi *(Clupisoma atherinoides)*	6.86±2.10
Sundried Chanda *(Ambasis ranga)*	7.92±1.62

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Table 12: TMA-N value of five (05) selected sun dried fish species of Sadar Upazilla. of Netrokona district.

Name of Sample	Average Value of TMA-N (mg/100 gm sample)
Chela *(Chela cachius)*	13.11±0.11
Punti *(Puntius sophore)*	10.66±0.21
Chapila *(Gudusiachapra)*	14.10±0.12
Kachki *(Coricasoborna)*	12.23±0.10
Tengra *(Mystusvittatus)*	9.53±0.23

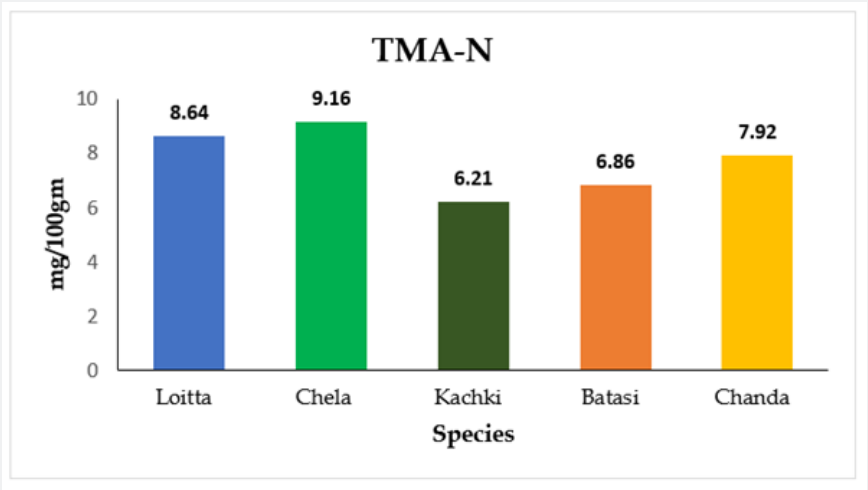

Figure 13: TMA-N content (mg/100mg) of selected sundried fish fish available at Trishal Upazilla of Mymensingh district.

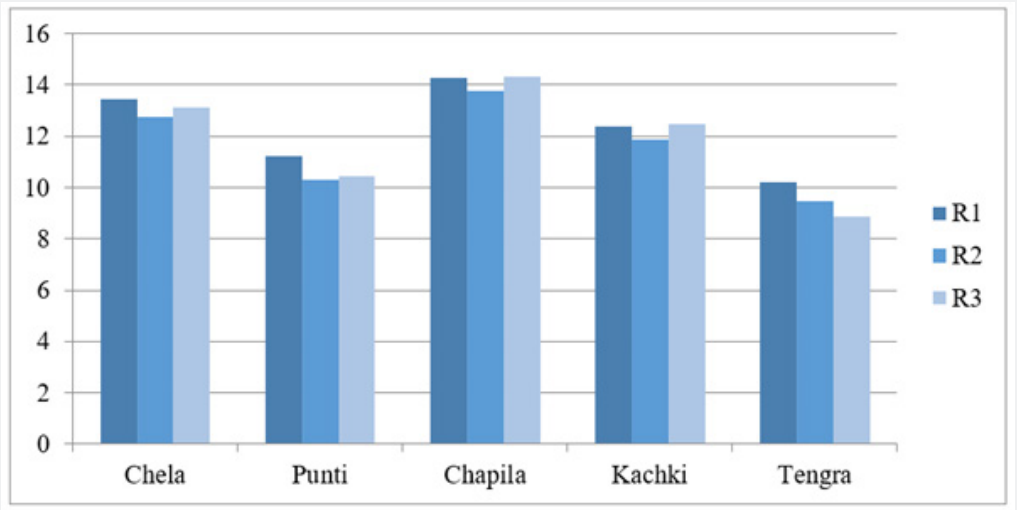

Figure 14: TMA-N content (mg/100mg) of selected sundried fish fish available at Sadar Upazilla of Netrokona district.

