

Volume III Issue II

# SPLASH AND SHOALS



**DEPARTMENT OF  
INDUSTRIAL FISH AND FISHERIES**

**Brahmananda Keshab Chandra College  
111/2, B.T. Road, Bonhooghly, Kolkata - 700108**

# SPLASH AND SHOAL

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**FROM THE PRINCIPAL'S DESK**

Department of Industrial Fish and Fisheries who have been publishing their departmental newsletter "Splash and Shoal" since July, 2020, have published five issues so far. Each issue has been much resourceful and informative with articles related to fisheries and aquaculture written by eminent scientists, researchers, fisheries professionals and students. This is the second issue of third volume wherein the articles published are very informative and thought provoking too.

My best wishes to the concerned faculty and students who are associated with this endeavor.

*Papia Chakraborti*

Dr. Papia Chakraborti  
Principal  
Brahmananda Keshab Chandra College  
Kolkata

**FROM EDITOR'S DESK**

*“Without sound conservation and management measures, fisheries will quickly become depleted and a basic component of global food security will be lost” – Sigmar Gabriel*

So, it is high time to take proper measures to conserve the global fisheries resources through sustainable management and this can only happen if the basic knowledge of fisheries and aquaculture will reach to each and every corner of our society. People should know about the present status, problems, and probable solutions related to aquaculture and fisheries to make them aware of the management measures to be taken.

Students are the backbone of our society and revolutionary steps related to conservation and management of fisheries resources can be strengthened only by active engagement of them. So with this view, the Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata took the initiative to publish the biannual (January and July) departmental newsletter “*Splash and Shoa*” from July 2020 engaging the students of the department. They have been motivated to go through the recent trendy topics of aquaculture and fisheries and write articles on those. The purposes are to enhance their knowledge and to spread the same information among their peers to channelize the same into the society further. Apart from our departmental students, articles written by fisheries experts and professionals have been published from time to time in the newsletter.

This is the II<sup>nd</sup> Issue of III<sup>rd</sup> Volume and following the same trend of the last three issues, we have published this issue in the bilingual mode. In total four articles have been published in this issue, and we hope that, just like earlier issues, our valued readers will show their love for this issue too. Appreciation as well as criticism, if any is most welcome.

Dr. Sandipan Gupta  
Editor  
Splash and Shoal

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## GUEST COLUMN



## Newer opportunities in rural women entrepreneurship and involvement in fishery and aquaculture sectors in West Bengal

**Subrato Ghosh**

Assistant Fishery Officer  
Directorate of Fisheries  
Government of West Bengal

Many women in rural West Bengal, mostly in the form of women-led Self Help Groups (SHGs) and some Primary Cooperative Societies, are gaining interest in farming of air-breathing catfishes and/or freshwater exotic aquarium fishes in rectangular cement cisterns (RCC; 2000-3000 litre each) constructed in 25-40 sq.mt homestead land, and also preparation of on-farm (home-made), formulated, floating pellet-type feed for cultivable economically-important freshwater food fishes and aquarium fishes in small scale (as cottage industry). We have heard about women preparing prawn pickles, shrimp meal from low-valued small-sized brackish water and marine shrimps after sun-drying. Sun-drying and salt-curing of less economically-important brackish water and marine fin-fishes in clean open areas adjacent to fishing harbours and fish landing centres, hand braiding and repairing of marine fishing nets are largely done by women. In addition to these, there exist other prospectful avenues of women participation, their empowerment and livelihood options in fishery and aquaculture sectors in West Bengal. Women at Haldia, Purba Medinipur are maintaining brooders of Pengba fish *Osteobrama belangiri*, a new candidate species for freshwater pisciculture, in hapa net enclosures in homestead ponds. They are doing breeding, seed production, rearing to higher stages and selling fry/fingerling of Pengba for income. They have obtained training in fish seed production in controlled condition, preparation of fish pickle, fish papad, glass aquarium construction, fishing net making, preparation of decorative and ornamental products from dried fish body scales. Preparation of pickles from small, naturally-occurring, freshwater fin-fishes (sometimes left unsold in fish markets or captured in good amounts from village ponds after dewatering/drag netting) like Punti *Puntius sophore*, *Pethia ticto*, Kanchan punti *P. conchonius*, Chela *Salmostoma bacaila*, Mourola *Amblypharyngodon mola*, Kholsa *Colisa fasciatus*, Chanda *Chanda nama* and their value addition can be taken up by women in small-scale to begin with. Under DC Schemes of ATMA of State Agriculture Department, women SHG members obtained success in production of high-priced design pearls by nucleus implantation and surgery technique in freshwater bivalve *Lamellidens marginalis* maintained in suspended-type

cages in fish culture ponds. Fish silage is a liquefied product prepared from less-economically important brackish water and marine fishes caught by marine fishermen in coastal districts. As alternative source of protein in supplementary feeds of calves, cattle, poultry birds and farmed pigs, its production is a women-friendly enterprise. Collection of Geri-gugli *Bellamya bengalensis*, Shamuk *Pila globosa* and Jhinuk *L. marginalis* from pisciculture and normal freshwater village ponds and sale of molluscan meat in fish markets for human consumption is an established medium-scale trade at Mecheda, Purba Medinipur, done by two groups of poor elderly SC/ST women. After gaining skill and knowledge, women in towns and sub-urban areas can adopt indigenous Biofloc- or semi-Biofloc based farming in round non-concrete 6000-10000 lit tanks constructed in home premises for high-valued fishes like Koi *Anabas testudineus*, Tengra *Mystus vittatus*, *M. cavasius*, Pabda *Ompak pabda*, Singhi *Heteropneustes fossilis*. Presence of women is predominant in breeding and seed production of live bearer aquarium fishes (in 18 inch diameter earthen pots 'gaamla' and further in discarded earthen sweet curd containers 1-2 kg capacity) and goldfish (in glass tanks or small RCC having *Hydrilla* sp, *Vallisneria* sp or mops) and sale; also extended in activities like aquarium fish packaging, live food collection for the fishes, preparing decorative aquarium accessories like water filter, thermostat, artificial ornamental plants, colorful pebbles and stones, air-stone, light fittings, toys, plastic hand net/scoop net. Village women can successfully participate in major carp seed rearing from 72-hour old spawn till fry and further till fingerling stage in well-maintained earthen nursery and rearing ponds near homes, also in Indian major carp-poultry bird integrated farming system in small- to medium-scale with inclusion of *A. mola*. Fattening of mud crabs *Scylla serrata* and *S. olivacea* in 1-2 decimal tide-fed brackish water impoundments and production of soft-shell crabs individually in floating boxes in small-scale is not impossible for women SHGs. Collectively women members can be trained in vermicomposting; fish farming in submerged-type cages in wetlands; cultivation of small, indigenous, nutritious and threatened fin-fishes in small backyard ponds (both for aquaculture diversification and conservation); blue-green algae

*Spirulina* sp. and duckweed *Azolla* sp. cultivation in RCC. Presence of employed women is increasingly observed in washing, grading, icing, freezing, packing of good-quality farmed brackish-water shrimps *Penaeus monodon* and *Litopenaeus vannamei* meant for export in hygienic condition in private shrimp processing plants, preparation and preservation of value-added minced fish based food products, preparation of frozen fillets from mackerel, tuna and other fin-fishes. Some rural women in Purba Medinipur and other districts apply supplementary feed (both dough balls and floating pellets) in grow-out major carp and giant prawn culture ponds in morning; they put in efforts seriously, work for some income to support their families. They

possess knowledge on stocking density of fingerlings of different fin-fishes both in monoculture and polyculture as per effective water area and depth of ponds, understood the importance of checking fish pond water parameters routine wise, killing predatory fishes before seed stocking but only with recommended plant-based toxicants. Their Indigenous Technological Knowledge cannot be underestimated. Collection, segregation and sale of naturally-occurring *P. monodon* seeds from brackish water rivers and creeks in Indian Sundarbans region is done by women, but this practice is not recommended, has destructive impact and poses threat to natural finfish and shellfish diversity.

## STUDENT COLUMN



## মাছ চাষের মুশকিল আসান

বাপন মণ্ডল

পঞ্চম সেমিস্টার

ইন্ডাস্ট্রিয়াল ফিস ও ফিসারিস বিভাগ

ব্রহ্মানন্দ কেশব চন্দ্র কলেজ

সাধারণত মাছের রোগ হয় না। এই আশ্চর্যজনক নীরোগ থাকাকাটা ই মৎস্য বিজ্ঞানের সাফল্য। বিজ্ঞান মেনে চাষ করলে মাছের রোগ বালাই ঠেকিয়ে রাখা যায়। তাই কথায় আছে “Prevention is better than cure”। দরকার শুধু মাছের সঠিক পরিবেশ রক্ষা ও মাছের যথাযথ পুষ্টির ব্যবস্থা। মাছ যেন অস্বস্তি বা স্ট্রেসে না থাকে সেটাই লক্ষ্য রাখতে হয় মাছ চাষিকে। সেই কারণেই কিছু মূল্যবান উপকরণের গুনাগুণ ও ব্যবহারের মাপ জেনে রাখলে মাছ চাষে মুশকিল আসান সম্ভব।

## চুন

“পান্ডা ভাতে নুন, আর মাছ চাষে চুন”- দুটো খুবই জরুরী। চাষীদের প্রথমেই চুন সম্পর্কে সঠিক একটা ধারণা থাকা খুব প্রয়োজন। পাথুরে চুন মানে হল ক্যালসিয়াম কার্বোনেট বা  $CaCO_3$ , যাকে চুনা পাথর অবস্থায় পাহাড়ে পাওয়া যায় এবং একে পোড়ালে কার্বন ডাই অক্সাইড উড়ে গিয়ে পড়ে থাকে ক্যালসিয়াম অক্সাইড। এই ক্যালসিয়াম অক্সাইড-এর সাথে জল মেশালে বিক্রিয়া করে তৈরী হয় ক্যালসিয়াম হাইড্রক্সাইড। এই ক্যালসিয়াম হাইড্রক্সাইড হল পুকুরে ব্যবহারযোগ্য চুন।

