MPEDA

Newsletter

VOL. X | NO. 7 | OCTOBER 2022

MAIN STORY

Applications of Chitosan in Food Industry & Aquaculture

MPEDA Export Awardees 2019-20 & 2020-21

Revival of Scampi Farming in India

Innovative Methods of Preservation

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CONTENTS

05 WEBINAR ON 'ROLE OF MPEDA IN SEAFOOD EXPORT DEVELOPMENT OF ANDHRA PRADESH'

MPEDA EXPORT AWARDEES 2019-20 15

29 APPLICATIONS OF CHITOSAN IN FOOD INDUSTRY AND AQUACULTURE : A WASTE INTO WEALTH CREATION

THE NIGHT WANDERERS 36

43 QUALITY AND SAFETY IMPROVEMENT IN FISH PRODUCTS BY INNOVATIVE METHODS OF PRESERVATION

WEST BENGAL BANS USE OF 20 ANTIBIOTICS IN THE SHRIMP SECTOR 59


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On the Platter

Mr. Dodda Venkata Swamy
Chairman

Dear Friends,

As you all are aware, detection of antibiotic residue in shrimps is a major bottleneck in our outreach to markets such as EU and Japan. Over these years, MPEDA has spearheaded many activities at the ground level to control this menace with the cooperation of other associated agencies and state departments, which has helped in bringing down the rejections due to antibiotic residue in EU market considerably. Considering the above, an inspection team from Europe has visited India during mid September to understand the improvements in the residue control mechanism in the aquaculture production value chain and its capability to ensure safety of food exported to European Union. The visit is crucial for India as we had been demanding the EC to lower the inspection frequency of 50% to 10% and also to permit more Indian seafood establishments to export aquaculture material.

The team of experts has inspected hatcheries, farms, processing units and wholesale and retail veterinary medicinal products in Kerala and Odisha. They have also verified the implementation of residue monitoring plans as well as Pre Harvest Testing of shrimps for banned antibiotic substances. MPEDA in coordination with EIC, Coastal Aquaculture Authority, Central and State Drug Controller, State Department Fisheries has made all the arrangements for a smooth audit. We are hopeful for a favorable recommendation from the audit team on our demands, which will give better access to EU market.

A senior management team from MPEDA and its society RGCA has visited Odisha and met the Chief Secretary of the State and other senior officials so as to give an impetus to the coastal and inland aquaculture development of the state. A separate meeting was also held with the Revenue Divisional Commissioner, North Division, Sambalpur for the promotion of inland aquaculture in the State especially that of 'GIFT' utilizing the dams and reservoirs with the technical assistance of MPEDA and RGCA.

During August and September, MPEDA has participated in the expositions abroad. The first one was the Japan International Seafood and Technology Expo (JISTE) held at Tokyo, wherein MPEDA has participated along with 6 exporters as co-exhibitors. During September, MPEDA has participated in Fish International Expo, Bremen, Germany, Seafood Expo Asia, Singapore and World Food Moscow. There were 7 exporters as co-exhibitors in Seafood Expo Asia. MPEDA was also a part of the trade delegation to Viet Nam organized in association with the Indian Consulate there. The delegation, which included 11 seafood exporters from India, also visited the exhibition VIETFISH. MPEDA has also organized 2 virtual Buyer Seller meets during the month with buyers from Japan and China.

Thank you.

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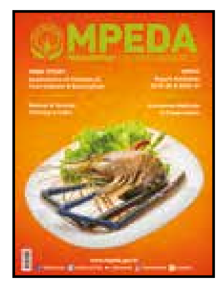

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Webinar on 'Role of MPEDA in seafood export development of Andhra Pradesh'

MPEDA - Regional Division, Vijayawada has conducted a Webinar on "Role of MPEDA in seafood export development of Andhra Pradesh" on 21st July 2022 as part of MPEDA Golden Jubilee Celebrations. Mr. Sivarajan K., Deputy Director, MPEDA Regional Division, Vijayawada made an introductory remark about the webinar and highlighted how MPEDA is taking part in the development of Andhra Pradesh through its aquaculture promotional activities. Mr. Jeyabal A., Joint Director, MPEDA, Regional Division, Vijayawada welcomed the invitees and guests. Mrs. Vijaya Krishnan IAS, District Collector, Bapatla, Govt. of Andhra Pradesh inaugurated the webinar. In her inaugural address, she briefed about the present status of production and export in Andhra Pradesh. She also thanked MPEDA for increasing infrastructure facilities in Andhra Pradesh. Dr. M. Karthikeyan, Director, MPEDA in his Key Note address elaborated the services of MPEDA and India's position in global seafood export trade.

Mr. K. S. Pradeep IFS, Secretary, MPEDA, briefed about seafood exports the contribution of Andhra Pradesh in shrimp farming. He urged the participants to come up with recommendations during the webinar for further development. Dr. S. Kandan, Director RGCA, Mr. IPR Mohan Raju, President, Prawn Farmers Federation of India, Mr. U. K. Viswanatha Raju, Chairman, M/s. Ananda Group of Companies, Bhimavaram, Mr. Ravi Kumar Yellanki, National President AISHA, Visakhapatnam, Mr. D. Sagar Reddy, President AISHA,Nellore and Mr. Dhirik Ikka ,CEO –in- charge, NaCSA offered felicitations.

The inaugural session was followed by technical sessions. Mr. Ravi Kumar Yellanki, Secretary of Aquaculture Professionals [SAP], Visakhapatnam & National President, AISHA took a class on 'Better Management Practices in shrimp hatcheries & aquaculture farms'. Dr. Ram Mohan Rao, Deputy Director of Fisheries [Retd.], Government of Andhra

Pradesh gave a presentation on "Diseases in shrimps-Prevention and Control". Dr. Viji P., Senior Scientist, ICAR-CIFT, Vizag took an online class on "Innovative Technologies in fish processing." Dr. K. Gopal Anand, Assistant Director, MPEDA SRD, Bhimavaram gave a presentation on MPEDA demonstration programmes, measures to improve traceability, SHAPHARI certification scheme etc.

Mr. Prasad Naik, Assistant Director, MPEDA, Visakhapatnam presented 'Genesis and pioneer of Indian and AP seafood exports'. Mr. Appala Naidu, Senior Scientific Officer, RGCA, Manikonda, Krishna district explained species diversification in aquaculture. Dr. K. Anand Kumar, Junior Technical Officer, NaCSA, Kakinada took class on NaCSA activities while Mr. Venugopal, Assistant Director, MPEDA QC Lab Nellore briefed about quality control and lab services to the seafood industry. Mr. M. Hanumantha Rao, State Coordinator, NETFISH has taken class on post harvest handling of sea caught items.

An interactive session followed was chaired by Mrs. Elsamma Ithack, Deputy Director, Aquaculture Section, MPEDA, Head Office. The programme was attended by 517 participants, and concluded with the Vote of Thanks by Mr. K. Sivarajan, Deputy Director Regional Division, Vijayawada.

MPEDA organized seafood exporters delegation to Vietnam

Inauguration of VIETFISH -2022

MPEDA in association with the Indian Consulate, Ho Chi Minh City had organized a trade delegation of seafood exporters from India to Vietnam from 24th to 26th August 2022. The trade delegation was represented from MPEDA by Dr. Ansar Ali A., Deputy Director, MPEDA Regional Division, Chennai. The trade delegation included 11 seafood exporters from India and the delegation visited the VIET FISH -2022 and had interactions with the prospective importers. Dr. Ansar Ali also had discussions with the Dr. Madan Mohan Sethi, Consul General, Indian Consulate at Ho Chi Minh City on enhancing seafood exports from India to Vietnam.

Seafood sector of Vietnam

Vietnam is one of the fastest growing economies of the world with an area of 3,11,699 sq. km. and with a population of 96 million. It has got a coastline of 3444 km. Vietnam borders China to the north, Laos and Cambodia to the west, and shares maritime borders with Thailand through the Gulf of Thailand, and the Philippines, Indonesia, and Malaysia through the South China Sea.

Currently, Vietnam is ranked as the fourth-largest producer of seafood from aquaculture behind China, Indonesia and India. Aquaculture systems in Vietnam are diversified in accordance to the different geographical and climatic conditions prevailing in the different parts of that country. Of the total shrimp production, Vannamei contributes around 90%, while remaining 10% is by black tiger shrimp.

Shrimp, currently represents the most important export product, and accounted for around 50% of the total export turnover of the country.The fishery sector plays a crucial sector in the Vietnamese economy. Although the domestic demand for seafood is rising due to the rising incomes in Vietnam, most of the fishery products are being exported. Vietnam exports seafood to 164 markets and the key export markets for Vietnamese seafood include the United States, the European Union, Russia, Japan, China and South Korea. The major products exported from Vietnam include shrimps, striped catfish, pangasius and hard clams.

Indian seafood exports to Vietnam

Vietnam is the 4th largest market for Indian Seafood during the year 2021-22 behind USA, China and Japan. During the year Indian exported 72,975 MT worth USD 229 million to Vietnam. The major exported products are frozen shrimps, frozen yellow fin tuna, frozen cuttlefish and squid, frozen mackerel, frozen albacore tuna etc. The imported material is mainly used for further processing, value addition and re -exports. Total imports of Vietnam are valued at USD 1632 million.

Vietnam is one of the leaders in the production and export of value-added marine products. Value marine added products occupy a share of 30% in the total marine products exports of Vietnam. This is mainly due to the availability of local made sophisticated machineries and skilled labour force.

Seafood Consumption in Vietnam

There has been an increasing consumption of fish in Vietnam in the last few years. The factors driving the consumption of fish in Vietnam is their heir high nutritional value, their easiness to digest and the they are more economical compared to other protein sources such as beef or pork. Moreover, consumers in Vietnam prefer fish in their diet as it's easy to cook, widely available, and adds variety to the daily diet. Some of the important seafood products consumed widely include shrimp, pangasius, tuna and marine fish. In 2020, the average monthly consumption of shrimp and fish per capita in Vietnam reached 1.4 kilograms.

VIETFISH 2022

Vietnam Fisheries International Exhibition - VIETFISH 2022 was organized at the Saigon Exhibition and Convention Centre of Ho Chi Minh city. VIETFISH is one of the leading seafood shows in ASEAN organized by Vietnam Association of Seafood Exporters and Producers (VASEP). VASEP was established in 1998 and the leading association in seafood sector in Vietnam with 270 member companies. During this year, there were 217 exhibiting companies and there were more than 30,000 visitors from all over the country and around the world attended VIETFISH. The exhibition included stalls from different categories and the main participated segments are the following:

(i) Seafood products: frozen seafood products, processed and canned seafood, dried seafood, fish-sauce, other aquacultural products (ii) machines and equipment: machines and equipment for processing, machines, and equipment for packing (iii) equipment for cold storage (iv) chemicals, additives, (v) packing, wrapping – transportation and (vi) information technology - services, consulting.

Indian seafood exporters' delegation: The trade delegation from India comprised of 11 exporting companies represented by 15 members from states such as Gujarat, Kerala, Karnataka and Andhra Pradesh. Indian exporters had one to one discussions with the Vietnam importers.

Dr. Ansar Ali A., Deputy Director, MPEDA visited Dr. Madan Mohan Sethi, Consul General, Ho Chi Minh City

Indian exporters interacting with the buyers

View of stalls

MARKETING NEWS

Indian seafood showcased in 24^{th} JISTE at Tokyo

The 24^{th} Japan International Seafood & Technology Expo 2022 was held from 24^{th} to 26^{th} August 2022 at Tokyo Big Sight International Exhibition Centre, East Hall 4. The expo was organized by Exhibition Technologies Inc. Japan International Seafood & Technology Expo is one of the largest expo in Asia, bringing together professionals and experts from all over the world under one umbrella.

It is a unique exhibition specializing in seafood, with wide range of business exhibiting not only domestic and foreign seafood products, but also various products and technologies related to seafood. The manufacturing companies of packaging materials, aquaculture technology and fishing equipment showcasing their best innovative products and displaying latest sophisticatedequipment's in the show.

Brief Statistics about JISTE 2022

- No. of exhibitors presented: 570
- No. of visitors: 18,820
- No. of Direct Exhibitor Overseas Countries: 17 countries and regions
- Machinery Companies: 100

Majority of the exhibitors from Japan and other countries displayed their value-added seafood products such as breaded and battered products, frozen sushi, frozen tempura, skewers, sashimi fish / tuna, fresh chilled fish, Freeze dried shrimp and live items.

Indian Pavilion

The Indian Pavilion set up by MPEDA was at stall No.I-06 and admeasured 48 sq. m. Six Indian exporters participated in JISTE 2022 along with MPEDA in the Indian Pavilion. The participation of MPEDA in the expo was organized by Mr. A. Jeyabal, Joint Director, MPEDA Regional Division, Vijayawada, Mr. Bhushan Patil, Assistant Director (Statistics), HO and Mr. Jun Nakayama, Executive Assistant, MPEDA Trade Promotion Office, Tokyo. Mr. Manoj Singh Negi, First Secretary, Embassy of India, Tokyo, visited the Indian Pavilion and had a round of discussion with co-exhibitors and others on trade development.

Samples of frozen and value-added shrimp, cephalopods, pasteurized crab, dried fish and collagen powder etc. were displayed in MPEDA stall. The product display by MPEDA and co-exhibitors attracted many visitors. Due to Covid related restrictions there was no inaugural ceremony for the show this time.

Feedback from co-exhibitor exporters reveal that there were considerable negotiations and many of them resulted in confirmed new orders. Most of the co-exhibitors confirmed their participation for next year.