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Figure 14 shows the TMA-N content of the sun-dried fish samples collected from Sadar upazilla of Netrokona district. The species were Sundried Chela *(Chela cachius)*, Sundried Punti *(Puntius sophore)*, Sundried Chapila *(Gudusia chapra)*, Sundried Kachki *(Corica soborna)*, Sundried Tengra *(Mystus vittatus)*. Table 12 indicates the mean value with standard deviation of three replications whereas the figure 14 shows the values (TMA-N) for replication 1, 2 and 3 for each species.

TVB-N and TMA-N tests are useful for measuring spoilage in fish and fishery products caused by autolytic enzymes and putrefactive bacteria. These two parameters are applicable to chilled, frozen, dried, salted, canned fish products. Connell [37] recommended that not more than 1.5mg TMAN/100g product is very good quality cod for pre-packaging and 10-15mg TMAN/100g is usually regarded as the limits beyond which round, whole chilled fish can be considered too spoiled for most uses. He also mentioned the normal range of TVB-N and TMA-N in the chilled fish, frozen fish, salted and dried fish products. A range of not more than 100 – 200 mg TVB-N/100g is specified for a variety of salted and dried fish. Malle and Poumeyrol [39] reported that the level of TMA found in fresh fish rejected by sensory panels varies between fish species but is typically around 10 - 15mg/100g TMA-N in aerobically stored fish and at level of 30mg TMA-N / 100 g in packed cod. Mansur et al. [22] reported that the Tri-Methyl Amine Nitrgen (TMA-N) content in Herring *(Clupea harengus)* and Mackerel *(Scomber scombrus)* was 2.6±1.29 and 4.0±1.14 (mg/100g) and the TMA-N content in salted *Clupea harengus* and *Scomber scombrus* were 6.2±1.73 and 12.0±2.16 (mg/100g) respectively. Ali et al. [40] Reported that the acceptable amount of TMA varies from 6.81 ±.17 to 13.25±21mg/100g, 13.57±37 to 26.40±.25mg/100g is moderately acceptable whereas 33.12±.11 mg/100mg is just acceptable, 39.37±.33 to 71.41±.35mg/100mg is unacceptable for shrimp.

In the present research the TVB-N and TMA-N value were within the acceptable limit. Both the TVB-N and TMA-N content of the sun-dried fishes indicated that there was very little deterioration took place by autolytic enzymes and putrefactive bacteria during processing. Also, time elapse between fish catch and sun-drying was minimum that means avoided undue delay in processing [41,42].

In this research we have found that the sensory quality, proximate composition, TVB-N and TMA-N of the sundried fishes collected from Trishal Upazilla of Mymensingh district and Sadar Upazilla of Netrokona district indicate that these sun-dried fishes are of acceptable sensory quality, possessed good proximate composition and minimum spoilage i.e., acceptable quality. Result of these analyses are mentioned in the tables 5, 7-12. But if the filth (Tables 3 & 4) is taken into consideration it can be said that these sundried fishes are not safe for consumers' health. Extraneous filth (all foreign particles) e.g. sand, broken piece of insect, waste (excreta) of insect and bird, rodent excreta, dead mosquito, legs of mosquito, wings of fly make all types of food unfit for human consumption. In the EU all types of processed fish are subjected to visual inspection to detect parasite and filth before issuing permission to place in market for sale. Presence of any type of parasite, filth which are visible must not be placed in the market for sale for human consumption. In the USA there are some protocols for this purpose. Situation is same in many developed countries. All these inspection, visual examination for filth detection are done to protect consumers' health. In the present study a number of filths have been detected in the sun-dried fishes. Such filth is not acceptable when compared with EU, USA etc. Because such filth is usually harmful for consumers' health. Such filth causes many types of gastrointestinal disease. In the present research it was also found that people are not aware of the adverse effect of filth, similarly processors and traders are not aware of the adverse effect of filth present in sun-dried fish. Sun-dried fish trade is a good trade and people are eating with satisfaction because they do not know about filth and its adverse effect on stomach health, gastro-intestinal problem etc.