পুকুরে পরিমাণ মতন চুন প্রয়োগ করলে যা যা লাভ হয়, তা হলঃ মাটি ও জলের অম্লতা কমিয়ে ক্ষারত্ব বাড়াই; মাটি ও জলের হার্ডনেস (কার্বোনেট ও বাই-কার্বোনেট) বাড়াই; জলের ঘোলাটে ভাব কমায় (ঋনাত্মক তড়িৎধর্মী মাটি কণাকে ধনাত্মক করে); মাছের দেহ পরিষ্কার রেখে রোগ জীবাণু থেকে দেহকে পরিষ্কার রাখতে সাহায্য করে; মাটি ও জলের রোগ জীবাণু এবং ক্ষতিকর কীটপতঙ্গ ও পরজীবী ধ্বংস করে; মাছের হাড় ও মাংসপেশীর সঠিক গঠনে সহায়তা করে; চিংড়ি ও কিছু প্রাণীকণার খোলস তৈরিতে সাহায্য করে। চুন জলের অতিরিক্ত কার্বন-ডাই-অক্সাইডকে বেঁধে আন্তঃ-আনবিক ক্ষেত্র ফাঁকা করে মুক্ত বায়ুর অক্সিজেনের প্রবেশাধিকার বাড়িয়ে মাছের শ্বাসকষ্টকে কম করতে সহায়তা করে।



পুকুরে চুন প্রয়োগ

প্রয়োগ মাত্রা - প্রতি মাসে একর প্রতি ১৫-২০ কেজি ব্যবহার করা যেতে পারে; তবে জল ও মাটির গুণগত মানের ওপর এই পরিমাণটা কমতে ও বাড়তে পারে।

## পটাসিয়াম পারম্যাঙ্গানেট

“মাছের গায়ে হলে ক্ষত, পটাসিয়াম পারম্যাঙ্গানেট দিও পরিমাণ মতো”। পটাসিয়াম পারম্যাঙ্গানেট একটি ভালো মানের জীবানুনাশক। যে কোন মাছ চাষে পটাসিয়াম পারম্যাঙ্গানেট ব্যবহার করা যায়; এটি মূলত মাছে অল্প পরিমাণে ক্ষত রোগ দেখা দিলে সেটা নিরাময় করতে সাহায্য করে। এটি পুকুরে জীবানুনাশক হিসাবেও যথেষ্ট পরিমাণে ব্যবহৃত হয়ে থাকে।

যদি সম্ভব হয়, ক্ষত রোগে পুকুরের সমস্ত মাছ জাল দিয়ে এক জায়গায় এনে পটাসিয়াম পারম্যাঙ্গানেট দ্রবণে কিছুক্ষণ স্নান করিয়ে নিলে ভাল ফল পাওয়া যায়। পটাসিয়াম পারম্যাঙ্গানেট মাছের হ্যাচারিগুলোতে breeding pool ও hatching pool-এ ব্যবহার করা হয় ব্যাকটেরিয়া ও ছত্রাক-এর আক্রমণ থেকে বাঁচানোর জন্য। এছাড়াও মাছ পুকুরে ছাড়ার আগে পটাসিয়াম পারম্যাঙ্গানেট এ (১-২ গ্রাম/৫ লিটার জলে) ১-২ মিনিট রাখার পর ছাড়লে ভালো ফল পাওয়া যায়।

প্রয়োগ মাত্রা - ২৫০-৩০০ গ্রাম/ একর (৪-৫ ফুট জলের গভীরতায়) জলে মিশিয়ে ছিটিয়ে প্রয়োগ করলে ব্যাকটেরিয়া ও ছত্রাক জাতীয় রোগ দমনে ভালো ফল পাওয়া যায়।



পুকুরে পটাসিয়াম পারম্যাঙ্গানেট-এর প্রয়োগ

## বেনজালকোনিয়াম ক্লোরাইড (BKC)

“BKC-এর ব্যবহার জানবে যখন, মাছ চাষ হবে আসান তখন”- এটি একটি বহুল ব্যবহৃত শক্তিশালী জীবানুনাশক ও জল



পরিশোধক তরল রাসায়নিক পদার্থ; মাছ চাষের বিভিন্ন সমস্যা দূরীকরণে যার বিশেষ ভূমিকা আছে। বাজারে প্রচলিত মাছের রোগের বহু ওষুধের আসল উপাদান এই BKC, তাই একে মহৌষধি ও বলা যেতে পারে।

BKC প্রয়োগে যে সকল সুবিধাগুলি পাওয়া যায় তা হলঃ ক্ষতিকর ব্যাকটেরিয়া, ভাইরাস ও ছত্রাক জনিত রোগের প্রতিকার ও প্রতিরোধ; পুকুর প্রস্তুতির সময় তলদেশের জীবাণুমুক্তকরণ; মাছের বিভিন্ন রোগ যেমন ফুলকা পচা, পাখনা পচা, লেজ পচা, চিংড়ির ছল কাটা রোগ প্রতিরোধ; পুকুরের জল শোধন ইত্যাদি। চিংড়ির খোলস পাল্টানো তরান্বিত করতেও এটি কার্যকর। এটির প্রয়োগে পুকুরের প্রাকৃতিক খাদ্যের কোন প্রকার ক্ষতিসাধন হয়না।

প্রয়োগ মাত্রা – পুকুরে ১২০০ মিলিলিটার প্রতি একরে (৪-৫ ফুট জলের গভীরতায়); জলে মিশিয়ে ছিটিয়ে প্রয়োগ করতে হবে।

### সোডিয়াম ক্লোরাইড

“মাছের spawn to fry and fry to fingerling, সব জায়গাতেই লবণের ব্যবহার অপরিহার্য”। মাছ চাষ ও পরিবহনে লবণের ব্যবহারে খরচ কম, উপকার বেশী। মাছ চাষের পুকুরে বিভিন্ন কারণে লবণ প্রয়োগের প্রয়োজন হতে পারে। তবে কোন কোন ক্ষেত্রে লবণ প্রয়োগ করতে হবে সেটা জানতে হবে। হ্যাচারিতে ও পোনা পরিবহনে লবণের ব্যবহার বিভিন্ন কারণে হয়ে থাকে যেমন মাছের ও পোনার কন্ডিশনিং করে শক্তি বৃদ্ধি করা; মাছের ডিমে ছত্রাক সংক্রমণ নিয়ন্ত্রণ করা। চাষের পুকুরে লবণের ব্যবহারগুলি হল – মাছের বাহ্যিক পরজীবী ও জীবাণু নিয়ন্ত্রণ; পুকুরের জলের নাইট্রাইট বিষাক্ততা কমানো বা নিরসন; মাছের খাদ্যে প্রয়োগ করে খাদ্য গুণ বৃদ্ধি করা; বায়োফ্লক বা Recirculatory Aquaculture System-এ ক্ষতিকর ব্যাকটেরিয়া ও ছত্রাক দমন এবং নাইট্রাইট নিয়ন্ত্রণ করা; রোগ প্রতিরোধ ক্ষমতা বৃদ্ধি এবং মাছের শরীরে শ্লেষ্মা (mucus) বাড়ানো।

প্রয়োগ মাত্রা - মিষ্টি জলের পুকুরে ৩০-৩৫ কেজি প্রতি একরে; জলের সাথে গুলে ছিটিয়ে প্রয়োগ করতে হবে।

### কোলিন ক্লোরাইড

“কোলিন ক্লোরাইড এর ব্যবহারটা জানতে পারলে পরিপাটি,

তবেই না মাছের বৃদ্ধিতে আসবে দারুণ গতি”। মাছ চাষের পুকুরে সরাসরি সার বা অনুখাদ্যের ন্যায় কোলিন ক্লোরাইড জলে গুলে ছড়ালে মাছের বৃদ্ধিতে চমৎকার গতি আসে; থমকে থাকা বৃদ্ধি বা রোগজনিত কারণে না হওয়া বৃদ্ধিতেও কাজ দেয়। পুকুরে স্বাভাবিক মাত্রায় সার, চুন, খাবার ইত্যাদি ব্যবহার হচ্ছে অথচ লক্ষণীয় বৃদ্ধি হচ্ছে না, সেক্ষেত্রে বৃদ্ধির হার বাড়াতে কোলিন ক্লোরাইড –এর ভূমিকা অসাধারণ।

প্রয়োগ মাত্রা – মাছের বৃদ্ধির সময় (চৈত্র থেকে আশ্বিন) খুব সামান্য পরিমাণে (৯০০-১০০০ গ্রাম প্রতি একরে) কোলিন ক্লোরাইড ১৫-২০ দিন অন্তর নিয়মিত প্রয়োগ করলে মাছ চাষি নিশ্চিত করতে পারেন সর্বাধিক বৃদ্ধি বা ফলন। যে পুকুরে যৎসামান্য পলি আছে, সেখানে কোলিন ক্লোরাইড -এর কার্যকারিতা চোখে পড়ার মতো।

### আয়োডিন

“পুকুরের জলে হয়েছে দুর্গন্ধ, পরিমাণ মতো আয়োডিন দিলে হবে সব বন্ধ”। এটি একটি বাদামী বর্ণের বহুল ব্যবহৃত শক্তিশালী জীবাণুনাশক ও জল পরিশোধক তথা পরিবেশবান্ধব তরল রাসায়নিক পদার্থ; মাছ চাষের বিভিন্ন সমস্যা দূরীকরণে যার বিশেষ ভূমিকা আছে। এটি ৫% বা ১০% জলীয় দ্রবণ (পোভিডোন আয়োডিন) এবং ১৬% অ্যালকোহলীয় দ্রবণ (আয়োডোফর) হিসাবে পাওয়া যায়। বর্তমানে আয়োডোফর দুস্প্রাপ্য এবং উচ্চমূল্যযুক্ত হওয়ায় পোভিডোন আয়োডিন মাছ চাষিদের ভরসা।