Seafood market potential in Japan

Nearly 80% of seafood products consumed in Japan are imported while remaining 20% is produced domestically. Japanese seafood market has good demand for shrimp, fish, squid, cuttlefish, Surimi, value added products from fin fish and shell fish, imitation products as well as products made from seaweed. As *Sushi* and *Sashimi* seafood products are a part of their daily diet, there is sustained demand in Japanese market for seafood in fresh or frozen form that complies with the quality requirement stipulated to make such products.

Nobashi ebi or stretched shrimp is also popular as it forms a part of lunch boxes *(O'bento)* and meals served in *tempura* shops. Retail and convenient stores serve products in frozen, chilled, dried, ready to eat or heat and eat forms to the customers. Young and working class prefer ready to eat or heat products for convenience.

There is a good potential for sashimi grade products of different species varieties such as fish, shrimp, cephalopods etc. There is good potential for live items as well, preferred mostly by hoteliers. Fishery certification at farmer and exporter level both are becoming essential to market products in retail chains.

The seafood trade Statistics of Japan is given in the tables 1-4.

Table 1: JAPAN - Global import scenario of Ch-03						
Rank	**Exporters**	**2017**	**2018**	**2019**	**2020**	**2021**
	World	11722	11884	11541	9940	10871
7	India	431	422	429	379	462
	India's % share	3.68	3.55	3.72	3.81	4.25
TOP 5 COMPETITORS						
1	Chile	1308	1291	1413	1284	1265
2	Russian Federation	1105	1270	1108	961	1252
3	USA	1404	1355	1176	1047	1180
4	China	1241	1273	1226	1021	1063
5	Norway	928	951	987	868	1009

**US$ million, 03-Fish and crustaceans, molluscs and other aquatic invertebrates*

Table 2: JAPAN - Global import scenario of Ch -1605+1604*						
Rank	**Exporters**	**2017**	**2018**	**2019**	**2020**	**2021**
	Japan	2985	3172	3222	2863	2936
7	India	17	17	19	19	18
	India's % share	0.56	0.54	0.58	0.67	0.61
TOP 5 COMPETITORS						
1	China	1417	1502	1474	1285	1424
2	Thailand	630	687	718	628	622
3	Viet Nam	415	449	505	509	456
4	Indonesia	210	221	219	198	185
5	Philippines	67	73	85	70	85

**US$ million, 1604: Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs,1605: Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved (excluding smoked)*

Table 3: Japan's import scenario for marine products*						
Rank	**Exporters**	**2017**	**2018**	**2019**	**2020**	**2021**
	Japan	15011	15395	15132	13153	14088
9	India	450	447	455	398	485
	India's % share	3.00	2.91	3.01	3.02	3.44
TOP 5 COMPETITORS						
1	China	2660	2778	2705	2309	2490
2	Chile	1372	1353	1471	1373	1327
3	Russia	1112	1277	1115	968	1259
4	USA	1470	1412	1218	1085	1213
5	Norway	934	957	993	878	1015

**US$ million, HS CODES: 03+01604+1605+1504+230120*

Table 4: Item - wise export of marine products to Japan from India								
Q: Quantity in M T, V: Value in Rs. Crore, $: US Dollar Million								
ITEM		2017-18	2018-19	2019-20	2020-21	2021-22	% Share 2021-22	% Growth 2021-22
FROZEN SHRIMP	Q:	33828	36649	38961	40502	38492	42.62	-4.96
	V:	2126.76	2151.03	2299.88	2335.33	2413.10	74.41	3.33
	$:	334.31	311.40	329.79	316.78	328.59	74.55	3.73
	UV	9.88	8.50	8.46	7.82	8.54		9.14
FROZEN FISH	Q:	1589	271	89	189	61	0.07	-67.65
	V:	14.50	9.36	3.24	6.20	2.40	0.07	-61.34
	$:	2.28	1.32	0.46	0.85	0.32	0.07	-61.94
		1.44	4.88	5.20	4.49	5.29		17.63
FR CUTTLE FISH	Q:	67	21	212	41	42	0.05	2.15
	V:	2.34	0.98	7.11	1.68	1.77	0.05	5.83
	$:	0.37	0.14	1.01	0.23	0.24	0.05	6.72
		5.50	7.02	4.77	5.56	5.80		4.47
FR SQUID	Q:	1710	1013	691	596	712	0.79	19.44
	V:	90.29	58.31	37.39	34.04	45.03	1.39	32.28
	$:	14.19	8.50	5.32	4.64	6.11	1.39	31.76
		8.30	8.39	7.70	7.78	8.58		10.32
DRIED ITEM	Q:	2816	6602	553	2755	3656	4.05	32.68
	V:	23.70	58.55	16.14	31.98	37.51	1.16	17.29
	$:	3.73	8.21	2.32	4.43	5.05	1.15	13.99
		1.32	1.24	4.19	1.61	1.38		-14.08
LIVE ITEMS	Q:	2	1	2	1	38	0.04	3732.49
	V:	0.61	0.82	1.09	0.80	2.06	0.06	159.42
	$:	0.10	0.12	0.16	0.11	0.28	0.06	155.55
		57.14	105.28	86.49	108.86	7.26		-93.33
CHILLED ITEMS	Q:	0	4	22	0	48	0.05	0.00
	V:	0.01	0.13	0.92	0.00	2.52	0.08	0.00
	$:	0.00	0.02	0.13	0.00	0.35	0.08	0.00
			4.82	5.90		7.24		
OTHERS	Q:	45639	39520	37977	42730	47260	52.33	10.60
	V:	588.08	640.57	554.50	623.34	738.55	22.77	18.48
	$:	90.30	93.56	83.05	85.08	99.84	22.65	17.34
		1.98	2.37	2.19	1.99	2.11		6.10
TOTAL	Q:	85651	84080	78507	86814	90308	100.00	4.02
	V:	2846.30	2919.75	2920.28	3033.36	3242.94	100.00	6.91
	$:	445.26	423.28	422.24	412.11	440.77	100.00	6.95
		5.20	5.03	5.38	4.75	4.88		2.82

As the demand for value added products more in Japan, exporting country has to focus on export of value-added products to reach out to potential B2B or B2C segments in Japan. Better air connectivity also offers opportunities in the export of chilled tuna / fishes and live items.

Trade enquiries received during JISTE-2022 is placed in the concerned section (Pages: 54- 56) of this Newsletter.

MARKETING NEWS

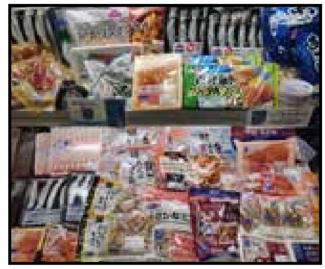
Visit to TPO,Tokyo, Japan and Numazu fish market

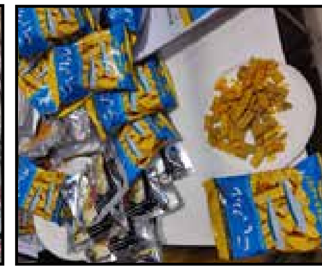
Shri. Manoj Singh Negi, First Secretary (Commerce), Embassy of India at Tokyo, Japan and Resident Director in-charge for TPO, Tokyo visited JISTE 2022 India stall on 26 August 2022

MPEDA team has also called upon Mr. Negi at the Embassy of India to continue the discussions.On 26.08.2022 at 6:00 pm had a detailed round of a discussion about JISTE 2022. As suggested by Mr. Negi, MPEDA officials visited Numatzu area where fishing harbor, auction center, various fish markets and retail stores/supermarkets are based. The fish market at Numatzu has display and sale of frozen and chilled tuna, Sushi products of various species, Dry products made from fish / shrimp / seaweed, chilled / fresh products, and live fishes.

The team also visited the berthing place of pole and fishing vessels near to fish market. The harbor and auction center of Numatzu are well maintained.

The Shizutetsu supermarket near Numatzu station has several fish and fisheries products for sale viz., Sushi made from fish / shrimp / cephalopods, dry fish / shrimp, products made from seaweed and algae, and surimi imitation products. The officials also visited various retail stores like 7/11, Family mart, KFC and other Japanese hotels/ restaurants to observe the type of fish products sold.





Mr. Manoj Singh Negi, First Secretary, EoI Tokyo (second from right) with Mr. A. Jeyabal, Joint Director, Mr. Bhushan Patil, Assistant Director and Mr. Jun Nakayama, Executive Assistant, MPEDA in front of Indian Pavilion at JISTE 2022

Mr. Jeyabal A, Joint Director, and Mr. Bhushan Patil, Assistant Director MPEDA with Indian Exhibitors at JISTE 2022, Tokyo

Mr. A. Jeyabal, Joint Director, Mr. Bhushan Patil, Assistant Director and Mr. Jun Nakayama, Executive Assistant, MPEDA in discussion with a buyer

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- Ham
- Poultry
- Seafood
- Bacon
- Deli Meats
- Fish
- Comminuted Meat
- Kebab Döner
- Marinated Meat

KEY TRENDS:

- Sodium Reduction
- Low Fat
- Higher Heat Processing
- Convenience
- Food Safety in Handling

SOLUTIONS FOR COMMON CHALLENGES:

- Slow Dissolving Rate
- Lumping
- Precipitation
- Crystal Development
- Yield Reductions
- Color
- Curing Solution Stability
- Flavor
- Brine Pockets

WHAT OUR FOOD SCIENTISTS ARE SAYING:

Phosphates are a functional ingredient that affects the meat proteins to improve water-holding capacity and protein extraction which results in a meat product with better bind and improved texture.

Phosphates can increase cooking yield and shelf life of processed meats while maintaining juiciness and flavor.

ICL's alternative protein product portfolio ingredients are unique and functional while versatile to the boundaries of culinary imagination.

There are numerous phosphate solutions available based on the customer's needs. In addition to increasing the water-holding capacity and protein extractions, phosphates also have great buffering capacity and chelating ability.

Phosphates provide excellent moisture retention in seafood throughout the following processes: soaking, freezing, thawing (if needed) and cooking.

MPEDA Export Awardees 2019-20

Category	Position	Awardee
I. Overall Exports		
(A) Value wise	1st	Devi Seafoods Ltd., Andhra Pradesh
	2nd	Nekkanti Sea foods Ltd., Andhra Pradesh
(B) Quantity wise	1st	Gadre Marine Export Pvt. Ltd., Maharashtra
	2nd	Mukka Proteins Limited, Karnataka
II. Commodity - wise		
(A) Frozen Shrimp	1st	Devi Seafoods Ltd., Andhra Pradesh
	2nd	Nekkanti Sea foods Ltd., Andhra Pradesh
(B) Frozen Cephalopods	1st	Profand Vayalat Marine Exports Private Ltd., Kerala
	2nd	Silver Sea food, Gujarat
(C) Frozen Fin Fish	1st	Sun Exports, Gujarat
	2nd	Silver Sea food, Gujarat
(D) Chilled Marine Products	1st	Aqua World Exports (P) Ltd., Tamil Nadu
	2nd	Gold Marine Exports (P) Ltd., Tamil Nadu
(E) Dried Marine Products (i) Dried Marine Products	1st	Kolkata Marine Products Private Limited, West Bengal
	2nd	Subasini Enterprises, West Bengal
(ii) Fish Meal, Fish Oil and Allied products	1st	Mukka Proteins Limited, Karnataka
	2nd	Yashaswi Fish Meal & Oil Co., Karnataka
(F) Molluscs other than Cephalopods	1st	Seaboy Fisheries Pvt. Ltd., Kerala
	2nd	Avla Nettos Exports, Kerala
(G) Frozen Surimi	1st	Gadre Marine Export Pvt. Ltd., Maharashtra
	2nd	Amarsagar Seafoods Pvt. Ltd., Gujarat
III. Live Marine Products other than Aquarium Fish		
	1st	Cresent Seafoods, Tamil Nadu
	2nd	Janani International, West Bengal
IV. Aquarium Fish		
	1st	Malabar Tropicals, West Bengal
	2nd	Aqualine Exports, Kerala
V. Special Efforts		
(A) Value added Products	1st	Gadre Marine Export Pvt. Ltd., Maharashtra
	2nd	HIC-ABF Special Foods (P) Ltd., Kerala
(B) New Market	1st	Al Badr Seafoods Pvt. Ltd., Kerala
(C) Woman Entrepreneur	1st	Naik Oceanic Exports Pvt.Ltd., Maharashtra

FOCUS AREA

MPEDA Export Awardees 2020-21

Category	Position	Awardee
I. Overall Exports		
(A) Value wise	1st	Devi Seafoods Ltd., Andhra Pradesh
	2nd	Nekkanti Sea foods Ltd., Andhra Pradesh
(B) Quantity wise	1st	Mukka Proteins Limited, Karnataka
	2nd	Nekkanti Sea foods Ltd., Andhra Pradesh
II. Commodity - wise		
(A) Frozen Shrimp	1st	Devi Seafoods Ltd., Andhra Pradesh
	2nd	Falcon Marine Exports Ltd, Odisha
(B) Frozen Cephalopods	1st	Profand Vayalat Marine Exports Private Ltd., Kerala
	2nd	Jinny Marine Traders, Gujarat
(C) Frozen Fin Fish	1st	Silver Sea food, Gujarat
	2nd	Salet Seafoods Pvt. Ltd., Gujarat
(D) Chilled Marine Products	1st	Aqua World Exports (P) Ltd., Tamil Nadu
	2nd	Gold Marine Exports (P) Ltd., Tamil Nadu
(E) Dried Marine Products (i) Dried Marine Products	1st	Nagina Exports, Gujarat
	2nd	KMC Enterprise, Maharashtra
(ii) Fish Meal, Fish Oil and Allied products	1st	Mukka Proteins Limited, Karnataka
	2nd	United Marine Products, Karnataka
(F) Molluscs other than Cephalopods	1st	Seaboy Fisheries Pvt. Ltd., Kerala
	2nd	Luke Export, Kerala
(G) Frozen Surimi	1st	Amarsagar Seafoods Pvt. Ltd., Gujarat
	2nd	Shree Ulka LLP, Maharashtra
III. Live Marine Products other than Aquarium Fish		
	1st	Janani International, West Bengal
	2nd	Puja Export House, West Bengal
IV. Aquarium Fish		
	1st	Aqualine Exports, Kerala
	2nd	Malabar Tropicals, West Bengal
V. Special Efforts		
(A) Value added Products	1st	Falcon Marine Exports Ltd, Odisha
	2nd	Accelerated Freeze Drying Co. Ltd, Kerala
(B) New Market	1st	Kalp Sea Foods, Gujarat
(C) Woman Entrepreneur	1st	Naik Oceanic Exports Pvt. Ltd., Maharashtra

FOCUS AREA


1. Award for the Sec highest export perfor
2. Aw for the hi port p rmance i


Cephalopods:- Ca ory - II (B)
Year: 2020-
1. Award the xport p rmance in


Year: 2019-20


Year: 2020-21


1. Award for the Second highest export performance in the export o


Year: 2019-20
Year: 2020-21


BHAI HODAR

Marine landings report an increase in August 2022

Dr. Afsal V. V. & Dr. Joice V. Thomas
NETFISH-MPEDA

NETFISH collects the real-time data on boat arrival and fish landing on a daily basis from around 100 fishing harbours/landing centres in India. The information on fishing vessels arriving at the harbor /landing centre and the species-wise quantity landed by these vessels, are recorded and uploaded into the MPEDA website. This report presents the species-wise, harbour-wise and state-wise trends in marine landings during August 2022, based on the data obtained from the selected landing sites.