Probable reason behind the presence of filth in sun-dried fish may be the faulty and ancient method. Fish is dried in open field, no covering, no protection from insect, bird, rat, cat, during sun-drying, transportation, storage and sale. There is no landing centre, so fishes are kept in clay on the bank of the river and on sand in the coast which is the main source of such filth in the final product. Processors do not have knowledge on safety, hygiene, quality etc. Cleanliness is not followed. Fishes are not washed in any step after catch. Handling, transportation, storage, display is not perfect. Neither the processors nor the traders are aware of filth. Even the consumers do not know what the filth is. Because of such unawareness of the people a valuable and nutritious food is regarded as unfit for human consumption. It is a loss for the fishermen, processor, traders and so on. Such situation can be improved by proper planning and growing awareness of consumers, training of fishermen, processors, traders.

Conclusion

On the basis of the result of this research the following conclusions may be drawn:

a) Sensory quality i.e. organoleptic characteristics of the sun-dried fishes were acceptable.

b) The proximate composition (moisture, protein, lipid and ash) of these sun-dried fishes was of excellent quantity.

c) Total Volatile Base Nitrogen (TVB-N) and Trimethyl Amine Nitrogen (TMA-N) of the sundried fishes were within acceptable level with a few exceptions.

d) Some filths were detected in sundried fish by visual examination which indicates that the sun-dried fish of the present research is unfit for consumption. It also indicates that sun-

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drying process is still ancient type and unsafe in some places of Bangladesh.

Result shows that sundried fish possess good nutritional composition, sensory quality is quite acceptable and overall quality by chemical check was excellent. But presence of filth causes loss of such valuable human food in the international market. Considering these facts, the quality and safety of sundried fish need to be improved despite considerable improvement has been made in some places.