এটি মাছের রোগ জীবাণুনাশক। জলের পচা ভাব, জলের দূষণ, ফেনাযুক্ত জল, জলের দুর্গন্ধ ইত্যাদি নিয়ন্ত্রণ করে। নিয়মিত ও পরিমিত প্রয়োগে মাছকে সুস্থ রাখে। সর্বোপরি মাছে লেজ ও পাখনা পচা, এবং মহামারী ক্ষত রোগে এটি একটি মহৌষধ।

প্রয়োগ মাত্রা - পোভিডোন আয়োডিন একর প্রতি (জলের সর্বোচ্চ ৫ ফুট গভীরতার জন্য) ১২০০ মিলিলিটার জলে গুলে প্রয়োগ করতে হয়। এটি পুকুরের জল ও মাছের স্বাস্থ্য রক্ষায় নিয়মিত এক – দেড় মাস অন্তর ব্যবহার করা যেতে পারে।

## ALUMNA COLUMN



## বাংলা ও বাঙালির জীবন সংস্কৃতিতে ইলিশ

শ্রীতমা বোস

ব্লক প্রযুক্তি ব্যবস্থাপক

কৃষি দপ্তর

পশ্চিমবঙ্গ সরকার

বাঙালিরা চিরকাল ভোজনরসিক জাতি নামে প্রসিদ্ধ। আর এই বাঙালির সাথে ইলিশের সম্পর্ক বড়ই মধুর ও গভীর। বাংলাদেশের জাতীয় মাছ ইলিশ যা পশ্চিমবঙ্গের “স্টেট ফিস”-এর স্বীকৃতি পেয়েছে। মাছের মধ্যে বাঙালির কাছে আদি যুগে যেমন ইলিশের কদর ছিল, আজও তেমনি আছে। অথচ খাওয়ার সময় খুব ধৈর্য সহকারে সুক্ষ কাঁটাগুলো বেছে ফেলতে হয়। একটি ইলিশ মাছে প্রায় নয় হাজারের বেশী কাঁটা থাকতে পারে। আর এই কারণেই দু’শো বছর রাজত্ব করেও ইংরেজরা ইলিশকে ব্রাত্য করে রেখেছিল। বর্তমানে দূরদর্শনে এক পানীয় সংস্থা তাদের স্বাদ ও গন্ধের মাহাত্ম্য বোঝাতে বাঙালির ইলিশ কেনার খুঁতখুঁতানির অভ্যাসকে তুলে ধরেছে। বাঙালির কাছে ইলিশের নাম উঠলেই বাকি সব মাছ অন্ধকারাচ্ছন্ন হয়ে যায়, একা সে ইলিশ বাঙালির খাদ্যরসনার আকাশে সূর্যের মতো উজ্জ্বল হয়ে জ্বলে।



বাঙালির আচার-বিচারের সাথেও ইলিশের সম্পর্ক সুপ্রাচীন। বসন্ত ঋতুর শুক্লা পক্ষে সরস্বতী পূজার সময় গৃহস্থ ঘরে জোড়া ইলিশ নিয়ে আসা অত্যন্ত শুভ বলে মনে করা হয়। পূর্ববাঙলায় লক্ষ্মী পূজার দিনে লক্ষ্মী ঠাকুরকে জোড়া ইলিশ দেওয়ার রীতি ছিল। বাঙলায় বিশ্বকর্মা পূজার দিন বাজারে ইলিশের ব্যাপক চাহিদা থাকে। এপার বাঙলার মানুষজনের কাছে রামাপূজার আয়োজন ইলিশ ছাড়া অপূর্ণই থেকে যায়। ভুবনেশ্বর, কটক, ময়ূরভঞ্জ এবং উড়িষ্যা রাজ্যের অন্যান্য জেলায় একটি কথা প্রচলিত আছে “মাছো খাইবা ইলিশি, চাকিরি করিবা পুলিশি”। অর্থাৎ ইলিশ মাছের মতো মাছ খাওয়ার আনন্দ পুলিশি বিভাগে চাকরী করার সমতুল্য। উড়িষ্যা ও পশ্চিমবঙ্গ দুই রাজ্যেই পয়লা বৈশাখ বহু বাড়িতে পান্তাভাতের সাথে ইলিশ মাছ ভাজা, শুটকি মাছের একটি পদ, আচার, ডাল, কাচা লংকা, আর পেঁয়াজ অতিথিদের খেতে দেওয়া হয়।

বাঙালির সাহিত্যেও ইলিশের অবাধ যাওয়া – আসা; প্রায় ১০৭ বছর আগে রামলাল বন্দ্যোপাধ্যায়ের “কষ্টিপাথর” নাটকে দেখা যায় “নবীন একজোড়া ইলিশ কিনে সকলকে তা দেখিয়ে আহ্বাদিত হয়ে রাস্তা

দিয়ে চলেছে”। অধ্যাপক ডঃ দেবজ্যোতি চক্রবর্তী তাঁর এক লেখায় উল্লেখ করেছেন “রবীন্দ্রনাথের জ্যেষ্ঠপুত্র নৌকা ভর্তি ইলিশ মাছ কিনে মাটি চাপা দিয়ে সার তৈরী করেছিলেন”। শুনলে অবাধ হতে হয় যে পদ্মানদীতে তখন প্রচুর ইলিশ মাছ ধরা পড়তো জেলেদের জালে, তারা সেই ইলিশের পেট চিরে ডিম বের করে নিয়ে জলে ফেলে দিত; এ গল্প আছে কবিগুরুর পল্লীপ্রকৃতিতে।

বাঙালি ছাড়াও অন্যান্য খাদ্যপ্রিয় জাতি ইলিশের স্বাদগ্রহণে নিজেদের রসনা মজাতে সমর্থ হয়েছে। সত্যেন্দ্রনাথ ঠাকুর তাঁর আত্মজীবনীতে লিখেছেন, “ইলিশের স্বাদে ওখানকার খাদ্যরসিকরাও লালায়িত হয়ে সিন্ধুনদীতে মাটির কলসী ভাসিয়ে এক অভিনব পদ্ধতিতে “পাল্লামাছ” (আঞ্চলিক নাম পাল্লা বা নালা) ধরতো। সিন্ধু প্রবাসে আছে “পাল্লা মচ্ছি খানা, সিন্ধু মুলুক ছোড়কে নাহি জানা”। পারসিরা বাঙালিদের মতো ইলিশ পাতুরি খায়, স্থানীয় নাম “পত্রানি মাচ্ছি”।

ইলিশ মাছকে বলা হয় “Icon of Bengali cuisine”। ইল মানে গমন করা বা চরা, তাঁর সাথে কতবাচা ক্লিপ্ প্রত্যয় যোগ হওয়ার পর “ঈশ” (প্রধান) শব্দটি যুক্ত হয়ে সংস্কৃত “ইল্লিশ” থেকে বাঙলা শব্দ ইলিশের উৎপত্তি, যার অর্থ অতি স্বাদুতা প্রযুক্ত যে জলচরের মধ্যে শ্রেষ্ঠ।

আর শুধু কি বাঙালির রসনা তৃপ্তি বা আচার অনুষ্ঠানেই ইলিশ তার গণ্ডি বেঁধে রেখেছে; বাঙালির রোয়াক – কালচারেও তার অবাধ বিচরণ। মোহনবাগান- ইস্টবেঙ্গল তথা ঘাট –বাঙাল লড়াইতেও তার সাবলীল উপস্থিতি। এই লড়াইতে পূর্ববঙ্গের তথা ইস্টবেঙ্গল সমর্থকদের



সগৌরব পরিচিতি দেয় ইলিশ; তাই ইস্টবেঙ্গল “ডার্বি” জিতলে পরদিন বাজারে ইলিশের দাম যায় বেড়ে।

**STUDENT COLUMN**



**Caviar– Pearls from fish’s belly**

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“Choice first course dish in five star hotels,  
Avant-garde meal of well-prepared sturgeon eggs,  
Vintage gourmet meals,  
Inspires chefs to prepare special dishes,  
Awesome,  
Refined to titillate connoisseurs’ palates”

Above one is the poem written by poet John Sensele on caviar and this rightly depicts the delicacy of this item.

**What is caviar?**

Caviar is salt-cured unfertilized eggs or roe of different sturgeon fish species. It is regarded as one of the rarest and valuable fish products, which is often associated with royalty and fine foods. Caviar is the most popular edible roe product worldwide and valued due to its high nutritive value, being rich in

high quality protein, polyunsaturated fatty acids (PUFA) and vitamins i.e. vitamins A, B, C, D and E.

**Where does caviar come from?**

The most valued genuine caviar is obtained from more than 20 sturgeon species endemic to the Caspian and Black Sea. The high valued black caviar is obtained from beluga sturgeon (*Huso huso*), Russian sturgeon (*Acipenser gueldenstaedtii*), Persian sturgeon (*Acipenser persicus*), Sevruga sturgeon (*Acipenser stellatus*), Sterlet sturgeon (*Acipenser ruthenus*) and Siberian sturgeon (*Acipenser baerii*). Black caviar can also be obtained from sturgeon’s inferior related paddlefish (*Polyodon spathula*), which is an acipenseriform species native to the Mississippi-Missouri drainage in USA. The reduction in Caspian and Black Sea sturgeon caviar availability has resulted in heightened



attention towards caviar products from non-sturgeon species as substituent. The non-sturgeon fish roe can be similarly processed as genuine caviar but they are instead termed as “fish roe”, not caviar and obtained from non-sturgeon fish species, such as Salmon, Lumpfish, Herring, Tobiko (Flying fish), Imitation Tobiko, Cod, Catfish, Shad, Mullet, Orange roughy, Hake, Pollock, Sea urchin, Sea cucumber and Crustaceans.

This should be kept in mind that roe from sturgeon is commonly known as caviar; roe from other non-sturgeon species cannot be considered as “true caviar”.