I. OBSERVATIONS ON FISH CATCH LANDINGS

In August, the marine fish catch landing was recorded from 92 selected landing sites along the 9 maritime states of India and the total catch was to the tune of 59,606.99 tons. The catch was composed of 21,315.69 tons (36 %) of Pelagic finfishes, 19,377.61 tons (33 %) of Demersal finfishes, 8,013.59 tons (13 %) of Crustaceans and 10,900.10 tons (18 %) of Molluscs (Fig.1).

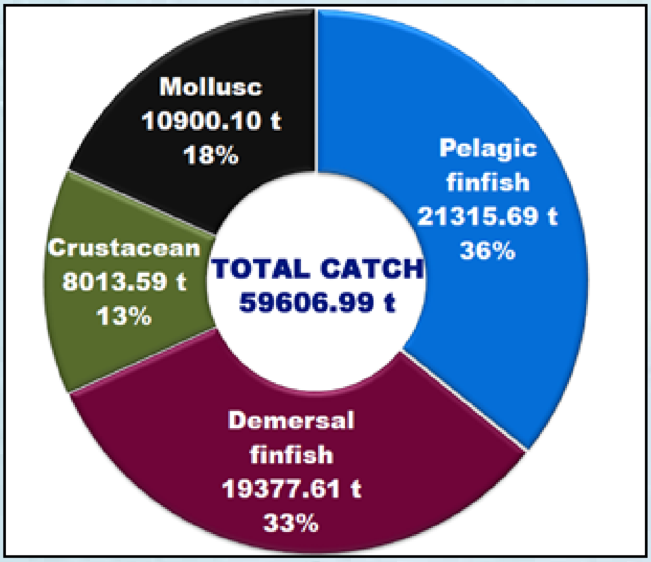

Fig.1: Catch composition of marine landings recorded in August 2022

Landing of about 241 species of sea caught materials were recorded during the period, wherein, the major five contributors were *Nemipterus japonicus, Rastrelliger kanagurta, Uroteuthis duvaucelii, Parapenaeopsis stylifera* and *Sardinella longiceps* (Table 1).

Table 1: Major fish species landed during August 2022

Sl. No:	Common name	Scientific name	Qty. in tons
1	Japanese thread fin bream	*Nemipterus japonicus*	7,396.64
2	Indian mackerel	*Rastrelliger kanagurta*	3,873.49
3	Indian squid	*Uroteuthis duvaucelii*	3,773.08
4	*Karikkadi* shrimp	*Parapenaeopsis stylifera*	3,768.29
5	Indian oil sardine	*Sardinella longiceps*	3,123.09

Considering the group-wise landing, Threadfin breams, Coastal shrimps, Squids, Sardines & Mackerels were observed as the major items landed during the month, forming 53 % of the total catch (Fig 2). The other major items reported were Ribbon fish, Cuttlefish & Croakers.

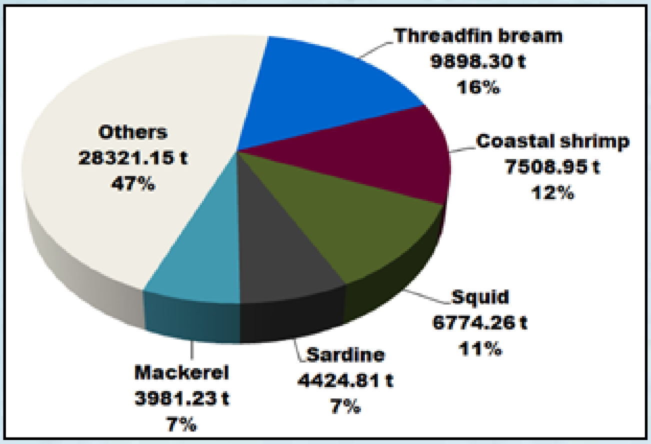

Fig. 2: Catch composition of marine landings recorded in August 2022

Among Pelagic finfishes, the Sardines and Mackerels were the highest contributors whereas, among Demersal finfishes the Threadfin breams and Croakers were the most landed items. About 94 % of the Crustacean catch was comprised of different species of Coastal shrimps, of which the *Karikkadi* shrimp was the dominant species. Among the Molluscan resources, Squid and Cuttlefish were the major items landed.

State-wise landings: Kerala had recorded the highest landing during the month with a contribution of 18,185.88 tons (31 %) to the total catch. Karnataka and West Bengal followed the list with a landing of 11,820.94 tons (20 %) and 7957.52 tons (13%) respectively.

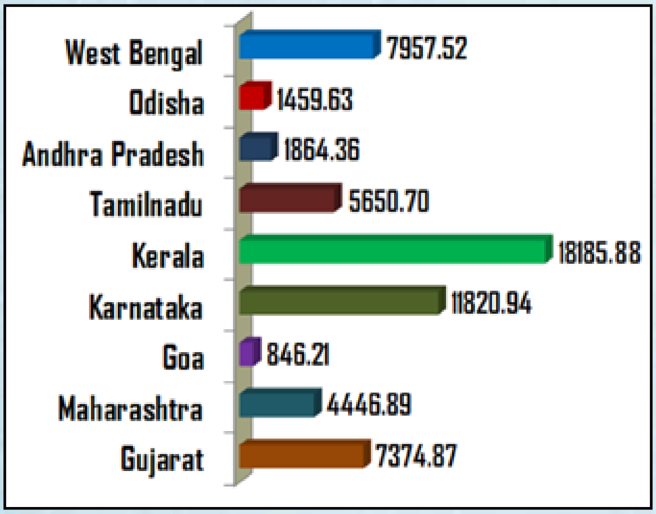

Fig. 3: State - wise fish landings (in tons) during August 2022

Harbour-wise landings: The Mangalore and Malpe harbours in Karnataka had recorded the maximum fish landings, 4,337.38 tons and 4,027.90 tons respectively.

II.OBSERVATIONS ON BOAT ARRIVALS

Fishing vessel arrivals recorded from 92 fish landing sites during August 2022 totalled to 26,702 nos. The state-wise figure (Fig. 4) shows that the highest number of boat arrivals had occurred in Kerala (28 %) followed by Tamil nadu (17 %).

Sakthikulangara (1,470 nos.) and Munambam (950 nos.) harbours in Kerala had topped the list in terms of highest number of boat arrivals.

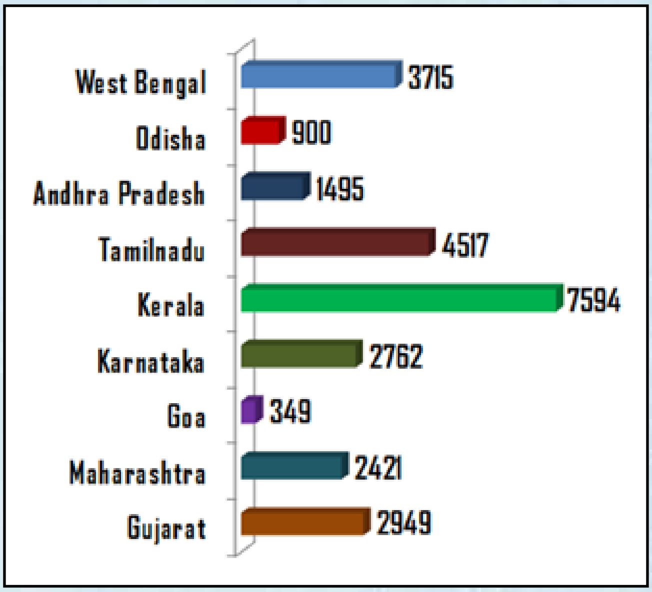

Fig. 4: State - wise Boat Arrivals (nos.) during August 2022

Summary: A total of 59,606.99 tons of marine landings and 26,702 nos. of boat arrivals were reported during August 2022 from 92 major fishing harbour/landing centres in India. In August, there was an increase by about 36,622.27 tons in catch landings and by about 10,704 numbers in boat arrivals compared to the figures of July 2022.

Though pelagic finfish resources remained as the major contributor to the total catch, the most landed species of the month was the Japanese Threadfin bream (*Nemipterus japonicus*). Kerala held the first place among the states in terms of total catch landed as well as the highest number of boat arrivals.

Among the various landing sites, the Mangalore harbour in Karnataka had attained the first position in terms of total catch landed whereas the Sakthikulangara harbour in Kerala had the highest number of boat arrivals.

Webinar on 'Five ways packaging to help boost the seafood exports'

MPEDA in association with M/s. Sealed Air Packaging Materials (India) LLP conducted a webinar on the topic '5 ways packaging can help boost your seafood exports' on 30th August 2022. The webinar was attended by 122 participants.

Mr. Anil Kumar P., Joint Director (Marketing), MPEDA chaired the session and delivered the welcome address. He explained the importance of packaging material in seafood Industry and highlighted how packaging can maintain quality of fishery products from physical damage and contamination, allowing greater handling and presentation of food.

Mr. Surendra Soni, Marketing Director, M/s. Sealed Air Packaging Materials (India) LLP gave a presentation on New Packaging Technologies in Seafood Industry, where he explained in detail the major problems faced by marine seafood industries and provided 5 valuable key points to boost the exports in terms of packaging. He also briefed on the products marketed by M/s. Sealed Air.

A question- answer session followed the presentation, which was moderated by Mrs. Anju, Deputy Director, (Development), MPEDA. Mr. Sushil Sharma, Head of Business Development, Sealed Air, briefly answered the queries raised by the participants on bio degradable packaging, recycle-reuse of packaging materials etc. During the presentation, poll questions and satisfaction survey was conducted among the participants. The webinar ended with Vote of Thanks by Mrs. Anju.

Monthly Outlook Forecast Report

Ritesh Victor -Co-Founder & Country Head- Myforexeye Fintech Pvt. Ltd.
Email-id: sales@myforexeye.com

USDINR

The August month started to trade at 79.18 but then our local unit came under intense selling pressure due to which it further kept on depreciating to cross the 80-level mark towards the month end and traded lowest at 80.12. Fed's decision played a key role in the scenario as Powell's speech clearly indicated Fed's interest rate decision to remain Hawkish in order to curb inflation in the US economy, despite resulting in a sustained period of slower economic growth and softer labor market conditions.

RBI continuously intervened and defended rupee by selling its FX Reserves as soon as it was about the hit the 80-level due to which our FX Reserves have been depleting and has gone to 2-year lows. It appears that this 80-level resistance by RBI will continue to support the INR in the coming trading sessions as well. U.S. Non-Farm Payrolls and Unemployment rate are two crucial events coming in the initial week of Sep which has the potential to affect and change the trajectory of the USDINR pair.

It is expected RBI will also try to add it's forex reserves by buying US dollar against INR as forex reserves hit 2 year low data released on last week of the August month.

After the calm of last week, we saw good volatility in the Indian Rupee this week. A weekly amplitude (high low range) of 82 paise (high of 80.12 and low of 79.30) is not something which we usually see in the Rupee.

Nevertheless, let's attempt a technical assessment. First glance at the USDINR daily candlestick chart shows a 'Double Top' formation – first top formed at 80.065 (mid Jul22) and the second top formed at 80.12 (end Aug22). In an extended uptrend, such a double top pattern indicates a resistance zone around 80.00 – 80.15 and a potential for price reversal. Neckline of the double top is at 78.49 and this could be a critical

support. Interestingly, there is a price gap (orange horizontal lines) around the neckline which is yet to be filled up. There are other unfilled price gaps at lower USDINR levels which are highlighted by blue and grey horizontal lines. Momentum indicators of RSI, MACD and Slow Stochastics are neutral.

My sense is for a period of range bound trades. 78.50 is a good support while levels around 80.05 – 80.15 could be a strong resistance. Play the range. Dollar exporters are recommended to increase their hedge ratios. Prefer to do more of forwards and some vanilla options (structured options are also a good idea). Dollar importers should use vanilla options to hedge. USDINR options volatility is low and hence option premiums will be cheap.