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References

1. DoF (2019) Annual Report 2018. Department of Fisheries, Bangladesh. Ministry of Fisheries and Livestock. Government of the People's Republic of Bangladesh, p. 64.
2. DoF (2022) Yearbook of Fisheries Statistics of Bangladesh 2020-21. Department of Fisheries, Ministry of Fisheries and Livestock, Government of the People's Republic of Bangladesh, pp. 124.
3. Doe PE, Ahmed M, Muslemuddin M, Sachithananthan K (1977) A polythene tent drier for improved sun drying of fish. Food Technology in Australia pp. 437-441.
4. Coulter JP, Disney JG (1987) The handling, processing and marketing of fish in Bangladesh. Overseas Development Natural Resources Institute (ODNRI), Bulletin No. 1.
5. Mukharjee S, Bondyapadhya S, Bose AN (1990) An improved solar dryer for fish drying in the coastal belt. J Food Sci Tech 27: 175-177.
6. Hall GM (1994) Fish Processing Technology. In: (eds.), Reprinted. Blackie Academic and Professional, Glassgow, UK. pp. 309.
7. Horner WFA (1994) Preservation of Fish by Curing (drying, salting and smoking). In: GM Hall (eds), Fish Processing Technology, Blackie Academic and Professional, (Reprinted), Glassgow, UK p. 31-71.
8. Ashraful MAK, Khan YSA (2001) Insect's infestation and Preventive Measures in Dry Fish Storage of Chittagong, Bangladesh. Online Journal of Biological Science 1(10): 963-965.
9. Banu CP, Nahar B, Ahmed K (1985) Studies on the Protein, Riboflavin and Iron Content of Some Fresh Water Fish and a Prawn of Bangladesh. Bangladesh Journal of Zoology 13(1): 25-28.
10. Love RM (1980) The chemical biology of fishes. In: (11th edn.), Academic Press. New York and London, Uk, pp. 467.
11. Abolude DS, Abdullahi SA (2005) Proximate and mineral contents in component parts of Clarius garipenus and Synodontis schall from Zaria, Nigeria. Nigerian Food Journal 23: 1-7.
12. Clement S, Lovell RT (1994) Comparison of processing yield and nutrient composition of cultured Nile tilapia *(Oreochrormis niloticus)* and channel catfish. Aquaculture 119(2-3): 299-310.
13. Chowdhury MF (1981) A study on the chemical composition and nutritive quality of some fresh water zeol fishes of Bangladesh. MS Thesis, BAU, Mymensingh, Bangladesh.
14. Mansur MA, Gheyasuddin S, Bhuiya AKMA (1990) Preparation of a new ready-to-use dried semi-fermented fish product of increased shelf life from Puntius sp. Bangladesh Journal of Fisheries 19(1): 27-32.
15. Rahman AAR, Haider S, Jansen EG (1994) Environment and Development of Bangladesh, Dhaka. University Press Ltd., Dhaka, Bangladesh.
16. Banu AN, Hasan M, Islam A (1995) Bacterial load in pond water of Bangladesh. Journal of Fisheries Resources 5(1): 43-48.
17. Huss HH (1995) Quality and Quality Changes in Fresh Fish. FAO Fisheries Technical Paper No.348, Food and Agriculture Organization (FAO) of the United Nations, Rome, Italy.
18. Hossain MN, Jamil MGM, Mia MM, Uddin MN, Mansur MA (2017) Studies on the proximate composition, quality and heavy metal concentration of two sun-dried marine fish (sun-dried silver pomfret and sun-dried perch) of Cox's Bazar district of Bangladesh. J Environ Sci Natural Resources 10(1): 25-32.
19. Council Directive (1991) Laying down the health conditions for the production and the placing on the market of fishery products. 91/493/EEC. Official Journal of the European Communities. No. L 268/15-34.
20. Reza MS, Bapary MAJ, Islam MN, Kamal M (2009) Optimization of marine fish drying using solar tunnel dryer. Journal of Food Processing and Preservation 33(1): 47-59.
21. Reza MS, Mansur MA, Kamal M (2021) Organoleptic, Chemical, Microbiological Quality and Heavy Metal Safety of Traditionally Dried Marine Fish of Bangladesh. In: Current Research in Agricultural and Food Science. Chapter 11. A.M. M. Al-Naggar, (eds.), Book Publisher International, India 3: 129-142.
22. Mansur MA, Rahman S, Khan MNA, Reza MS, Kamrunnahar US, et al. (2013) Study on the quality and safety aspect of three sun-dried fish. African Journal of Agricultural Research 8(41): 5149-5155.
23. Mansur MA, Reza MS, Paul SK, Hossain MA, Roy MC, et al. (2021) A study on identification of filth and quality assessment of some popular sun-dried freshwater fish products in sadar upazilla of Dinajpur district of Bangladesh. World Journal of Advance Healthcare Research 5(6): 41-49.
24. Mansur MA, Uddin MN, Haider MN, Reza MS, Md Mubarack Hossain, et al. (2022) Composition and quality of indigenous freshwater schilbeid catfish *(Pangasius pangasius)* of Bangladesh and consumers' response to a new product prepared from this species. World Journal of Advance Healthcare Research 6(4): 47-55.
25. Nadia U, Hazarika P, Handique PJ (2016) Biochemical Quality Assessment of Ten Selected Dried Fish Species of Northeast India. International Advanced Research Journal in Science, Engineering and Technology 3(1): 30-33.
26. Han F, Huang X, Mahunu GK (2016) Exploratory review on safety of edible raw fish per the hazard factors and their detection methods. Trends in Food Science & Technology 59: 37-48.
27. Jamil MGM, Hossain MN, Mia MM, Mansur MA, Uga S (2017) Studies on the Proximate Composition, Quality and Heavy Metal Concentration of Sun-Dried Bombay Duck and Sun-Dried Ribbon Fish of Cox's Bazar District of Bangladesh. Journal of Environmental Science & Natural Resources 10(1): 55-60.
28. Paul PC, Reza MS, Islam MN, Kamal M (2018) Quality Assessment of Traditionally Dried Marine Fish of Bangladesh. Asian Food Science Journal 1: 1-11.
29. Howgate PA, Johnson P, Whittle KJ (1992) Multilingual Guide to EC freshness grades for fishery products. Torry Research Station, Aberdeen. Food Safety Directorate, Ministry of Agriculture, Fisheries and Food, UK. pp. 9.