### How many types of caviar are there?

Black sturgeon caviar is ranked first among the world caviar production, which is further classified based on the type of sturgeon fish producing it and may be differently named according to processing methods. These are:

**Beluga Caviar:** Beluga caviar is caviar consisting of the roe (or eggs) of the beluga sturgeon *Huso huso*. Beluga caviar is the most expensive type of caviar with market prices, at the beginning of the millennium, ranging from \$7,000 to \$10,000/kg. Beluga eggs are very large; range in color from light grey to black, and has a smooth, buttery flavor. It is considered the first-class most delicately flavored caviar.

**Ossetra and Imperial Caviar:** Fine-grained roe, gray-green or brown colored roe obtained from Russian sturgeon (*Acipenser gueldenstaedtii*) and Persian sturgeon (*Acipenser persicus*), respectively. Ossetra caviar is one of the most prized and expensive types of caviar.



**Sevruga Caviar:** Sevruga caviar is one of the highest priced varieties of caviar, eclipsed in cost only by the Beluga and Ossetra varieties. It is harvested from a variety of critically endangered sturgeon fish species that are known for their small, grey colored eggs. In Eastern Europe, it is harvested from the Sevruga sturgeon (*Acipenser stellatus*), the Sterlet sturgeon (*Acipenser ruthenus*) and the Siberian sturgeon (*Acipenser baerii*), which are native to the Caspian Sea and the surrounding rivers. Because the Sevruga sturgeon was once the most common

and fastest to reproduce, this made Sevruga caviar the most commonly found of the sturgeon caviars, and the most inexpensive of the three main types of sturgeon caviar – Beluga, Ossetra and Sevruga. It has been estimated that about half the caviar production comes from Sevruga. Sevruga caviar eggs are a pearly grey, and smaller in size than other sturgeon. The flavor is more pronounced than other varieties, often described as saltier, but it can vary depending on the origin of the fish.

### Non-sturgeon fish roe (caviar substitute)

**Salmon roe (Ikura):** It is the most popular sturgeon roe substitute. Salmonid fish eggs are red in color, larger in size than sturgeon caviar, i.e., chum eggs are 4-5 mm in diameter whereas that of Chinook salmon reaches 7 mm in diameter, processed with less amount of salt and possess a less fishy flavor than sturgeon caviar. The eggs are disconnected from connective tissue and cured to produce the “Ikura”, sold by harvesters in Alaska.

Salmon roe is mostly produced from Pacific salmon, with pink salmon (*Oncorhynchus gorbuscha*) and chum salmon (*O. keta*) being the most popular, followed by sock-eye (*O. nerka*), Chinook (*O. tshawytscha*) and coho (*O. kisutch*). Arctic char (*Salvelinus alpinus*), Atlantic salmon (*Salmon salar*) and aquacultured rainbow trout (*O. mykiss*) are also used for caviar production due to its availability in large quantities.

**Hake roe:** Roe skeins obtained from Atlantic hakes (*Merluccius hubbsi*).

**Lumpfish roe:** A popular and moderately priced caviar substitute obtained from Lumpfish (*Cyclopterus lumpus*). It is small-sized (2-5 mm) with gray-white roe color when immature, which upon ripening become reddish-orange in color. Lumpfish roe was reported to better survive pasteurization than other caviar products and can be processed by a high salt level and low water content amount and hence to exhibit longer shelf stability.

**Flying fish or Tobiko roe:** A small (2 mm or less in diameter) crisp, golden orange roe obtained from flying fish or Tobiko (*Cheilopogon furcatus*).

**Imitation Tobiko:** Roe obtained from herring (*Clupea* sp.) and small capelin (*Mallotus villosus*) owing to the short supply of Tobiko.

**Mullet roe (Karasumi):** A yellowish red colored roe obtained from Mullet (*Mugil cephalus*) with a rubbery texture. It is prepared either as salted product or salted and dried, named as “Karasumi”. It contains a large wax esters content which makes it to possess a unique chewy mouth feel.

**Catfish roe:** Roe obtained from channel catfish (*Ictalurus punctatus*) which is smaller in size than other species and serves as a black caviar substitute with many applications in gourmet food.

**Orange roughy roe:** Orange roughy (*Hoplostethus atlanticus*) is another source of roe containing a large wax esters content which makes it a good substitute for sperm whale (*Physeter catodon* and *P. microcephalus*) oil.

**Shad roe:** Roe harvested from anadromous

member of herring family, i.e., *Alosa sapidissima*, harvested from North American watersheds and Atlantic Coast.

**Herring roe (Kazunoko):** A small sized (1.3-1.5 mm diameter), creamy white to yellow colored roes obtained from Pacific herring (*Clupea pallasii*) and Atlantic herring (*C. harengus*). It is sold as cured whole egg skeins which are named yellow diamond roe or “kazunoko”.

**Cod roe (Tarako):** Roe obtained from cod [*Gadus morhua* (Atlantic cod) and *G. microcephalus* (Pacific cod)] after being salted and aged for several months prior to its consumption.

**Pollock roe (Mentaiko):** A popular roe in the Japanese and Korean markets which is obtained from Alaska or walleye pollock (*Theragra chalcogramma*). It is formed of whole pairs of skeins with an intact oviduct which is brined, cured and may be red dyed and/or flavored.

**Sea urchin roe:** A common roe-based product contains the gonadal tissue of sea urchin viz. purple urchin (*Strongylocentrotus intermedius*), red sea urchin (*S. franciscanus*) and green urchin (*S. pulcherrimus*). The quality of sea urchin roe is determined by its color with orange is the most preferred.

**Sea cucumber roe:** It is the dried gonads of sea cucumber (*Stichopus* sp.) which is fifty times more expensive than sea cucumber muscles.

**Crustaceans roe:** Gravid female shrimp, lobster and crab are also sources of roe which are frequently added to seafood cuisines or sold canned products.

### History of caviar delicacy

Caviar and sturgeon from the Sea of Azov began reaching the tables of aristocratic and noble Greeks in the 10th century, after the commencement of large-scale trading between the Byzantine Empire and Kievan Rus'. The first known record of caviar goes all the way back to the 4th century B.C., when the Greek scholar Aristotle praised sturgeon eggs as a delicacy. However, the Russian Tsars truly delivered caviar into the world of luxury. Caviar grew popular in Russia during the 12th century, when fishermen of the Volga River recognized the value of the rare golden roe from Sterlet sturgeon. In the 16th century, it was delivered to the European royal court and Russian imperial table. From there, it would spread to all countries across Europe. By the 19th century, Russian caviar became a luxury product throughout the international market. Iran started its own caviar industry as well, producing this delicacy at the highest standard. Meanwhile, America's caviar industry took off in 1873. German immigrant Henry Schacht opened a sturgeon fishing business on the Delaware River. The west coast followed suit and started harvesting sturgeon roe from the Columbia River. American waters were abundant with sturgeon during this time, making U.S. the top caviar producer in the world. By the 1900s, sturgeons were so overfished that they nearly became extinct. This caused the

price of caviar to skyrocket. Prices were so high by the 1960s that people began to seek new sources of domestic caviar. Today, 18 of 27 sturgeon species are endangered due to overfishing. That's why producers have turned to more sustainable aquaculture practices to make caviar more economically feasible and environmentally friendly.

### Nutritional value and health benefits of caviar

Caviar has a rich nutritional profile. It has been recognized as a rich source of high quality protein; thus has been considered as a food of highly nutritive value. It is also a good source of  $\omega$ -3 Poly Unsaturated Fatty Acid (PUFA), such as docosahexaenoic (22:6n-3, DHA) and eicosapentaenoic (20:5n-3, EPA) acids. Good amount of vitamins and minerals are also available in caviar.

100 gm of caviar has the following nutritional quality

Calories 264 Kcal

Water: 47.5 gm

Protein: 24.6 gm

Threonine: 1.263 gm

Tryptophan: 0.323 gm

Lysine: 1.834 gm

Leucine: 2.133 gm

Isoleucine: 1.035 gm

Valine: 1.263 gm

Methionine: 0.646 gm

Phenylalanine: 1.071 gm

Fats: 17.9 gm

Saturated fatty acids: 4.060 gm

Polyunsaturated fatty acids: 7.405 gm

Monounsaturated fatty acids: 4.631 gm

Carbohydrates: 4 gm

Vitamin A: 905 IU

Vitamin D: 117 IU

Vitamin B<sub>1</sub>: 0.19 mg

Vitamin B<sub>2</sub>: 0.62 mg

Vitamin B<sub>5</sub>: 3.5 mg

Vitamin B<sub>6</sub>: 0.32 mg

Vitamin B<sub>12</sub>: 20  $\mu$ g

Potassium: 181 mg

Magnesium: 300 mg

Calcium: 275 mg

Sodium: 1.5 gm

Iron: 11.88 mg

Zinc: 0.6 mg

Selenium: 65.5  $\mu$ g

Phosphorus: 356 mg

Caviar has numbers of health benefits which are as follow:

**1. Anti-ageing effect:** As caviar is rich in omega-3 fatty acids, caviar improves skin by slowing down aging, improving skin firmness and reducing dryness. It has been reported that DHA from caviars produces adiponectin, which is anti-inflammatory in nature; also helps in wound healing; promotes collagen production and prevents damage to collagen. Collagen is vital to reduce signs of skin ageing.

**2. Improve mental health and heart condition:**

Omega-3 fatty acids help in improving mental health. It has been reported that omega-3 fatty acids help in fighting away inflammation which in turn improves mental health. They reduce the cognitive decline seen in Alzheimer's disease.

Omega-3 fatty acids also can act as a preventive measure and help to manage the risk factors related to cardiac arrest. They prevent oxidative damage to the heart and reduce inflammation in the heart.

As caviar is rich in omega-3 fatty acids, it thus helps to improve the mental health and heart condition.

**3. Improve blood cholesterol and lower blood pressure:**

It has been reported that Omega-3 fatty acids lower triglyceride levels in the blood. Additionally, they increase good cholesterol levels. They also prevent blood clotting. Therefore, reduce the risk of high blood pressure. Additionally, they have antioxidant properties; thus reduce oxidative stress. On the other hand, omega-3 fatty acids help in reducing heart rate and stiffness of blood vessels; thus lower blood pressure by promoting smooth flow of the blood.