EURUSD

The EURUSD began the month with a slight rise to reach a monthly high of 1.0368 in the second week but the pair fell below the parity again during the fourth week and touched a new multi-year bottom of 0.9900 level (since December 2002). Retail sales in Germany and the EU were negative in June, along with shrinking manufacturing production in July.The US CPI advanced less than forecast in July, up 8.5% (YoY). In August, economic sentiment fell amid inflation in the EU was reported at 8.9% (YoY) in July. After the FOMC meeting minutes, the positive US data became the propulsion factor giving a sharp push to the greenback. During the Jackson Hole Symposium, US Fed Powell's hawkish tone to curb inflation indicated further interest rate hikes. Russia has already substantially cut its energy exports to the European continent putting massive pressure on Euro. Meantime, the EU and Iran are going through negotiations to revive the 2015 nuclear deal. The US also sent an optimistic response to the EU on a proposal to revive the Iran nuclear deal. Investors are focusing on ECB's move as its members discussed front-loading rate hikes, but there is still confusion over controlling inflation. Eurozone Inflation reading rose to 9.1% than expected 9.0% in the 12 months through August. Due to this, the probability of the ECB raising rates by 75bps on Sept. 8, bounced to 67%.

The downtrend is continuing and the decline witnessed during the trading hours on month end, EUR/USD stayed above 1.0020 the Fibonacci 23.6% retracement of the latest downtrend, 20-period SMA. Additionally, the Relative Strength Index (RSI) indicator on the four-hour chart started to inch higher after having retreated to the 50 area earlier in the day, confirming the bullish doldrums in the near-term technical outlook.

On the upside, 1.0080 the Fibonacci 38.2% retracement, 100-period moving average aligns as next resistance before 1.0130 of 50% Fibonacci retracement and 1.0145 in the 200-period SMA.Psychological support on the downside is located at 1.0020, and breach of which leads to 1.0000 the static level and 0.9980 as per the 50-period simple moving average.After having registered its highest daily close in nearly two weeks at 1.0057, EUR/USD has lost its bullish momentum. Nevertheless, the pair held comfortably above parity and the near-term technical outlook forecasts that bears will remain on the side-lines for the time being.

FOCUS AREA

GBPUSD

GBP/USD stayed on back foot during the month of August. The sterling lost almost 4.5% versus the dollar in the previous month in its worst performance since October 2016. It has declined by nearly 15% this year, fuelled by worries about slowing growth in the British economy amid inflation soaring into double digits. Looking at American currency its outlook remain positive, especially the hawkish comments from Federal Reserve which pushed US 10 year treasury yields to 3.25% levels. It seems there is less chances of rebound in the pair.

Ongoing energy crisis in Eurozone and UK would also help dollar to strengthen. Market participants will be eying the release of US Nonfarm Payrolls data due at the start of this month, expected to come at 300k. A higher than expected reading should be taken as a negative for the pair, while a lower than expected reading should be taken as a positive.

It's quiet an important month ahead for the pair on the event side as Composite and Manufacturing PMI is scheduled at the start of month, going ahead we have Manufacturing Production data along with Claimant count change of August month and most importantly UK inflation is scheduled on 14th Sep which is expected to come 0.3% lower compared to the previous print of 10.1%. On the very next day we have BoE Interest Rate decision which is expected to remain unchanged. Sterling remained in the bearish trend since the start of month as slowing British economy and hawkish stance from Federal Reserve pushing the pair towards its psychological level of 1.15.

We might see short-term bounce as buyers could take long position at psychological region of 1.15, mainly due to the overextension of the negativity and could push the pair towards 1.20 levels for no other reason than psychology. After that, the 1.23 level seems to be a good resistance. Looking at the current volatility, market could surprise traders with unexpected moves. On the daily time frame momentum indicator MACD trading in a neutral zone while RSI hovering around 28 which is considered to be an oversold zone.

USDJPY

The USDJPY pair initially started the month with a fall and dropped to the monthly lowest at 130.39 but then turned around to reveal hefty upward pressure from the 130 level to the monthly highest level of 139.08 (near July's 24-year high 139.39 level).

The blockbuster headline NFP data reported 528K jobs were created in July twice than expected. The multiple factors exhausted the Japanese Yen and fueled the pair during a modest pickup in the dollar demand. In fact, the BoJ has continuously said to follow its ultra-easy

policy settings and keep interest rates extremely low indicating to buy unlimited bonds. US Fed's Powell said during the Jackson Hole Symposium, that FOMC trying to bring inflation under 2%. The hawkish tone indicated that further bigger rate hike in September. USDJPY could break out above 140.00 level if September's August NFP data indicated a solid state of the labor market, permitting the US Fed to follow its newly adopted goal of having positive interest rates.

The pair held just below July's highs as Treasury yields receded on a fusion of month-end portfolio adjustments and a negative instinctive response to ADP's new jobs measure which was not reported for 2 months. The pair started September by surpassing the 24-year high and trading above 140 level.

USD/JPY climbed to a fresh 24-year high on last Thursday of August amid the Fed-BoJ policy divergence. The widening of the US-JPY yields differential weighs on the JPY and remains supportive. Speculations about an intervention by authorities hold back bulls from placing fresh bets.

The USD/JPY pair trimmed a part of its intraday gains to a fresh 24-year high touched on last Thursday of August and retreated to the 139.35-139.40 area during the early European session. The pair, however, managed to hold in the positive territory and seemed poised to prolong its recent bullish trajectory.

The key support levels on the downside lies at 138.49 and the break will lead to second support of 138.01 and after 137.75. Likewise on the upper side the key resistance lies at 139.22, the breach of which goes up to 139.48 and the next resistance lies at 139.96.

Global Equities

August was a mixed month for global equities. Global equities had started to rally after the minutes of the last Fed meeting in which the Fed had again hiked rates by 75 bps, showed some indications that the Fed might not be as aggressive in the next few meetings. The Fed stated that the next hike would be data dependent and with inflation seemingly having peaked, the market assumed that the next hike at worst would be 50 bps. The equity markets rallied with the Dow, which had started the month around 32798 surged to touch the level of 34152.

However, repeated statements by various Fed members through the month laid out the thought that the Fed would keep on raising rates till inflation is brought down and sustained at those low levels. Market expectations that the rate hikes would be reversed early next year as inflation was showing mixed signs and could move lower in the coming months had also led to positive sentiments in the market. The markets were therefore in for a rude shock when the Fed Chair at the Jackson Hole meet clearly and equivocally stated that Fed will remain aggressive in hiking rates till inflation is brought down to the 2% target. He also seemed to suggest that rate cuts are unlikely next year and this reversed the market sentiments. The Down reversed its gains and crashed lower, ending the month around 31510. With the 10-year Treasury paper now again above 3.15%

and other central banks also looking to hike rates aggressively to combat inflation, we are likely to see a prolonged sell off in the market this month unless the geopolitical situation cools down suddenly or the Iran nuclear deal goes through successfully.Lower petrol prices at the pump will go a long way in combating inflation fears and only that could lead to another rally of the global equity markets. Till then selling on any temporary rally seems to be the only way to play this market.

MAIN STORY

Applications of chitosan in food industry and aquaculture: A waste into wealth creation

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Introduction

Chitosan [β-(1-4)-N-acetyl-D-glucosamine] is a cationic biopolymer, which is a derivative of the alkaline deacetylation of chitin and it is a natural polymer which is present in the exoskeletons of insects, crustaceans and fungal cell walls (El-Naggar, *et al.*, 2022). Chitosan is a copolymer consisting of -(1–4)-2-acetamido-D-glucose and-(1–4)-2-amino-D-glucose units with the latter usually exceeding 60%. Chitosan is described in terms of degree of deacetylation and average molecular weight and its importance resides in its antimicrobial properties in conjunction with its cationicity and film-forming properties. Chitosan extracted from prawn shells has antibacterial, antifungal, and anti-oxidant activity and can be used as a natural additive in the food industry. Chitosan has been shown to be effective in controlling viral diseases in plants. It has been used to create antimicrobial films for use in food packaging, medical supplies, and as a laminated coating. The coating food with chitosan films reduces the oxygen partial pressure in the package, maintains temperature with moisture transfer between food and its environment, declines dehydration, delays enzymatic browning in fruits and controls respiration. In addition, chitosan is also used on issues such as the increasing the natural flavor, setting texture, increasing of the emulsifying effect, stabilization of color and deacidification. Chitosan is also an excellent film forming material. Chitosan films have selective permeability to gasses (CO_2 and O_2) and good mechanical properties.

Chitosan and chitosan nanoparticles have several exclusive biological properties that qualify them to act as promising materials in varied applicable areas like - biosafety, biocompatibility, improved solubility and biodegradability. These properties enabled them to get utilized in several applications in fish aquaculture, such as growth promoters and immunity boosters. Moreover, they act as innocuous feed additives, drug carriers and are extensively used in water treatment as well.

Sources of chitosan

Chitosan is a modified, natural carbohydrate polymer derived by deacetylation of chitin [poly-β-(1 → 4)-N-acetyl-Dglucosamine], a major component of the shells of crustacean such as crab, shrimp, and crawfish, and the 2nd most abundant natural biopolymer after cellulose (No and Meyers, 1995). *Penaeus monodon* commonly known as Giant Tiger Prawn and *Penaeus indicus*, commonly called white shrimp (Tarafdar *et al.*, 2013; Paul *et al.*, 2014) were observed for chitosan extraction. In other study it has been mentioned that, shrimp and crabs are perhaps the most commonly mentioned raw material sources; alternatively, other species such as lobster, crayfish, and oyster can also be utilized (Elieh-Ali-Komi *et al.*, 2016; Raghvendrakumar *et al.*, 2017). Chitin content (wt %) may vary from species to species; crustacean shell waste includes 30% - 50% $CaCo_3$ by weight and 20% - 30% chitin by weight. In addition to these, *Procambarus clarkii* (crayfish) by-products (which included the entire animal body, thorax, and claws) were reported to contain nearly 20% - 23% (by weight) of chitin. Whereas other chitin- containing species, such as *Nephrops* sp. and *Homarus* sp. belong to lobster genera, contains 60-75 percent by weight of chitin and its shows highest of all other shell containing species (Kous *et al*., 2021).

Properties of chitosan

Chitosan is an alkaline polysaccharide and it is odourless, nontoxic, biocompatible, and biodegradable. This is a biocompatible substance, which degrades gradually to nontoxic byproducts (amino sugars) that are totally absorbed in the body. Chitosan's chemical and physical properties are determined by its molecular weight (MW), degree of deacetylation (DDA), crystallinity, ionization/free amino group, and other factors.

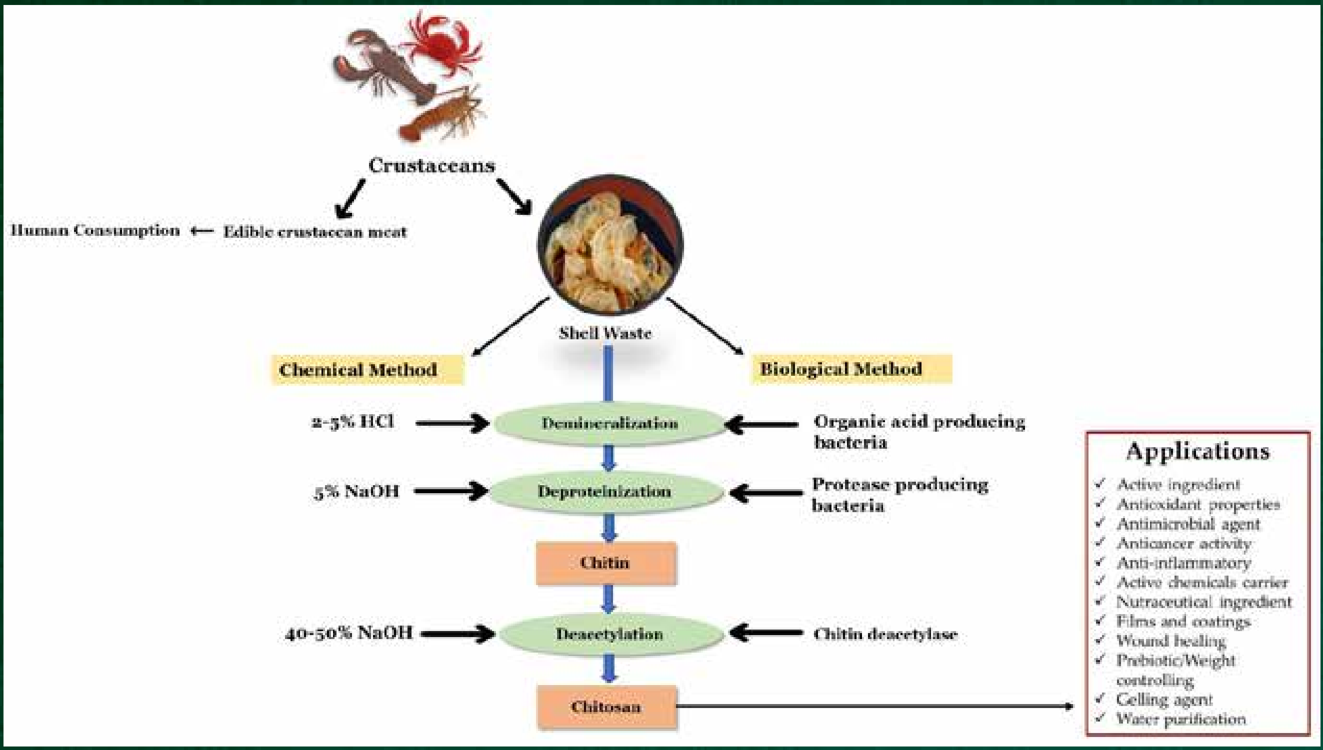
Conditions such as reagent type and concentration, time and temperature employed even during processing can have an impact on the physical characteristics and the final chitosan product's performance (Baksha *et al*., 2020). Its Molecular weight can range from 50 to 2000 kDa.