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DOI: 10.19080/OFOAJ.2022.15.555905

30. A.OAC (1965) Official methods of analysis. Association of Official Analytical Chemists. 10th edition, Washington DC, USA.

31. AMC (Analytical Methods Committee) (1979) Recommended general methods for the examination of fish and fish products. Analyst 104: 434-450.

32. Enamul H, Kamruzzaman M, Shofikul I, Tanvir S, Shaikh SR. (2013) Assessment and Comparison of Quality of Solar Tunnel Dried Bombay Duck and Silver pomfret with Traditional Sun-Dried Samples. International Journal of Nutrition and Food Sciences 2(4): 187-195.

33. Pravakar P, Mansur MA, Asadujjaman M (2013) Quality and Safety Aspects of Three Sun-Dried Marine Fish Species: Chinese Pomfret *(Stromateus chinensis)*, Bombay Duck *(Harpodon nehereus)* and Ribbon Fish *(Trichiurus haumela)*. World Journal of Zoology, 8(4): 381-387.

34. Siddique MAM, Aktar M (2011) Changes of nutritional value of three marine dry fishes (*Johnius dussumieri*, *Harpodon nehereus* and *Lepturacanthus savala*) during storage. Food and Nutrition Sciences 2(10): 1082-1087.

35. DoF (2019) Yearbook of Fisheries Statistics of Bangladesh, 2018-19. Fisheries Resources Survey System (FRSS). Department of Fisheries, Bangladesh: Ministry of Fisheries and Livestock 36: 135

36. Mansur MA, Uddin MN, Jamil MGM, Manik MM, Karmakar M (2017) Quality and safety aspect of some traditionally processed freshwater fish and fishery products of Mymensingh district in Bangladesh. International Journal of Current Research 9(11): 61867-61872.

37. Connell JJ (1980) Control of Fish Quality. In: (4th edn.), published 1995. Fishing News Books, a division of Blackwell Scientific Ltd.

38. Mansur MA (1995) Biochemical and textural aspects of the ripening of pickled Herring *(Clupea harengus)*. Ph.D. thesis, University of Hull, England, UK, pp. 229.

39. Malle P, Pounmeyrol M (1989) A new chemical criterium for the quality control of fish, Trimethylamine /Total Volatile Basic Nitrogen (%). Journal of Food Protection 52(6): 419-423.

40. Ali MY, Sharif MI, Adhikary RK, Faruque MO (2010) Post mortem variation in Total Volatile Base Nitrogen (TVB-N) and Trimethylamine Nitrogen (TMA-N) between Galda *(Macrobrachium rosenbergii)* and Bagda *(Penaeus monodon)*. University Journal of Zoology Rajshahi University 28: 7-10.

41. Mansur MA, Islam MN, Chakraborty SC, Chaity F (1990) A comparative study on the traditional and solar tent dried fish. Bangladesh Journal of Fisheries 13(1&2): 33-39.

42. US-FDA (2020) ORA Lab Manual, Microbiological and Filth Analysis 4(4): 1-78.

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