Due to enriched presence of omega-3 fatty acids in caviar, consumption of caviar may improve blood cholesterol level and lower blood pressure.

**4. Improve fertility:** Recent researches have shown that PUFAs can improve fertility. They particularly enhance male fertility. Sperms have a subsequently high DHA content. Low levels of DHA might reduce the quality of sperms. Omega-3-rich food enhances sperm health. They improve fluidity, sperm shape, and structure, helping the sperm to bind to eggs easily. Therefore, it improves the chances of conception. Due to the presence of high PUFAs in caviar, it may improve fertility.

**5. Supports immune system:** Selenium and omega-3 fatty acids improve immunity. Caviars are rich in both these nutrients. Therefore, they help to improve immune function. In addition, omega-3 fatty acids help in reducing inflammation. They also restore skin's barrier. Thus, protecting the lungs and intestines and restricting the entry of harmful pathogens. Besides, they help to repair damaged white blood cells. Selenium aids in regulating immune responses. Reports suggest that selenium improves the function of antibodies. They increase the production of antibodies and macrophages, which strengthen the immune system.

**6. Anticancer effect:** Caviars are an excellent source of selenium. As per scientific reports, selenium has anti-cancer properties; it prevents the growth of cancer cells and also protects the DNA from cancer-causing substances. Selenium has antioxidant properties; can prevent free radical damage to cells and organs, thus reducing the risk of cancer.

**Extraction and processing of caviar**

Over the past few decades, due to over-fishing, pollution, poaching and man-made disruptions to its

natural habitat, the native sturgeon population has drastically declined and some of which is critically endangered. Convention on International Trade in Endangered Species of Wild Fauna and Flora decided to place all sturgeon species on Annex II list in the convention of 1997 in order to cut down sturgeon caviar trade.

Accordingly, many countries have resorted to artificial rearing due to the high price and scarcity of original caviar. To accommodate the global demand for caviar, China has become a major country in farming sturgeon for caviar production with a share of about 78% of the global sturgeon production. Sturgeon farming has also emerged in western countries i.e. France and Italy, since 1980s, and grown substantially over the years. Among the most common cultured species are Russian sturgeon (*Acipenser gueldenstaedtii*), Siberian sturgeon (*A. baerii*), White sturgeon (*A. transmontanus*), Japanese sturgeon (*A. schrenckii*) and Adriatic sturgeon (*A. nacarii*). Paddlefish is also cultivated in fish farms in a number of European countries.

Right now, around the world, sturgeon are raised to produce caviar using aquaculture. Young fish require constant feeding and are fed high-protein pellets continuously throughout the day and night. As the fish grow, the frequency of feeding lessens. Bacteria are added into the grow-out tanks to remove toxic metabolites, and the tanks are monitored regularly to ensure the optimum fish growth. After several months, the fishes are transferred into larger tanks. The water from these tanks is continuously circulated to introduce oxygen and remove carbon dioxide produced by the fish. Solid waste is removed from the tanks by filtering the water through screens. In addition, the water circulates through plastic pieces that contain filtering bacteria, and molasses is added to the tanks to feed those bacteria.

It takes 7-10 years for the fish to be ready to be harvested for its eggs. The eggs can account for 15-18% of the weight of the sturgeon. At this stage, the fish are typically at least a meter in length. Interestingly, there is no visual way to externally determine if a fish is male or female. For this reason, high frequency ultrasound is needed to determine not only the sex of the fish but also the egg development within the fish. Various methods are used to sedate the fish. These include exposure to carbon dioxide or sedatives, as well as sedation via low electric current. Once the fish are sedated, high frequency ultrasound is used to evaluate the sturgeon's ovaries, or roe sacks, and to evaluate the egg production in each fish, one at a time. Small biopsies are also taken to visually observe the egg quality, including color and size. The color of the eggs in each fish varies, and there is no way to predict it. For example, "royal" caviar is golden and is found in only one in 1,000 ossetra sturgeons. When ready for harvesting, the sturgeon will contain tens of thousands of eggs. At seven years of age, only about 10-20% of fish are typically ready for harvesting. Fish

that are not yet ready are added back into the tank for another year of growth.

During the next processing step, the fish are purged in clean water tanks. This step is important to remove off-flavors. It is also important that the fish are not stressed at this or any stage of their growth. If the fish are stressed, they will reabsorb their eggs and need to go back into the growth chambers for another year or two to produce them again.

After selection for further processing; the fishes are rapidly stunned, and the two ovaries are removed by a process called "stripping" that extracts the caviar through a small incision in the fish wall.

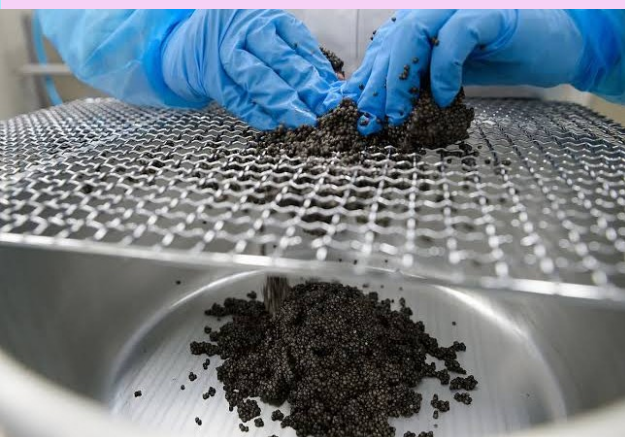


Alternatively, the caviar can be extracted by performing a cesarean section, which can then be stitched up, allowing the female to continue producing roe.



The third process for removal of the roe is by massaging the eggs out of the fish.

The very fragile eggs are then chilled and gently removed by hand from the membrane by rubbing the eggs against a mesh screen.



The eggs are next rinsed repeatedly with cold water to wash away impurities, broken eggs, and membrane residues. Additional removal of crushed eggs and impurities is achieved by manual removal, using tweezers.



The pure eggs are then poured into a fine mesh colander to remove the water.

The caviar is then weighed carefully and salted. Very fine salt is used in the process, and its addition is critical for optimal flavor and shelf life of the caviar. Lightly salted caviar is called "*malossof*" and has a salt content of less than 5%. Most high-quality caviar contains less than 3% salt. Caviar with a salt content up to 8% is called salted caviar or semi-preserved caviar, and its flavor is less fresh. If salt is added at greater than 10%, the product is called "*payusnaya*" and forms a jellylike cake that can be kept for three months.

The caviar is then chilled to allow it to absorb the salt for six minutes to several hours, after which it is drained again using a colander to remove water. After draining, it is dried further by carefully blotting it using a towel.

Now the caviar is ready for packing. Lacquer-lined tins are commonly used and are hand-filled and pressed gently to remove air. The tins are then sealed tightly.

Caviar is typically aged for three months. Aging is critical for the final product flavor and for caviar to develop subtle fragrance notes. Longer aging is sometimes used. Caviar is perishable and requires refrigerated storage. Fresh caviar can be stored for two to four weeks. Caviar can also be pasteurized to extend shelf life and allow for storage times of up to a year at room temperature. Pasteurization is known to reduce quality in terms of final product texture and flavor, but it improves food safety. Other caviar preservation methods include freezing and drying, both of which extend shelf life.

### Handling and serving of caviar

Caviar can be served by itself as an appetizer. Before serving, caviar should be removed from the refrigerator before 15 minutes. The lid of the can containing the caviar should be removed only at the last moment. The ideal presentation is to offer the

whole tin on a bed of crushed ice. It is traditionally served on toast points with butter and freshly minced onions. It is also served on blinis, sometimes cream cheese or sour cream along with crackers. It is used as a stuffing ingredient for many seafood dishes and even for some meats.



There is a tradition that caviar should not be served with a metal spoon, because metal may impart an undesirable flavor. Thus, special caviar spoons are available which are traditionally made of inert materials, such as animal horn, gold, mother of pearl, and wood. They range in length from 7-13 cm and have a small shallow bowl that may be either oval or paddle shaped.



**How is the taste of caviar?**

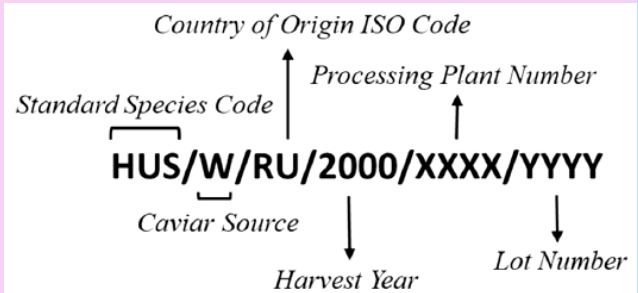
All caviar has some common characteristics in respect to taste. The first flavor is salty and briny with a slight fishiness, followed by a short idling taste. The second flavor which can be tasted a few seconds after the first transitions is a smooth, bright or nutty lingering flavor.

**Caviar labeling**

Many countries have attempted to regulate caviar trade and ensure their authenticity through imposing strict regulations and provisions for caviar labeling and production. According to the Codex Alimentarius, any roes from species other than Acipenseridae family must be labeled as caviar substitute. Also, in the U.S., only sturgeon roes are labeled as caviar, whereas the label of non-sturgeon roes must include the fish's common name such as

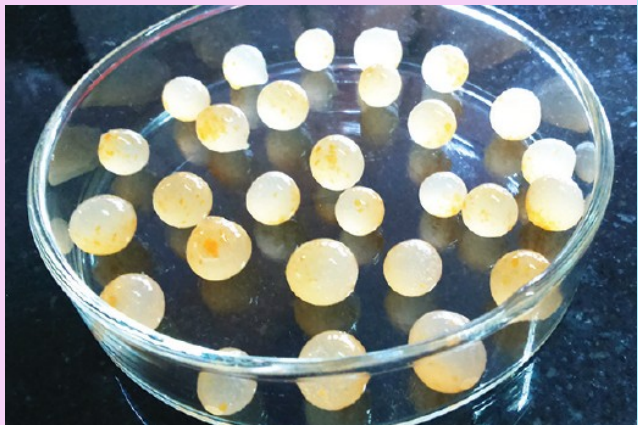
“salmon caviar”.