Important property of chitosan is deacetylation, as deacetylation increases, the chitosan chain becomes more flexible, forming a random coil with more intramolecular hydrogen connections inside the chain. So, the chitosan chains become less intertwined and more elliptical in shape, Where as Mechanical characteristics are generally poorer than in less deacetylated microspheres. In contrast, the less deacetylated chitosan chain was longer and stronger intermolecular interactions, which entangled the chains. The general deacetylation value ranges from 40 to 98% (Habibi and Lucia, 2012).

Increase of temperature affect on the viscosity of the chitosan as well as shear also influence on the viscosity alteration (EL-Hefian *et al*., 2010; shaji *et al*., 2010). Chitosan dissolves in mild acids but becomes insoluble above pH 7. It is typically polydisperse and can dissolve in a variety of inorganic and organic acids, many factors determine the solubility of chitosan especially, Pka value and solvent strength (Chen *et al*., 1994).

Preparation of Chitosan

Two types: chitosan extracted from the crustacea by-products via chemical methods, and via biological methods.



Steps involved in Chitin/Chitosan preparation and their applications

Chemical method

Chemical methods of chitosan preparation mainly include three stages of reaction: First step is Demineralization (HCl in concentrations of up to 10% w/v to remove the $CaCO_3$ in the shell by reacting for 2 - 3 h with agitation), deproteinization [removing the protein and other organic components other than chitin in the shell by reacting with heated alkali solution, such as 1% - 10% (w/w) aqueous NaOH solution at temperatures of 65 - 1000c for 0.5 - 12 h], and deacetylation [converting chitin to chitosan using 40% - 50%(w/w) heated alkali solution, for example, NaOH solution].

Another study explored the demineralization of shrimp by a range of acids such as HCl, HCOOH, CH_3COOH, citric acid. This research found that under the same reaction conditions used (i.e. 0.25 M acid with a shell-to-acid ratio of 1:30 w/v at room temperature for 30 min with agitation) HCl removed Ca most efficiently with a decalcification rate of 90.8%, although HCl is environmentally toxic at high concentration.

In light of these issues, using acetic acid could be justified as the most desirable alternative to HCl rather than citric acid. This is due to several reasons. Firstly, calcium acetate has a high solubility in water. Chitin can be converted to chitosan by enzymatic preparations or chemical process.

Chemical methods are used extensively for commercial purpose of chitosan preparation because of their low cost and suitability to mass production. In contrast, literature suggests that KOH could be deemed an environmentally and commercially viable alternative to NaOH and other bases for deproteinization. Deacetylation is the last stage of preparing chitosan from marine by-products like crustacea, and it is achieved by using either heterogeneous or homogeneous reaction methodologies.

Heterogeneous methods use 40% - 50% (w/v) NaOH or KOH solution with the reaction being conducted at a temperature of approximately 100°C for 1 - 12 hours, and produce water-insoluble chitosan possessing a DD of 85% - 99%. In contrast, the homogeneous method while using 40% - 50% NaOH, prepares water-soluble chitosan in free amine form at ambient temperature.

Biological methods

Besides chemical methods, biological methods (i.e. enzymatic methods and fermentation methods) are also available to prepare chitosan from crustacean byproducts. The development of the green extraction techniques based on the concept of 'Green chemistry' is gaining greater attention, favoring the application of enzymes and microorganisms for chitin extraction. A comparative study was carried out by Khanafari *et al*. [49] for extraction of chitin from shrimp shells by chemical and biological methods. The results indicated that the biological method (using microorganisms) was better than the chemical one because it preserves the structure of chitin. The presence of this enzyme activity has been reported in several fungi and insect species.

The mostly well-studied enzymes are those extracted from the fungi *Mucor rouxii, Absidia coerulea, Aspergillus nidulans* and two strains of Colletotrichum. Various proteinases have been developed for enzymatic deproteinization and these enzymes are usually extracts from microbes or fish entrails, such as intestines of sardinella (*Sardinella aurita*) and grey triggerfish (*Balistes capriscus*).

Likewise, deacetylases can also be extracted from fish intestines or microbes for instance, Alcalase® obtained from *Bacillus licheniformis*. Genetically modified microorganisms have also been reported as another source of enzymes for deproteinization and deacetylation reactions. Moreover, enzymatic methods are less efficient than chemical methods, because of their inability to eliminate the final residual 10% of the proteins in shells during deproteinization and the DD value by enzymatic deacetylation is even lower.

Fermentation methods can be subdivided into two sub-categories, namely lactic acid fermentation methods and non-lactic acid fermentation methods, depending on whether the microbial strains used in the studies secrete lactic acid or other organic acids as the acid(s) for the demineralization reaction. Biological methods have the merit of producing high MW chitosan product (which exhibits better mechanical properties). However, biological methods have some drawbacks. For instance, although fermentation methods have the advantages of lowering the cost of operation and not using generic acids for demineralization reaction when comparing with enzymatic methods and fermentation.

Food Application of Chitosan

Chitosan has gained interest as a potential natural food preservative, because of its antimicrobial activity against different range of food borne filamentous fungi, yeast, and bacteria (Sagoo et al., 2002). The most feasible explanation seems to be that cell permeability changes as a result of interactions among both positively charged chitosan molecules and negatively charged microbial cell membranes. The above action caused proteinaceous and other intracellular constituents to release. Some mechanisms also include interaction of diffused hydrolysis products with microbial DNA, which hinders mRNA and protein synthesis as well as the chelation of metals, spore elements, and essential nutrients. Chitosan as well as its compounds are more effective against Gram-negative bacteria than Gram-positive pathogens (Kong *et al*., 2010). According to Cao *et al*. (2009), chitosan at 5 g/L increased the shelf life of oyster *(Crassostrea gigas)* from 8 to 9 days to 14–15 days. They stated that even the most abundant microorganisms during cold storage of fish and shellfish are Pseudomonas and Shewanella, and these bacteria could be effectively lowered or destroyed with the application of chitosan.

Meat industry

Meat or meat products are highly susceptible to lipid oxidation, which leads to rapid development of rancid or warmed-over flavor. Chitosan possesses antioxidant capacity (Kamil *et al*., 2002), and may retard the lipid oxidation and inhibit the growth of spoilage bacteria in meat during storage. Many researchers documented between the chitosan and the meat. Lee *et al*., (2003) investigated the storage stability of pork dipped in chitosan solution. Pork was dipped for 1 minute in different concentration (0.1 percent, 0.5 percent, 1.0 percent) of chitosans with varying molecular weights (5, 30, 120 kDa) and then stored at 10 degrees Celsius for 8 days. The results showed that dipping pork in 1.0 percent solutions of 30 and 120 kDa chitosans enhanced its shelf life and antioxidation in pork. Similary, Radiation processing is an alternative approach for removing microbial contamination from meat and meat products; nevertheless, it hastens lipid peroxidation (Kanatt and others 2004, 2005). To avoid oxidative changes in foods, synthetic antioxidants such as butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), and others are now employed (Rao *et al*., 2005). Irradiated chitosan was used as an antioxidant that significantly delayed lipid peroxidation and possibly prevent spoiling due to microbial development in irradiated intermediate-moisture (IM) processed meat (Rao *et al*., 2005).

Seafood products

Seafood products are highly susceptible to quality deterioration due to lipid oxidation of unsaturated fatty acids, catalyzed by the presence of high concentrations of hematin compounds and metal ions in the fish muscle (Decker and Hultin, 1992). Furthermore, seafood quality is highly influenced by autolysis, contamination by and growth of microorganisms, and loss of protein functionality (Jeon et al., 2002).

Antioxidant activity of chitosans of different viscosities (360, 57, and 14 cP; corresponding molecular weight of 1800, 960, and 660 kDa) in cooked, comminuted flesh of herring *(Clupea harengus)* was investigated by Kamil and others (2002). The oxidative stability of fish flesh with added chitosans (50, 100, and 200 ppm) was compared with those added with conventional antioxidants, butylated hydroxyanisole + butylated hydroxytoluene (BHA + BHT, 200 ppm) and tert-butylhydroquinone (TBHQ, 200ppm), during storage at 4°C. Among the 3 chitosans, 14 cP chitosan was most effective in preventing lipid oxidation. Kim and Thomas (2007) showed that the antioxidant properties of chitosan in salmon varied according to its molecular weight (MW=30, 90, and 120 kDa) and concentration (measured at 0.2, 0.5, and 1 percent w/w). The 30 kDa chitosan demonstrated the most radical-scavenging action. Chitosan's scavenging actions were enhanced by increasing its concentration. When 120 kDa chitosan was utilised, however, altering the concentration had no effect.

The TBARS value of coated pink salmon *(Oncorhynchus gorbuscha)* fillets glazed with chitosan (1.3 mg MDA/kg sample) was considerably lower than those of fillets glazed with lactic acid (3 mg MDA/kg sample) or distilled water (1.8 mg MDA/kg sample), Among the tested options, chitosan glazing was found to be the most effective at reducing lipid oxidation (Sathivel *et al*.,2007).

Similarly, other study also revealed that protein–chitosan conjugates were generated between the reactive amino groups of glucosamine and the glutaminyl residue of myofibrillar proteins in the presence of chitosan in a kamaboko gel consisting of grass carp (*C. idellus*). The linkages between chitosan and myofibrillar proteins were linked to improved textural qualities in gels (Mao and Wu, 2007).

Seafood processing

The use of chitosan as a coagulating agent has been widely investigated for the removal of suspended solids from various processing streams, including cheese whey and dairy wash water and effluents from the processing of poultry and seafood products. At a concentration of 10 mg/L, chitosan reduced the total suspended solids in shrimp processing wastewater by up to 98%.

Chitosan is a biopolymer that can be used to make polyelectrolyte complex products with natural polyanions such as alginate, a negatively charged polymer. The positive charge of chitosan and the resulting interactions with negatively charged compounds in the effluents, such as protein, were primarily responsible for its efficacy in the treatment of seafood plant effluents. Furthermore, the chitosan molecule's hydroxyl groups promote the precipitation of proteins and other suspended solids from these effluents.

Conclusion

Chitosan is a natural carbohydrate polymer derived from the deacetylation of chitin, a major component of crustacean shells such as crab, shrimp, and crawfish. Chitosan's antimicrobial activity against a variety of food borne filamentous fungi, yeast, and bacteria has made it a potential food preservative. Its biocompatibility, biodegradability, and non-toxicity make it useful in a variety of applications. Chitosan's broad-spectrum antimicrobial activity lends itself well to commercialization. Chitosan could be successfully incorporated into seafood products to improve both the quality of the seafood and human nutrition.

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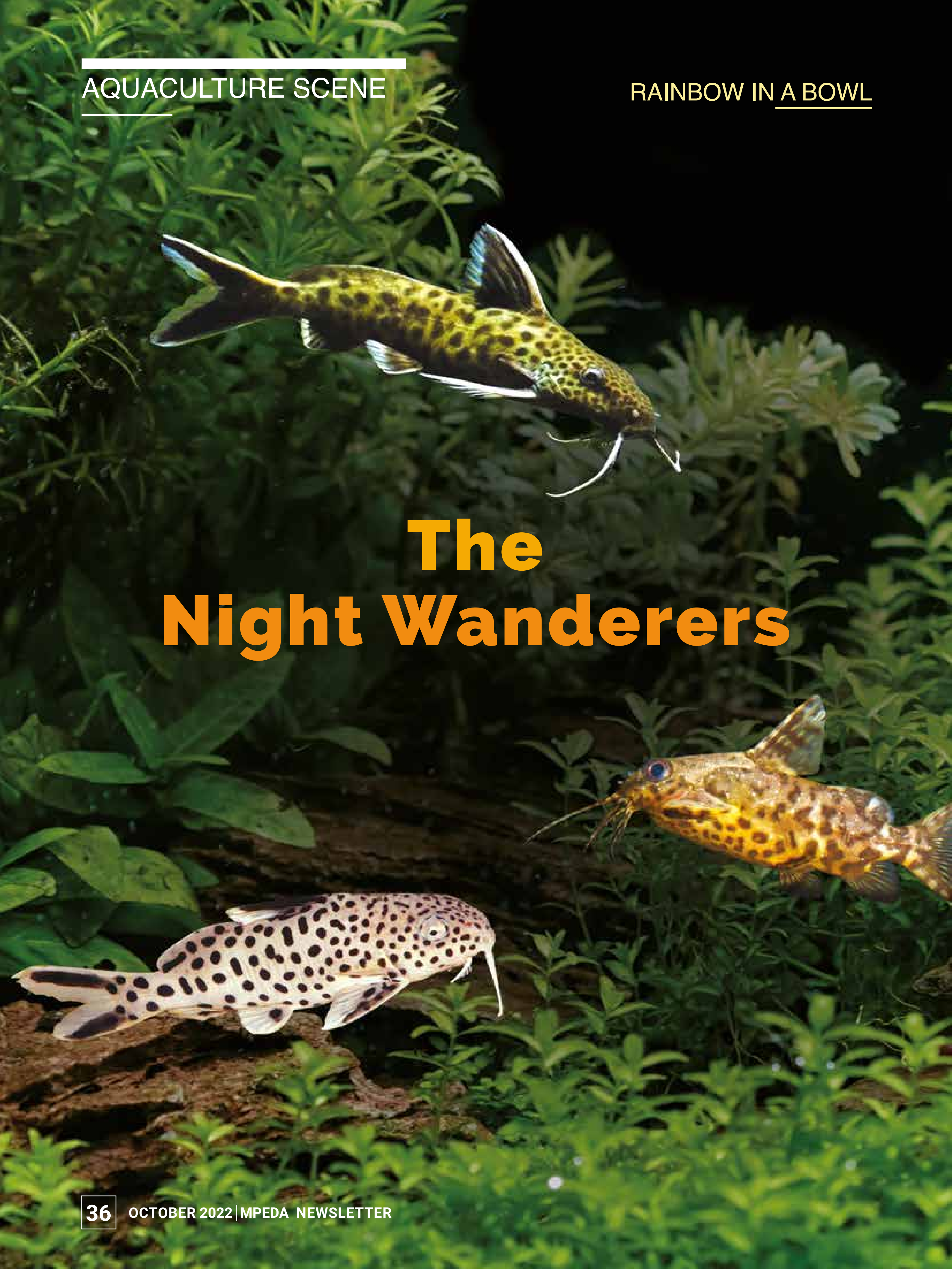


The Night Wanderers

V. K. Dey

V. K. Dey has over three decades of experience in diverse sectors of seafood industry in Asia-Pacific region. He was the Deputy Director of MPEDA and then associated with INFOFISH, Malaysia. As part of INFOFISH, he was involved in several studies related to seafood industry in the Asia-Pacific region and beyond, including setting up of Aqua-technology Park for ornamental fish. MPEDA has published Living Jewels, a collection of his articles on ornamental fish.

Originating from Africa, the striped catfish (*Synodontis spp.*) was once regarded as an expensive fish although it is now a common fish in the hobby. As the name implies, it is known for its joined teeth or closely spaced lower jaw teeth. With the popularity of African cichlids, *Synodontis* became more in demand as a fish that is compatible with them. Soon even Congo River species such as *S angelicus* and *S. decorus* began to be kept with African cichlids even though water conditions in such aquariums are usually not comparable with their native habitat. This shows the hardiness of *Synodontis.* They are territorial and will defend their territories. They can be kept with fishes like angels, *gouramies*, American Cichlids and tetras. The exception may be three predatory species, *S. acanthomias, S. notatus* and *S. schal*, which are still not aggressive fish but will predate on smaller fish. On the whole *Synodontis* catfish are a very popular and rewarding group of catfish, hardy, peaceful, colourful and amusing. There are more than 80 species known today in the industry, of which *S. acanthomias, S. alberti, S. angelicus, S. brichardi, S. decorus, S. flavitaeniatus, S. multipunctatus, S. nigrita, S. nigiventris, S. notatus*, *S. ocellifer*, *S. robertsi*, *S. schoutedeni* and *S. soloni* are popular. They will eat crustaceans, algae and insect larvae in the wild, while they will accept flake, tablet and live foods in aquarium conditions.

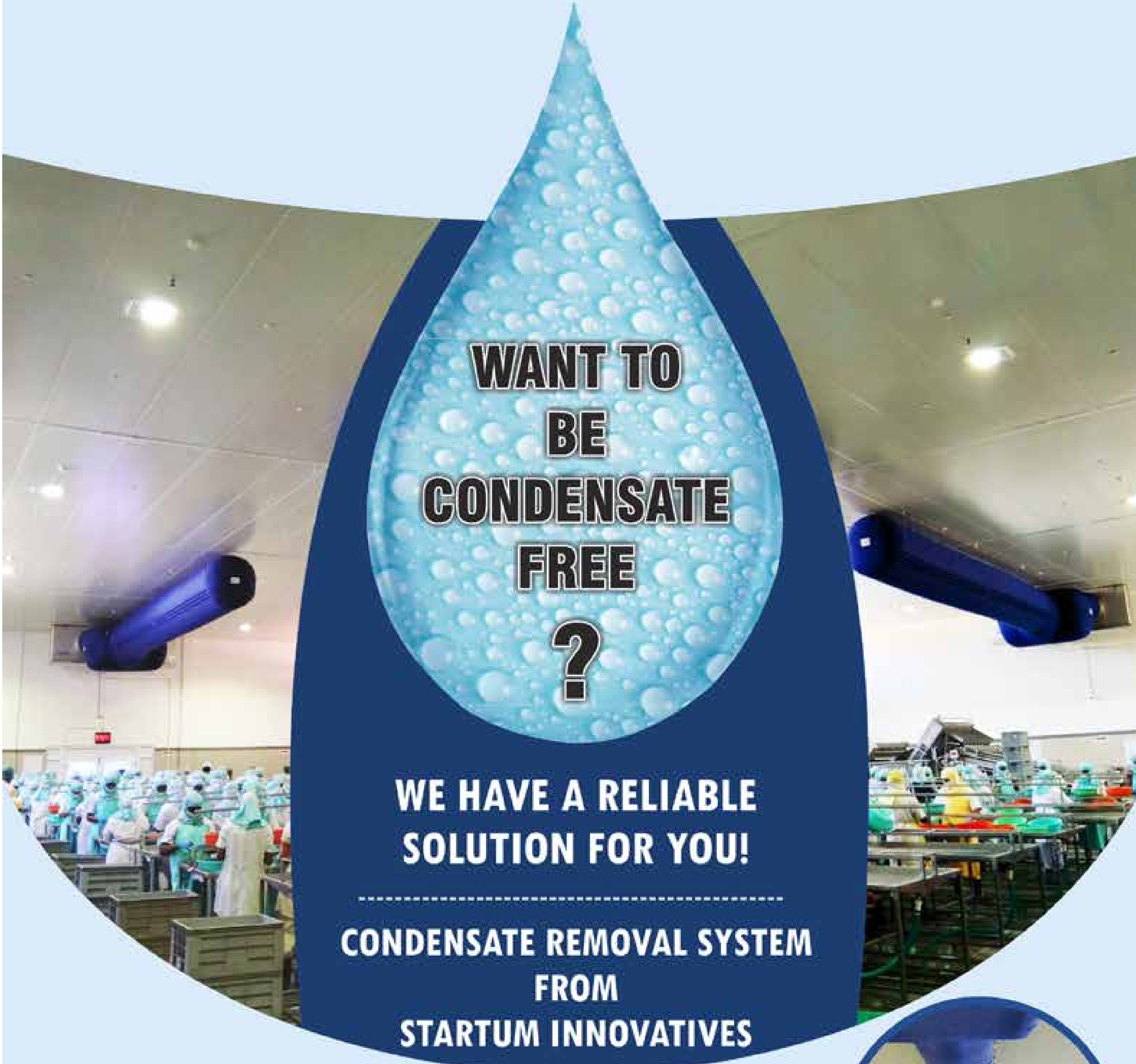
Synodontis acanthomias is one of the largest species of Synodontis and may be one of the more aggressive ones. This fish is an ideal choice for tanks with any medium to large sized cichlids regardless of the country from which they originate. With a spotted pattern over the body, it is more desirable than many of the other larger *Synodontis*. It requires neutral to medium hard water with a temperature 26°C. It can attain a maximum size of 24 cm.*Synodontis brichardi* is a very distinctive *Synodontis* catfish with long thin built and a mouth more like that of a *Plecostomus*. They are algae eaters. They require good water quality unlike other *Synodontis*. The ideal water temperature is 26°C with neutral to medium hard conditions. They are territorial but not aggressive and attain a maximum size of 15 cm.

The gold striped catfish, better known as Orange striped squeaker (*S.flavitaeniatus*), is a very popular fish in the hobby. It originates from the waters of the Democratic Republic of Congo. It can reach an approximate size of 18 - 22 cm. With water temperature ranging from 22 - 25°C and pH around 6 - 8, it is easy to accommodate. This fish mixes well with cichlids and robust anabantoids. The fish should have plenty of swimming space. It can be kept with other *Synodontis* if enough hiding places are provided in the aquarium. It can be easily bred in captivity. *Synodontis nigriventris*, the upside down catfish, is an ideal catfish for smaller aquariums. It is distributed in the river systems of Congo. The water temperature should be 22 - 28°C with pH 7 - 7.5, while the spawning temperature is 26 - 28°C with pH 6.8 It prefers over-hanging structures or tunnels of rock, wood or large broad-leafed plants in aquarium conditions, which act as shady places for rest while the fish is upside down.

Synodontis decorus, known as the Clown Syno, is distributed in the Congo basin with the exception of the Laupula River system. Juveniles have a long filament on the leading dorsal fin ray, with a tan background colouration with black spots over the body. This is one of only three *Synodontis* species with filaments on both maxillary barbels and mandibular barbels. The male has somewhat ridged genital papillae on which the spermatoduct is on the rear side, facing the tail fin. Gravid females will also show extended papillae but the oviduct is on the ventral side of the papillae. The ideal temperature is between 24 - 28°C with pH ranging from 6 - 8. It can grow about 30 cm in size in aquarium conditions. They are compatible with any small fish but must be kept away from fin nippers as they may be tempted to pick at the filaments on its dorsal fin.

STRATUM INNOVATIVES

TRULY INNOVATIVE



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Revival of scampi farming in India - Need for pragmatic approach

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Indian aquaculture is scaling new proportions with the advent of new culture technologies, introduction of new species, genetic improvements in existing species, diversification of culture species and spectacular advancements in hatchery, feed and disease diagnostic services. Lot of spatial and temporal changes have been taken place in aquaculture and new dimensions have been imbued in aquaculture across the globe. In India, Government and private sectors are taking proactive steps in taking aquaculture to a next level with the support of R&D. Freshwater aquaculture has gained momentum and efforts were made in developing fast growing strains of native species and introduction of exotic species like Tilapia (GIFT), Pangasius etc.

The Giant freshwater prawn, *Macrobrachium rosenbergii*, also widely known as 'Scampi' is an indigenous freshwater prawn species of India that inhabits rivers, canals and estuaries. It is one of the most important cultivable species in freshwater systems either monoculture or polyculture with fish and it has certain attributes like large size, faster growth, good taste and fetches higher price with good export demand. Scampi culture can be taken up either in freshwater or slightly brackish water.

Scampi farming has roused the interest of many aqua farmers till 2005 and Andhra Pradesh stood first both in extent and production of Scampi in India. At a time when farmers are hoping for an alternative species to Black Tiger Shrimp, *Penaeus monodon*, Scampi was thought to be a notable option for replacing Tiger shrimp. But there was a gradual fall in both extent and production mainly because of the several reasons viz.,

- Long duration of crop period
- Heterogeneous Individual growth resulting in low yields
- Hurdles resulting in repeated harvesting disease threats right from stocking of post-larvae
- Low survival rate in ponds
- Small sized females and
- Introduction of Vannamei Farming in India in 2009.

Out of all these, the major hurdle is the White tail disease (WTD) caused by the viruses i.e., MrNV and XSV which is responsible for heavy mortalities in hatchery and nursery phases of prawn farming. Infected Post Larvae become opaque and develop a whitish appearance, particularly in the abdominal region. There has been continuous weakening in their feeding and swimming ability and degeneration of telson and uropods may occur.The disease has a variable mortality rate reaching up to 95% (Sahul Hameed and Jean-Robert Bonami, 2012).

As culture of scampi has been slowed down drastically, some states like Telangana, Andhra Pradesh are stocking scampi in the reservoirs, lakes and larger water bodies as a part of culture based capture fisheries to enhance productivity of water bodies. This includes not only *Macrobrachium rosenbergii*, but also another species, *Macrobrachium malcolmsonii* collected from Godavari anicuts in Andhra Pradesh. This ranching of juvenile prawns in natural water bodies have certainly paid good dividends to the Fishermen depending on these water bodies apart from the fish catch from the same water.

Some farmers are resorting to polyculture practices of stocking Indian Major Carps with Scampi and Tiger shrimp or vannamei shrimp and are doing subsistence culture by resorting to cull harvesting. This can be seen in certain pockets of Godavari districts of Andhra Pradesh where small and marginal farmers are satisfied with their culture operations through polyculture.

The introduction of vannamei into our country has almost set aside the scampi farming as farmers are happy and comfortable with the vannamei farming since it has its advantages viz., euryhaline nature, high stocking densities and initial fast growth rate and low susceptibility to diseases. As years rolled by, even vannamei farming is facing some challenges like quality seed and feed, disease threat and price fluctuation etc. Aqua farmers are now fervently aspiring for a good alternative even to vannamei farming.

At this juncture, that Central Institute of Freshwater Aquaculture (ICAR), Bhuvaneswar, Orissa has come out with anew genetically improved, fast-growing strain of Scampi (Giant Freshwater Prawn, *Macrobrachium rosenbergii* recently. Some hatcheries throughout the country were identified to supply the broodstock of genetically improved scampi wherein seed will be produced and supplied to the farming community for the ensuing season. The new developed strain has got a registered trademark as 'CIFA-GI Scampi' in 2020.This step from CIFA can be a welcome step to revive the scampi culture operations in the country by combating disease threats and attaining fast growth.

Concomitantly, RGCA wing of MPEDA has also established a project of the Giant Fresh Water Prawn (Scampi) in Krishna District AP where superior strains of Scampi have developed through selective breeding. The all-male Scampi seed production through the development of Neo-females is another great achievement. The note-worthy features of these seed are: uniformity in size, faster growth rate, disease resistance, higher yield with low FCR. All these R&D efforts are definitely be laudable in the present scenario as part of diversification of aquaculture in the country.

On one hand the production from vannamei ponds is escalating and the price fluctuation can be noticed as a result of supply-demand and on the other hand several known and unknown diseases are crippling the vannamei farming. At this juncture, revival of scampi farming can give aqua farmers the necessary respite in terms of decreasing dependency on exotic vannamei to some extent and expanding scampi culture. There is a ray of hope that market of scampi can offset the market of vannamei.

At the same time, Government should play a pivotal role with close monitoring and surveillance on the culture operations as well as the disease outbreaks on the CIFA-GI Scampi. Therefore advisories need to be widely circulated among the farming communities on the advantages of CIFA-GI Scampi.