In order to combat the prevalence of illegal caviar trade CITES parties have developed an internationally recognized universal labeling system in which any caviar container, regardless of their size, must affix a non-reusable label containing certain code. The code contains a set of numbers and letters that can help consumers and retailers identify the legal source of the product, thereby allowing them to make informed decisions.



**Artificial caviar**

Let's finish this article with some interesting information. Roes of many fishes are not in use and thus recently techniques have been adopted to use those roes for the production of “artificial caviar”. These are also known as fish caviar substitutes. Artificial caviar is produced using reverse spherification technique using dehydrated fish roe with sodium alginate (a salt derived from algae) and calcium chloride to create a membrane around liquid, encapsulating it and creating a small sphere that look a lot like real caviar.



**Artificial caviar produced from carp roe**



## DEPARTMENTAL ACTIVITIES

**Chief Guest**  
 Prof. Sumit Homechaudhuri  
 Dept. of Zoology  
 University of Calcutta

**Patron**  
 Dr. Papia Chakraborti  
 Principal  
 B.K.C. College

**Program details**  
**Inauguration of Dr. Hiralal Chaudhuri Laboratory**  
 Time : 12:30 P.M.  
 Venue : Room No. G14  
**Students' Seminar Presentation Competition**  
 Time : 1:00 P.M.  
 Venue : Room No. 111

### CELEBRATION OF NATIONAL FISH FARMERS' DAY, 2022:

On 12th July, 2022 Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata celebrated National Fish Farmers' Day, 2022 with great enthusiasm. The newly renovated departmental laboratory (which has been named after Dr. Hiralal Chaudhuri, the pioneer person behind the "Blue revolution" in India) was inaugurated in presence of the chief guest of the event **Professor Sumit Homechaudhuri**, Senior Professor and Ex-Head, Department of Zoology, University of Calcutta. **Dr. Papia Chakraborti**, Principal, Brahmananda Keshab Chandra College, Kolkata also graced the session. **Dr. Seikh Ahmed Hossain**, IQAC Coordinator of our college along with faculties of other departments of the college were also present.

A departmental students' seminar presentation competition was also organized where students of II and IV semester participated and delivered presentations on different topics related to fisheries & aquaculture. **Nandan Das** and **Bapan Mondal** from IV semester secured first position; **Sonamoni Koley** from IV semester secured second position while **Prithviraj Bhadury** from II semester secured third position. **Dr. Santanu Debnath**, Assistant Professor, Department of Zoology of our college graced the event as the judge. Pictures and video of the event were uploaded on official Facebook page and YouTube Channel of the department respectively. [Click to view the video](#)



## DEPARTMENTAL ACTIVITIES

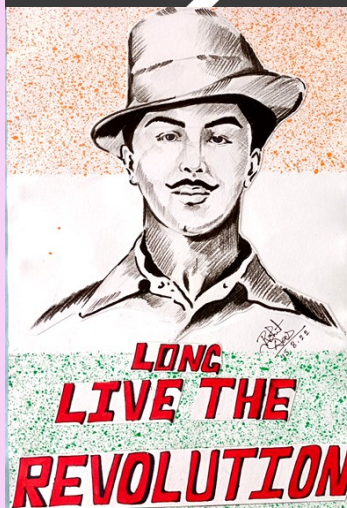


Volume III Issue I

## SPLASH AND SHOAL

**PUBLICATION OF VOLUME III ISSUE I OF "SPLASH AND SHOAL":** On 23rd July, 2022, the 1st issue of volume III of "Splash and Shoal", the biannual newsletter of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata was published. Following the last two published issues, this issue was also published in bilingual mode. In this issue, under guest column an article on the topic "নিও ফিমেল স্ক্যাল্পি ও পুরুষ গলদা – এক উন্নত আধুনিক প্রযুক্তির গলদা চিংড়ির চাষ" written by Suman Kumar Sahu, Fishery Extension Officer, Egra Block I, East Midnapore, West Bengal was published. Nandan Das, IVth semester student of the department wrote an article on the topic "দেশীয় রঙিন মাছ ও তার ব্যবসায়িক বাস্তবতা" under the student column while Palashi Goswami, Fishery Extension Officer, Joynagar Block II, South-24-Paraganas, West Bengal published an article on the topic "Recirculatory Aquaculture System" under the alumna column. Departmental activities, students' participation in training programs, webinars and seminars, students' results and achievements, educational contents uploaded on YouTube Channel by the department were also showcased in this issue.

DEPARTMENT OF INDUSTRIAL FISH AND FISHERIES

Brahmananda Keshab Chandra College  
111/2, B.T. Road, Bonhooghly, Kolkata - 700108

**CELEBRATION OF 76TH INDEPENDENCE DAY OF INDIA:** On 15th August, 2022 students of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata celebrated the 76th Independence Day of our country by sharing sketches relevant to this auspicious day. Sketches were shared on official Facebook page of our department.

## DEPARTMENTAL ACTIVITIES

**CELEBRATION OF TEACHERS' DAY 2022:** On 5<sup>th</sup> September, 2022 students of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata celebrated Teachers' Day 2022 at New Digha sea beach... yes it may sounds odd, but it's true. As we were off to Digha for educational tour from 4<sup>th</sup> to 6<sup>th</sup> September; the students took the opportunity to surprise the teachers by celebrating that special day at New Digha sea beach in the late evening... Amidst of moon light, strong wind and roar of the sea; the celebration was done. Pictures of the event and the video were uploaded on official Facebook page and YouTube Channel of the department.

[Click to view the video](#)

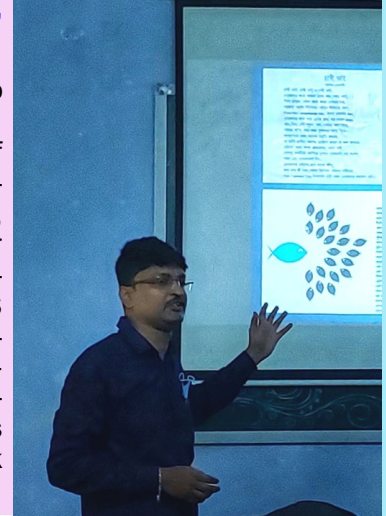


### SPAWN TO FRY 2022



### "SPAWN TO FRY"- STUDENTS' INDUCTION PROGRAM, 2022:

On 20<sup>th</sup> September, 2022 "Spawn to Fry", the students' induction program, 2022 was organized by Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata to induct the first semester students about the departmental activities, overall idea about the CBCS system and the syllabus, how to progress with the syllabus, higher education and job opportunities after completion of the graduation etc. Pictures were shared on official Facebook page of the department.



20.09.2022 | 11:00 AM | ROOM: III



# DEPARTMENTAL ACTIVITIES

**PARENTS-TEACHER MEET:** On 24th September, 2022 a Parents-Teacher meeting was held with guardians of first semester students of our department. The aim of this meeting was to share the information with the guardians regarding the CBCS syllabus pattern and how the department will progress to complete the syllabus in each semester, the importance of regular attendance of classes for the students, the future plan of the department regarding academic development of the students, what kind of academic supports the students will get from the college as well as from the department and so on.



**UNVEILING OF “MECHHOWALLEE”, THE DEPARTMENTAL WALL MAGAZINE:** On 27th September, 2022, “Mechhowallee”, the first ever wall magazine of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata was unveiled in the gracious presence of **Dr. Papia Chakraborti**, Principal, Brahmananda Keshab Chandra College, Kolkata. Theme of this issue of wall magazine was “সংস্কে গন্ধে পূজোর ছন্দে”. Two poems and one short story written by alumni of the department were published. Nandan Das and Rohit Das, Vth semester students of the department put important contribution behind the preparation and decoration of the wall magazine.



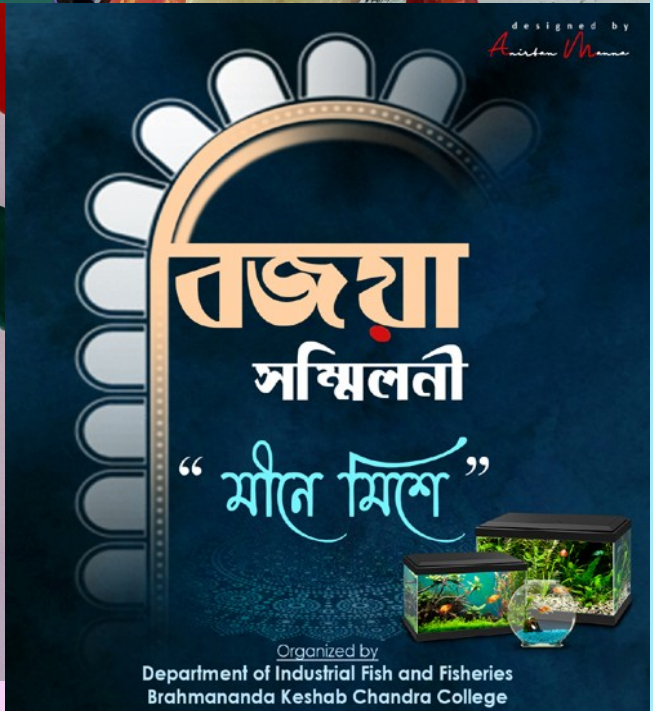
**আগমনী ২০২২:** On 27th September, 2022, students of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata organized a cultural program to celebrate the home-coming of Goddess Durga. **Dr. Papia Chakraborti**, Principal, Brahmananda Keshab Chandra College, Kolkata graced the event along with faculties of other departments of the college. This was a compact program of almost half an hour where the students delivered an audio-drama on arrival of Maa Durga on the Earth, sung songs and recited poems related to Durga Puja. Pictures and video of the event were shared on official Facebook page and YouTube Channel of the department respectively. [Click to view the video](#)



**DEPARTMENTAL ACTIVITIES**



**CELEBRATION OF BIRTH ANNIVERSARY OF MAHATMA GANDHI:** On 2nd October, 2022, Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata celebrated the birth anniversary of the “Father of the Nation” Mohandas Karamchand Gandhi. Students of the department paid their tribute to the great freedom fighter by sharing sketches. Those were shared on the official Facebook page of the department.