MPEDA and CIFA should throw light on Breeding Programme of GI Scampi to selected hatcheries and should check the illicit operation of non-GI scampi hatcheries by frequent inspections. Wherever possible, Demos to be conducted on pilot scale for scampi farmers and on-farm performance evaluations of this genetically improved scampi in ponds need to be carried out.

Hatchery/ Field technicians/ Fisheries Department personnel need to be trained properly for disseminations of scientific farming practices of GI scampi. As far as selection of hatcheries for producing GI scampi seed is concerned,Government/private hatcheries having all requisite biosecurity and other infrastructure facilities need to be considered and brooders are to be supplied continuously. Department of Fisheries of all states should disseminate the research findings down to the end-users as part of Research-Extension Linkage.

Genetic improvement programmes would go a long way in enhancing the growth rate, disease resistance with improved production of quality Scampi. Considerable efforts have been made by CIFA, Bhuvaneswar as well as RGCA, Krishna district,AP in bringing out the GI-Scampi and extension activities are to be planned to see that fruitful results be achieved.

There is an urgent need for planning proper multiplier units in different states that would go long way in transfer of technology to the hatcheries and farmers. Focused attention on the price structure and marketability of scampi is of immediate concern as farmers may not be convinced with the present market price for this species even though it has fetched some lucrative returns during yester years. Hence there should be massive awareness programmes towards diversification of aquaculture, particularly GI-scampi. Suitable strategies are to be planned in a proper way. Needless to say that genetic improvement of aquatic animals is an essential component of sustainability.

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SPF *L. vannamei* brooders imported and quarantined at AQF facility during August 2022

Sl. No	Name of the stakeholders	State	"Country of origin/ supplier"	"Date of receipt of the lot at AQF arrival"	Broodstock imported (nos)		
					Male	Female	Total
1	Sun Glow Marine	Tamil Nadu	SIS, Florida	4/8/2022	200	200	400
2	Varun Shrimp Hatchery Private Limited	Andhra Pradesh	SIS, Florida	4/8/2022	300	300	600
3	Vaisakhi Bio-Marine (P) Ltd. - Unit IV	Tamil Nadu	SIS, Florida	12/8/2022	580	580	1160
4	SVR Hatcheries	Andhra Pradesh	"Kona Bay, Hawaii"	12/8/2022	300	300	600
5	Srinidhi Biotechnologies	Andhra Pradesh	"Kona Bay, Hawaii"	12/8/2022	600	600	1200
6	Golden Marine Harvest	Tamil Nadu	"Kona Bay, Hawaii"	12/8/2022	600	600	1200
7	Vaisakhi Bio-resources Pvt. Ltd, Pl-II	Andhra Pradesh	SyAqua, Florida	12/8/2022	600	600	1200
8	BMR Shrimp Hatcheries	Tamil Nadu	SIS, Florida	13/8/2022	400	400	800
9	Gaayathri Bio Marine	Andhra Pradesh	SIS, Florida	13/8/2022	300	300	600
10	Srinivasa Hatcheries Unit - 2	Andhra Pradesh	"Kona Bay, Hawaii"	15/8/2022	300	300	600
11	Sapthagiri Hatcheries	Andhra Pradesh	"Kona Bay, Hawaii"	15/8/2022	200	200	400
12	Anuradha Hatcheries	Andhra Pradesh	"Kona Bay, Hawaii"	15/8/2022	300	300	600
13	Saivasista Hatcheries	Andhra Pradesh	"Kona Bay, Hawaii"	15/8/2022	500	500	1000
14	Saivasista Hatcheries	Andhra Pradesh	"Kona Bay, Hawaii"	15/8/2022	200	200	400
16	Srinidhi Biotechnologies	Andhra Pradesh	SyAqua, Florida	18/8/2022	300	300	600
17	Samudra Hatcheries Private Limited	Andhra Pradesh	SIS, Florida	21/8/2022	120	120	240
18	Sun Glow Marine	Tamil Nadu	SyAqua, Florida	24/8/2022	200	200	400
19	Sree Hatchery	Andhra Pradesh	SyAqua, Florida	26/8/2022	200	200	400
20	Sri Mahalakshmi Hatcheries	Andhra Pradesh	SIS, Florida	26/8/2022	290	290	580
21	Sarada Hatcheries Unit - I	Andhra Pradesh	SIS, Florida	26/8/2022	600	600	1200
				TOTAL	7090	7090	14180

Quality and safety improvement in fish products by innovative methods of preservation

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Abstract

Fish and fish products are highly perishable, require low temperature storage conditions before applying any preservation methods. Traditionally, fishes harvested are processed (smoking, salting, marinating, drying, etc.) to extend the shelf-life with major changes in organoleptic characteristics and form. In the recent years, some innovative processing technologies are applied to extend shelf-life of fish and fish products with minimum effect on organoleptic properties and also ensure safety. This article aims to describe the primary mechanisms of some of these innovative methods applied to preserve quality and safety of fish products; namely, non-thermal atmospheric plasma (NTAP), pulsed electric fields (PEF), pulsed light (PL), ultrasounds (US) and electrolyzed water (EW).

Introduction

Fishes are rich in proteins with high biological value due to the presence of essential amino acids. Presence of unsaturated fats, mainly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), allow fish products to maintain good health, reduce inflammation and control blood clotting and triglyceride levels. Achievement of high-quality and safety standards is the main objective of the production chain of fish products. Physical, chemical, microbiological and biochemical transformations happen immediately after death, resulting in a progressive loss of food properties in terms of taste and quality.The high perishability of fish products is mainly due to their peculiar composition and structure, even if storage time and temperature are crucial factors for the final quality of the product. Traditionally, the methods used to extend the shelf-life of fish products include fermentation,smoking, salting and marinating, or treatments such as chilling, refrigeration,freezing, drying, boiling, steaming, etc. However, all these techniques are associated with undesirable changes, from a reduced nutritional value to worsened sensory attributes,which fight against the increasing demand of consumers for minimally processed foodswith high quality. Thus, in recent years some alternative methods have been proposed for extension of shelf-life while minimally affecting their organoleptic properties.

Innovative Preservation Methods Applied to Fish Products

The purpose of an optimal preservation method should be counteracting the causes of food deterioration maintaining its chemical, physical,organoleptic and nutritional properties. Non-thermal technologies can significantly inactivate microorganisms in food,extend shelf-life without significant changes in sensory perception and maintain the nutritional value of the processed food.

1. Non-Thermal Atmospheric Plasma (NTAP)

Plasma refers to the state of an ionised gas, it is considered as the fourth state of matter, alongside the liquid, solid and gaseous states. Plasma can be generated artificially by supplying a gas with sufficiently highenergy by means of lasers, shock waves, electric arcs, or electric and magnetic fields. Plasma generated atambient pressure and temperature is called cold plasma (CP), or atmospheric cold plasma(ACP), or non-thermal atmospheric plasma (NTAP). Three mechanisms of action are involved in inactivation of microorganisms: (1) Disruption of the membrane or cell wall, with leakage of cellular components, (2) oxidative damage to membranes or intracellular components, such as proteins and carbohydrates, (3) damage to cellular DNA.

Plasma technology has proven to be a successful tool in both the food sector and medical sector. NTAP

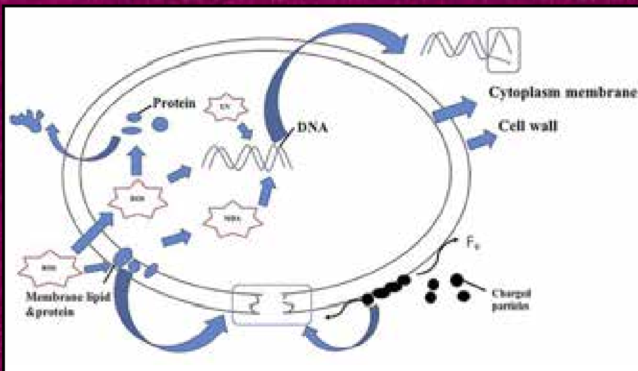

Fig.1: Microbial inactivation mechanisms of NTP in biological and physical aspects

technology is widely adopted for preservation of food products, such asmeat and fresh agricultural products, while its use in fish and seafood is still limited.This technology is only able to inactivate microorganisms on the surfaceof solid food, due to its poor penetration capacity. The main limitation in this technology is lipid oxidation,thus causing off-flavours and off-odours during storage.

However, pre-treatment of fish products with natural extracts rich in antioxidants could retardthe rate of lipid oxidation in samples treated with NTAP.This technology has an excellent ability to inactivate microorganisms without promoting their resistance. Its application as a minimal processing method to preserve the quality of fish products is recommendable, since it offers very important advantages for food industries, namely, (1) it allows short processing times; (2) it is effective at low temperatures; (3) it is non-toxic; (4) its application reduces the consumption of water and chemical agents.

2. Pulsed Electric Fields (PEF)

Although the technique was known 50 years ago, PEF can be still considered an emerging technology, because of its recent industrial applications. PEF involves the delivery of short high-power electrical pulses (microsecond) to a product placed in a treatment chamber, confined between electrodes. The process produces modest thermal increases without causing any effect in the product.

The application of an external electric field to biological cells causes damage to the cell membrane. Exposure to an electric field induces accumulation of charges inside and outside the cell across the membrane and thus an increase in trans - membrane potential.

When the trans-membrane potential exceeds a critical value, there is a rapid electrical collapse of the cell membrane, whose structure changes, with an increase in permeability, loss of cellular components and collapse of the proton motive force.

Charges with opposite signs are formed on both sides of the membrane, compressing it and forming pores. The breaking of the membrane can be reversible or irreversible, depending on the intensity of the treatment. Besides being a non-thermal alternative, this technique proved to have a good impact on the microstructure of muscle foods, without affecting physical, organoleptic and functional characteristics.

PEF is as an effective method to inhibit psychrophilic bacteria and chemical inhibition of the enzyme like polyphenoloxidase which result in improved sensory and nutritional properties. Although PEF is a non-thermal treatment, when used at high intensity, there is a significant increase in temperature,which must be considered with sensitive compounds such as proteins.

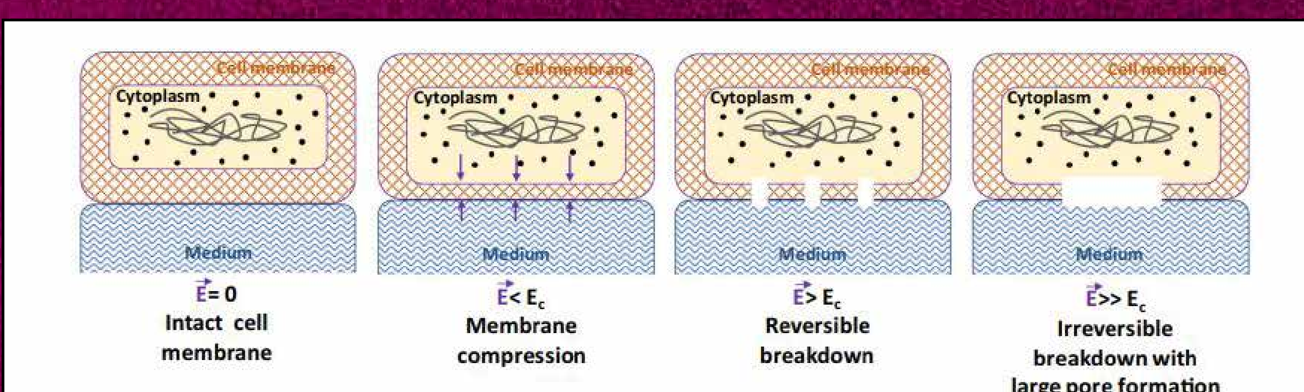

Fig . 2: Compression and possible breakdown by pore formation of a biological cell subjected to a pulsed electric field treatment (E), Ec is the critical electric field.

3. Pulsed Light (PL)

Pulsed light (PL) is a non-thermal technology, involves the emission of short flashes of light in a broad spectrum. PL technology was first used in the medical field to sterilise medical devices and then in water purification processes. In 1996, the FDA approved the use of PL technology for food production, processing and handling processes.

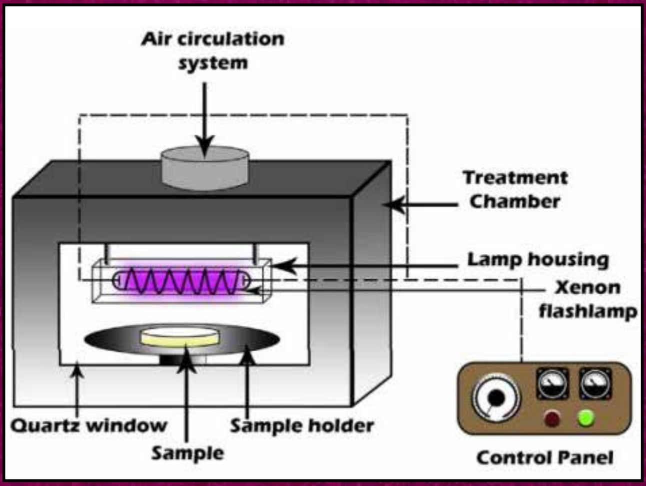

Fig. 3: Schematic diagram of a pulsed light chamber.

In the food industry, pulsed light technology is mainly used for ready-to-eat products, meat, fish and dairy products which are subject to rapid spoilage and require delicate preservation measures.The decontamination effect of PL is mainly due to the photochemical changescaused by UV-C radiation on microbial DNA, in combination with the photothermal and photophysical damage caused to cells by water vaporisation and membrane destruction.

High power, long treatment time and the closer distance between target and flash lamp cause an increase in microbial reduction but a consequent loss of quality, so it is necessary to find the optimal treatment conditions to improve microbiological safety without affecting food quality.