Date : 16.10.2022 📅 || Time : 6:00 PM 🕒  
Platform : Google Meet 🗺️


**CELEBRATION OF BIJOYA SAMMILONI:** On 16th October, 2022, Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata organized Bijoya Sammiloni on virtual platform. It was a kind of platform where ex and present teachers and students of the department got the opportunity to interact and to cherish their golden memories associated with the department.

## DEPARTMENTAL ACTIVITIES

Workshop On

### FORMULATION AND PROCESSING OF FISH FEED

Organized by  
Department of Industrial Fish and Fisheries  
Brahmananda Keshab Chandra College, Kolkata



**RESOURCE PERSON**  
**DIPAN BISWAS**  
Aquaculture Expert and Consultant  
Managing Director, J.P. Agro Care

Date : 05.11.2022  
Time : 10:30 AM  
Venue : Room No. 111  
6 Cr. Harekrishna Lab

**WORKSHOP ON FORMULATION AND PROCESSING OF FISH FEED:** On 5th November, 2022, Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata organized a workshop on “*Formulation and Processing of Fish Feed*”. Mr. **Dipan Biswas**, Aquaculture Expert and Consultant and Managing Director, J.P. Agro Care graced the workshop as the resource person. Pictures of the workshop were shared on the official Facebook page of the department.



### SPECIAL LECTURE ON ECONOMICALLY IMPORTANT AND EDIBLE VALUE ADDED PRODUCTS AND BY-PRODUCTS FROM FINFISHES AND SHELLFISHES:

On 3rd December, 2022, Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata organized a special lecture on “*Economically important and edible value added products and by-products from finfishes and shellfishes*”. Mr. **Subrato Ghosh**, Assistant Fishery Officer, Directorate of Fisheries, Government of West Bengal was the resource person for this event. Pictures of the event were shared on official Facebook page of the department.

Special Lecture On



**ECONOMICALLY IMPORTANT AND EDIBLE VALUE ADDED PRODUCTS AND BY-PRODUCTS FROM FINFISHES AND SHELLFISHES**



Organized by :  
Department of Industrial Fish and Fisheries  
Brahmananda Keshab Chandra College, Kolkata



**RESOURCE PERSON**  
**SUBRATO GHOSH**  
Assistant Fishery Officer  
Directorate of Fisheries  
Government of West Bengal

Date : 03.12.2022 Time : 11:00 AM  
Venue : Room No. 111

designed by  
*Amita Manna*

## DEPARTMENTAL ACTIVITIES



## EDUCATIONAL EXCURSION



**TOUR TO DIGHA:** An education excursion was organized engaging third and fifth semester students of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata in between **4-6th September, 2022**. Students visited Digha Mohona International Fish Market to have an idea about the species availability, composition, demand as well as the way the market flow-chain works. Near about 50 fish specimens were collected and finally have been displayed in the departmental fish museum. Visit to Marine Aquarium and Regional Centre, Zoological Survey of India, Digha was also made. Pictures of the tour were shared on the official Facebook page of the department.



**VISIT TO ICAR-CENTRAL INLAND FISHERIES RESEARCH INSTITUTE, BARRACKPORE:** On **3rd November, 2022**, third and fifth semester students of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata visited ICAR-Central Inland Fisheries Research Institute, Barrackpore. The purpose of the visit was to provide practical exposure on fish feed preparation and proximate composition analysis of the feed to the students. We are thankful to Dr. B.K. Das, Director, ICAR-CIFRI and Dr. M. A. Hassan, Principal Scientist, ICAR-CIFRI for their kind cooperation and help.



# EDUCATIONAL EXCURSION



**VISIT TO A FISH FEED PROCESSING FARM:**  
On 7th November, 2022, an educational visit to J.P. Agro Care, a fish feed processing farm located at Barasat was organized by Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata engaging the fifth semester students of the department. Students got the exposure of how the different feed processing machines work in commercial line. They themselves also prepared the bulk quantity of feed there under the guidance of Mr. Dipan Biswas, Managing Director, J.P. Agro Care. Pictures of the visit were uploaded on the official Facebook page of the department.





## EDUCATIONAL EXCURSION

**TOUR TO FRASERGUNJ:** On 23rd November, 2022, an education excursion was organized by Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata engaging mainly the first semester students of the department to fulfill the curricular activity. Students visited the Frasergunj fish landing centre to have an idea about species availability and catch composition. They also collected some fish specimens there which have been displayed at the departmental fish museum. A further visit to Frasergunj dry fish market and Baliara, a village where shabars are engaged in fish drying was also made. Pictures of the tour were uploaded on the official Facebook page of the department.



**VISIT TO RUPSHA FISH PRIVATE LIMITED:** On 17th December, 2022, a visit to Rupsha Fish Private Limited, a shrimp processing farm was made engaging third semester students of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata. The purpose of the visit was to provide practical exposure to the students regarding commercial level processing in a shrimp processing farm, the SOPs and HACCPs they are maintaining and so on. We are thankful to Mr. **Shakti Mandal**, Production Manager, Rupsha Fish Private Limited who is also our alumnus for his kind help and cooperation. Pictures of the tour were uploaded on the official Facebook page of the department.



## STUDENTS' PARTICIPATION IN TRAINING PROGRAM



**TRAINING PROGRAM AT SSKVK, SONARPUR:** Twenty five students of Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata successfully completed eight days (1-8 August, 2022) certificate training course on "Innovative and viable techniques for freshwater aquaculture management" from SSKVK, RKMVERI, Sonarpur. We are thankful to **Dr. N.C. Sahu**, Head of the institute and **Dr. Swagat Ghosh**, SMS (Fisheries) for their kind help and cooperation. It was full of practical exposure for our students and hope the knowledge they acquired from this training course will be beneficial for their future endeavor. Pictures and video of the event were uploaded on official Facebook page and YouTube Channel of the department respectively. [Click to view the video](#)



## STUDENTS' PARTICIPATION IN SEMINARS/WORKSHOPS

Students of our department have participated in total 1 webinars, 2 training program and 1 workshop in between July to December, 2022.

- Akshay Mandal from VI semester participated in ten days training course on pisciculture organized by Ministry of Rural Development, Government of India in collaboration with Punjab National Bank from **27th June - 6th July, 2022**.
- Jyotirmoy Singha from II semester attended the national webinar on "Nutritional significance of sea-food" organized by ICAR-Central Institute of Fisheries Technology, Kochi on **5th August, 2022**.
- Jyotirmoy Singha, Riya Gupta, Koyal Mondal and Nilesh Pradhan from II semester; Akash Haldar, Amrita Sen, Arikta Chandra, Arup Kumar Mandal, Ashmita Brahmachary, Ayan Ghosh, Ayush Boral, Bapan Mondal, Debjit Mondal, Deep Dey Sarkar, Nandan Das, Nasin Aktar, Prarona Dey, Rohit Das, Souvik Kuila, Swarnali Sikdar and Vinmoy Mondal from IV semester; Arpan Nayak, Akshay Mandal, Pratyush Kumar Jana and Malay Duyari from VI semester successfully completed eight days certificate training course on "Innovative and viable techniques for freshwater aquaculture management" from SSKVK, RKMVERI, Sonarpur from **1-8th August, 2022**.
- Abir Sarkar, Ankita Dewanji, Deepjyoti Dutta, Jayita Maity, Koyal Mondal, Malay Jana, Moumita Sen, Nilesh Pradhan, Prashna Mondal, Prithviraj Bhadury and Samyak Banik from III semester; Akash Haldar, Amrita Sen, Arikta Chandra, Arup Kumar Mandal, Ashmita Brahmachary, Ayan Ghosh, Bapan Mondal, Debjit Mondal, Deep Dey Sarkar, Nandan Das, Nasin Aktar, Prarona Dey, Rohit Das, Rudra

## STUDENTS' PARTICIPATION IN SEMINARS/WORKSHOPS

- Ghosh, Sonamoni Koley, Souvik Kuila, Supravat Majumdar, Swarnali Sikdar and Vinmoy Mondal from V semester attended a workshop on "Formulation and Processing of Fish Feed" organized by Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata on **5th November, 2022**.

## LAST BATCH STUDENTS PURSUING HIGHER EDUCATION



Nine students namely **Akshay Mandal** (M.Sc. in Marine Biotechnology from Andhra University), **Angana Bag** and **Rohit Ghosh** (M.Sc. in Fishery Science from Vidyasagar University), **Pratyush Kumar Jana** and **Urbi Halder** (M. Sc. in Aquatic Biology from Veer Narmad South Gujarat University), **Arpan Nayak** and **Malay Duyari** (M.Sc. in Coastal Aquaculture from Annamalai University), **Satyaki Ghosh** (MBA from Bharatiya Vidhya Bhavan Institute of Management Science) and **Santanu Sahoo** (M.Sc. in Marine Biology from Vikrama Simhapuri University) are pursuing higher education.

In picture: Akshay Mandal, Angana Bag and Rohit Ghosh (Left to Right top row); Pratyush Kumar Jana, Urbi Halder and Arpan Nayak (Left to Right middle row); Malay Duyari, Satyaki Ghosh and Santanu Sahoo (Left to Right bottom row)

## LAST BATCH STUDENTS GOT JOB PLACEMENT



Three students have got job placement till date. **Anirban Manna** is presently working as the Quality Control Technologist at Rupsha Fish Private Ltd.; **Banai Das** is presently engaged at Digha Seafood Exports Private Ltd. as Quality Control Technologist and **Amamaheswari Muhury** is presently working at HDFC Bank as bank teller with the role of cashier and operations.

## STUDENTS' RESULTS

**IInd semester:** Fourteen students of Ist semester secured first class marks. **Riya Gupta** scored the maximum with full 10 SGPA followed by Ankita Dewanji (SGPA 9.7), Abir Sarkar (SGPA 9.6), Swaheshna Roy and Prithviraj Bhadury (SGPA 9.4), Jayita Maity, Moumita Sen and Ankita Paul (SGPA 9.2), Deepjyoti Dutta and Prashna Mondal (SGPA 9.1), Samyak Banik (SGPA 9), Nilesh Pradhan (SGPA 8.6), Jyotirmoy Singha (SGPA 8.5), Malay Jana (SGPA 8.1), Sudip Das (SGPA 7.8) and Koyal Mondal (SGPA 6.8).

**IVth semester:** All the students of IVth semester secured first class marks. Five students namely **Debjit Mondal**, **Nandan Das**, **Ayush Boral**, **Ashmita Brahmachary** and **Nasin Aktar** scored the maximum with full 10 SGPA followed by Sonamoni Koley, Souvik Kuila, Akash Haldar, Bapan Mondal and Amrita Sen (SGPA 9.77), Prarona Dey (SGPA 9.62), Rudra Ghosh, Deep Dey Sarkar and Swarnali Sikdar (SGPA 9.38), Arup Kumar Mandal (SGPA 9.23), Rohit Das (SGPA 9.15), Vinmoy Mondal and Nahida Parvin (SGPA 9), Arikta Chandra (SGPA 8.77), Ayan Ghosh and Supravat Majumdar (SGPA 8.69).

**Vlth semester:** All the students of Vlth semester secured first class marks. Five students namely **Angana Bag**, **Urbi Halder**, **Amamaheswari Muhury**, **Rohit Ghosh** and **Malay Duyari** scored the maximum with full 10 SGPA followed by Pratyush Kumar Jana, Banani Das, Akshay Mandal, Arpan Nayak and Santanu Sahoo (SGPA 9.75), Anirban Manna and Satyaki Ghosh (SGPA 9.5) and Swarnab Saha (SGPA 8.25).

## STUDENTS' ACHIEVEMENTS



**Akshay Mandal**, VI semester student of our department participated in ten days training course on pisciculture organized by Ministry of Rural Development, Government of India in collaboration with Punjab National Bank from 27th June to 6th July, 2022. *Akshay was the only student participant who got the selection; rest were professional farmers from different blocks of South 24 Paraganas.* On the third day of training, Akshay shared the knowledge so far he has gathered in his graduation course in a session of about one and half hour and also secured first position scoring 254 out of 300 on the final day of assessment.



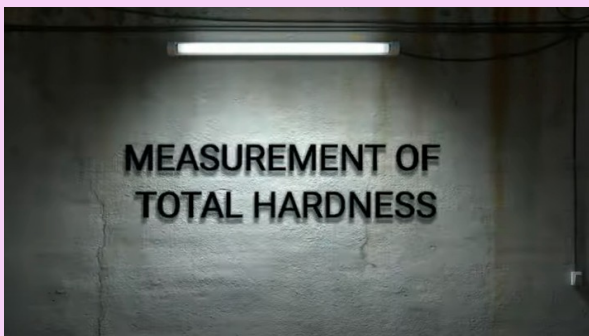
**Rohit Das**, IV semester student of our department secured **first position** in the intra-college sketch competition on the theme "76th Independence Day of India" organized by cultural committee of Brahmananda Keshab Chandra College, Kolkata.



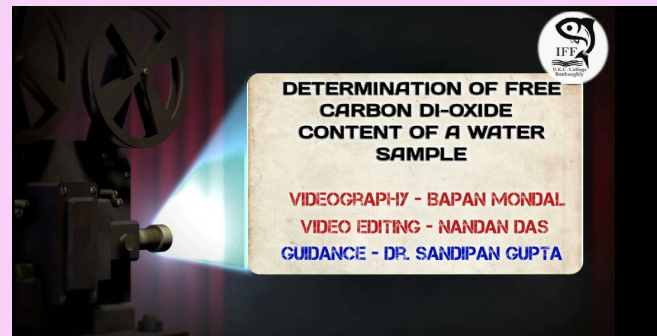
Students of our department bagged total 15 medals in the Annual Sports 2022-23 of the college. **Sudip Das** from III semester won total 5 medals (4 gold and 1 bronze); **Malay Jana** from III semester won total 3 medals (2 silver and 1 bronze); **Samyak Banik** from III semester won total 2 medals (1 silver and 1 bronze); **Riya Gupta** from III semester won 1 gold medal; **Protima Mondal** from I semester won 1 gold medal; **Jyotirmoy Singha** from III semester won 1 bronze medal; **Prashna Mondal** from III semester won 1 bronze medal and **Ayush Boral** from V semester won 1 bronze medal.

## EDUCATIONAL CONTENTS UPLOADED

Department of Industrial Fish and Fisheries, Brahmananda Keshab Chandra College, Kolkata in this tenure (July-December, 2022) prepared and uploaded the following educational videos on the official YouTube Channel. These videos have been prepared in student friendly attitude (voice over in Bengali with English subtitles) so that they can understand the steps to follow to do the practical topics of the curriculum at ease.



[CLICK TO WATCH THE VIDEO](#)



[CLICK TO WATCH THE VIDEO](#)

## FISHY PUZZLE

### Answers of the last issue

1P	2E	3N	G	4B	5A		7C	8H	A	N	9O	S		
O	A	E		A	B	6I	O	O		10E	S	C	A	
T	A	O		R	A	C	D	B			11C	A	S	T
A	I	N		B		H				12H	A	C	C	P
M							13B	A	14G	A	R	I	U	S
20O	S	P	H	R	O	N	E	M	U	S				
21N	A	N	D	U	S		15T	Y	P	H	A			
						17U	T		16P	A	M	P	U	S
			19T	A	N	G	A	N	Y	I	K	A		
22P	E	L	A	G	I	C				18M	P	E	D	A

### FISHY PUZZLE of this issue

1	3			4			2				5		6	8
	7													
			9							10				
				11									12	
	13													
14			15				16							
		17							20		21			
18					19									
					22									
						23								

**Across**

1. The most expensive caviar type
2. Popular name of mullet roe
7. Type of algal weed
9. Type of fish disease
11. Organization playing major role in Indian fisheries development
13. Fish mince based product
15. Flowing aquatic habitat
18. Type of tetra fish
19. Popular antioxidant of fish feed industry
20. Mahseer
22. Fully ripe egg mass of fish
23. Luminescent lure of angler fish

**Down**

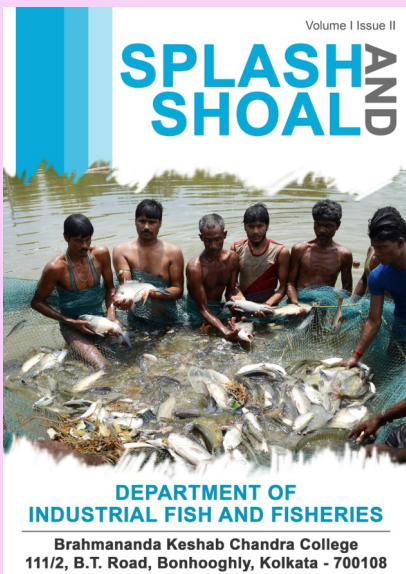
3. Moulting hormone
4. Fish showing lunar periodicity
5. Japanese coated shrimp product
6. Lightly salted caviar
8. Genus of channel catfish
10. Lungfish
12. Polysaccharide in use as fish feed additive
14. A variety of *Betta* fish
16. Multilateral treaty controlling international trade of threatened species
17. One of the five Pacific salmon species
20. Commercially important pelagic fish
21. Common aquarium barb species

**Answers will be provided in the next issue**

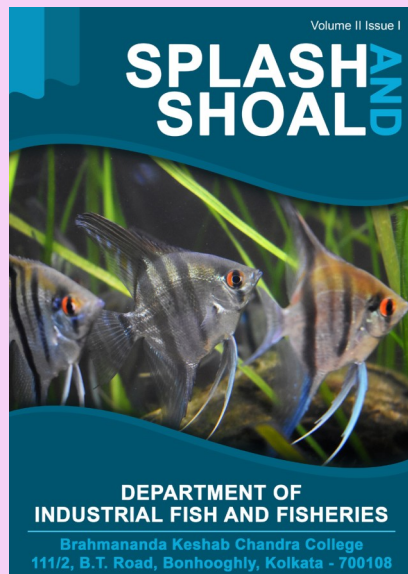
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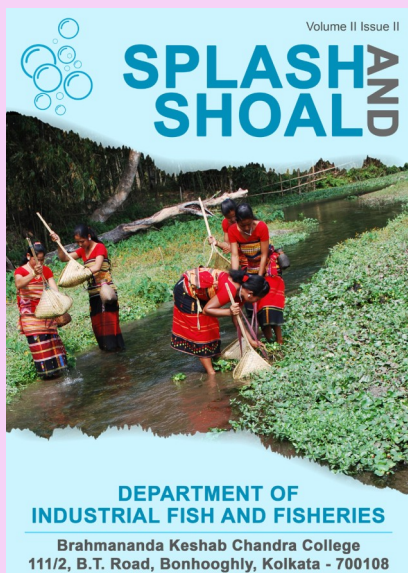
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ARTICLE SUBMISSION GUIDELINES

- The article should be related to fisheries and aquaculture and should be written in lucid language so as to be understandable to everyone. Article should be written in either English or Bengali.
- The title should be relevant and simple and should be followed by author's affiliation. A colored high resolution front faced photograph of the author must be submitted (to be used in author details).
- The article should be submitted in MS-Word, written in A4 page, single column, font "Times New Roman" 12 size and line spacing 1.
- High resolution colored images relevant to the article (preferably copy right protected) to be submitted if applicable. If the author is interested to use supportive pictures from online platform, then proper courtesy to be provided to the source.
- Though there is no page limit; but try to complete it in 5 pages including the references.
- Soft copy of the article to be submitted within **1st June, 2023** to our departmental email address (iff.bkccollege@gmail.com).