PL technology is an effective, fast and mild decontamination method and its applications are increasing not only for food contact surfaces, but also for the decontamination of packaging materials. However, this technology, due to the non-uniform shape and opacity of the products, cannot be used for sterilisation processes, but only for reducing the microbial load.

4. Ultrasound (US)

Ultrasound (US) is one of the innovative non-thermal techniques that is proving to be very successful in the food sector. Ultrasonic waves used in the food industry are low energy, high frequency (16–100 kHz)waves. US production consists of three parts: (1) a current generator that supplies electricity at the desired frequency to the transducer; (2) a transduceror

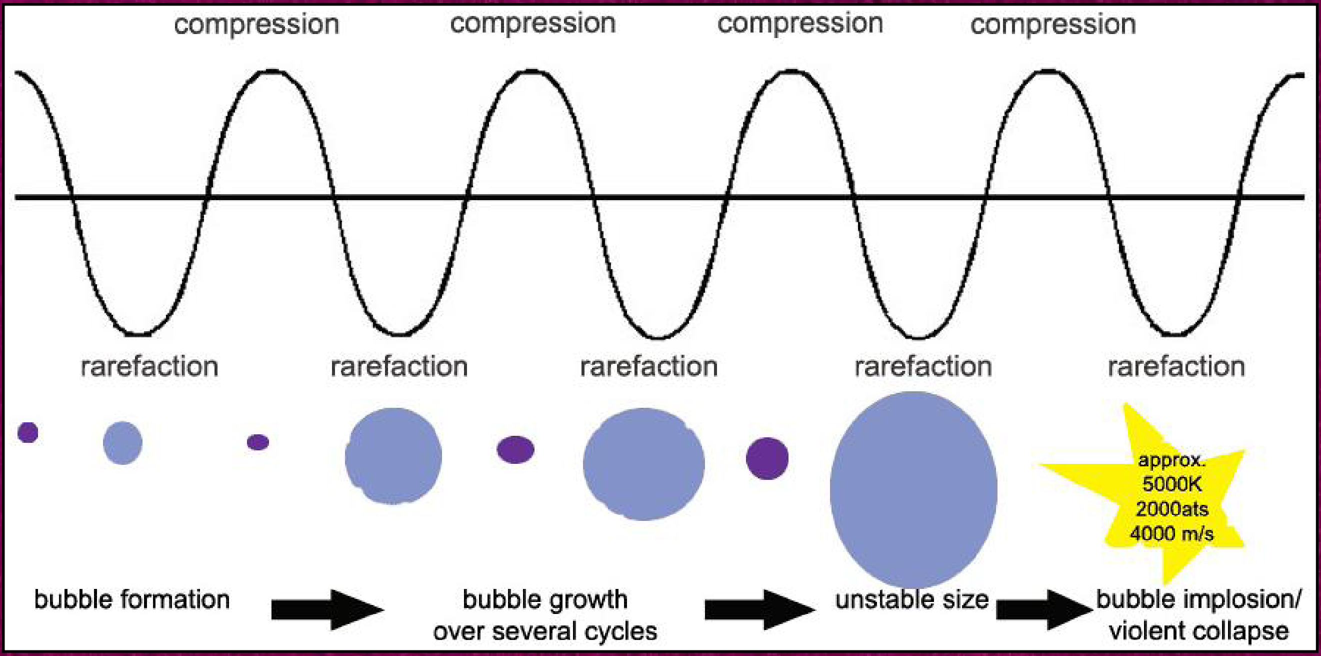

Fig. 4: Mode of action of ultrasonic waves

converter, which converts electrical energy into mechanical vibrations (pressure waves) that are conveyed into a probe; (3) a probe that amplifies the vibration produced forming the sonication site that can be continuous or discontinuous.

The mechanism behind sonication is the well-known phenomenon of cavitation, i.e., the repeated creation of microbubbles inside a liquid, followed by their implosion. The pressure resulting from these implosions causes the main bactericidal effect of ultrasound, which consists of a thinning of cell membranes, localised heatingand production of free radicals. The effectiveness of the treatment depends on several factors, such as type of microorganism treated, amplitude of the ultrasonic waves,exposure/contact time, volume and composition of the food to be treated and temperature of the treatment.

Gram-positive cells are more resistant to ultrasound than Gram-negative cells and this may be due to the structure of the cell wall, vegetative cells are more susceptible to bacterial spores. The treatment appears better than traditional pasteurisation techniques, due to the absence of negative effects on the nutrient content and physical characteristics of treated food products. However, the effect of the application time should be considered; longer exposure times (more than 60 min) are not recommended.

5. Electrolysed Water (EW)

EW has strong bactericidal effect on the pathogens associated with foods. It is generated by a process of controlled diaphragm electrolysis produced by passing a salt solution through an electrolytic cell, where the anode and cathode are separated by a membrane. During the electrolytic process, NaCl splits into metallic sodium and chlorine gas, while water splitsby electrolysis into hydrogen and oxygen.

The negatively charged ions Cl-and OH- lose their electrons through the generator anode, while, during this oxidation, hypochlorous acid, hypochlorite ion, hydrochloric acid, gaseous oxygen and gaseous chlorine are generated. Conversely, positively charged ions(Na+ and H+) gain electrons pushed out of the cathode, where reduction occurs, resulting in the generation of sodium hydroxide and hydrogen gas. Within the chamber, two types of EW are produced, namely, at the anode, acidic electrolysed water(AEW) or electrolytic oxidising water (EOW), with a pH value

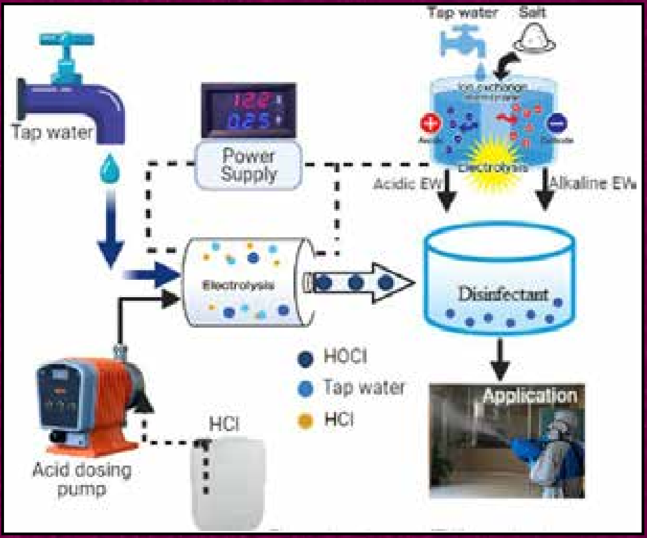

Fig. 5: Production of electrolysed water

of 2–3, oxidation–reduction potential (ORP) >1100 mV and chlorine concentration of 10 to 90 ppm, while, at the cathode, basic electrolytic oxidising water (BEW), with a pH value between 10 and 13 andan oxidation–reduction potential of 800–900 mV. Another type of EW is neutral electrolysedwater (NEW), with a pH value of 7–8 and an ORP of 750–900 mV. The effectiveness of the EW generated varies depending on the type and concentration of the solution, the voltage and current value, the water flow and the electrolysis time.

The antimicrobial activity of EW has been widely demonstrated against various foodborne microorganisms, it is also effective against spores, fungi and viruses present in food, environment and food processing plants. The treatment of fish products with various types of EW highlights great results for microbiological quality, but also good results in inhibiting pH changes, formation of total volatile basic nitrogen (TVB-N) and activity of the enzyme polyphenol oxidase (PPO). Although the application of EW on fish products appears to reduce the total count of pathogenic and spoilage bacteria, at the same time, it has shown some undesirable effects on the organoleptic quality and nutritional value of food. To overcome these limitations, a combination of two or more preservative and sanitizing technologies in low quantities shows a better preservative or even synergistic bactericidal effect.

Conclusion

Non-thermal technologies developed in recent decades have received much attentionin the food industry, showing great potential compared to traditional preservation methods, although some limitations with respect to sensory attributes have been highlighted when used under extreme working conditions.These limitations could be overcome by using the technologies in a synergistic and combined way, thus increasing microbiological safety and sensory quality.

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Valorization of fish and fishery products for entrepreneurship development

School of Industrial Fisheries, Cochin University of Science and Technology, organized capacity building programmes on "Valorization of fish and fishery Products for entrepreneurship development" in association with National Fisheries Development Board (NFDB), Hyderabad, under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) scheme. The programme was inaugurated by the Honourable Minister for Industries, Law and Coir, Government of Kerala, Mr. P. Rajeev. The trainings were conducted in two schedules in November - December (2021) and May - June (2022) at eight venues in total at Ernakulam district, Kochi.

The training was given to 400 participants including fishers, fish farmers, women communities, self-help groups, start-ups, unemployed youth, and students. The programme focused on developing new entrepreneurs and capacitating existing entrepreneurs in the fisheries sector by providing hands-on training in the preparation of value-added fishery products alongside providing a strong theoretical knowledge on various aspects like hygienic handling, nutritional significance, labelling, licensing, certification, marketing and the like. Special focus was given to "Tilapia Value Addition" in the training programme.

The line of products trained included fish roll, fish pickle, fish momos, fish sandwich, fish cutlet, fish balls, battered and breaded fillet. Eminent resource persons from various institutes including Marine Products Export Development Authority (MPEDA), Network for Fish Quality Management and Sustainable Fishing (MPEDA-NETFISH), Export Inspection Agency (EIA), Bureau of Indian Standards (BIS), Indian Council of Medical research (ICMR), Centre for Marine Living Resources & Ecology (CMLRE) and Central Institute of Fisheries Technology (CIFT), Food Safety Standard Authority of India (FSSAI), delivered classes to the participants. Mrs. Asha C. Parameswaran, Joint Director (Retd.), MPEDA, Mrs. Preetha Pradeep, Technical Officer (QC) and Dr. Biji K. B., Junior Technical Officer (QC), MPEDA handled the technical sessions on "Quality Assurance in Seafood Products". At the end of the training programme a product launch ceremony was organized for entrepreneurs generated from the entire course of the training programme at Ernakulam Town Hall. During the function, the entrepreneurs launched their value-added seafood products by handing them over to Adv. M. Anil Kumar, Mayor of Cochin Corporation. The entire training programme was coordinated by Dr. Ginson Joseph, Assistant Professor, School of Industrial Fisheries, Cochin University of Science and Technology.

Inaugural talk by Mr. P. Rajeev, Honourable Minister for Industries, Law and Coir, Government of Kerala

Mrs. Preetha Pradeep, Technical Officer, MPEDA Regional Office, Kochi handles a technical session

Handing over of seafood pickle prepared by Karuna Special School, Nayarambalam to Adv. M. Anil Kumar, Mayor, Cochin Corporation

Mrs. Asha C. Parameswaran, Joint Director (Retd.), MPEDA during the technical session

Dr. Ginson Joseph, Assistant Professor, School of Industrial Fisheries handling the practical session

Dr. Biji K. B., Junior Technical Officer (QC), MPEDA taking class

Group photos of the participants

MPEDA Regional offices conducted HACCP training programmes

Ceremonial Lighting of Lamp by Mr. B. Jayanth, Deputy Director, EIA Visakhapatnam, Dr. Jesmi Debbarma, Sr. Scientist, ICAR-CIFT & MPEDA Officials

With the objective of equipping the quality control wing in the seafood processing establishments in Visakhapatnam and Kakinada for effective implementation of the HACCP and HACCP - based food-safety program, 4 days' training programme was organized by MPEDA- SRD, Visakhapatnam for 28 technologists from 18 processing units of Visakhapatnam and Kakinada area of Andhra Pradesh. The training programme was conducted at Hotel Best Western Plus, Oakwood Hall from 1st to 4th August 2022.

Mr. V. Padmanabham, MD, SSF Ltd and Former National President of SEAI, inaugurated the programme. Mr. R. Prasad Naik, Asst. Director, MPEDA Visakhapatnam, welcomed the dignitaries and participants. Mr.B. Jayanth, Deputy Director, EIA Visakhapatnam and Dr. Jesmi Debbarma,

Special invitees & MPEDA officials

Group photo with participants

Presentations by work groups

Group discussion by work groups

Sr. Scientist, ICAR-CIFT shared key points of HACCP implementation in the seafood industry. Mr. K. Dinesh, Assistant, MPEDA Visakhapatnam proposed the Vote of thanks.

Mr. V. Vinod, Deputy Director, Mr. Subray Pavar and Mr. V. Kishore Kumar, Assistant Directors, MPEDA handled the technical session of the training. All the instructors formed work groups of trainees to perform Practical exercises and later a work session was conducted on SSOP by the instructors.

The trainees gave their feedback and the instructors conducted Post-Assessment test and course evaluations. Later, all the trainees as the work groups gave their presentations on SSOP & Hazard Analysis worksheet HACCP Plan as per their product. Course completion certificates were distributed to the participants to conclude the training.

MPEDA – Regional Division Kochi

Four days' training programme for effective implementation of the HACCP and HACCP based food-safety programme was organized by MPEDA Regional Division Kochi at the MPEDA Golden Jubilee hall from 19th to 22nd July 2022.

Dr. M. Karthikeyan, Director, MPEDA inaugurated the training programme and Mr. K. S. Pradeep IFS, Secretary, MPEDA delivered the key note address. Mr. Anil kumar P., Joint Director (Marketing), MPEDA, Mr. Ravi Shankar, Joint Director, EIA, Kochi, and Mr. Alex Ninan, Regional President, SEAI, Kerala offered felicitations.

Twenty six candidates from different processing facilities in Kerala participated in the training programme. The updated version on HACCP training curriculum 2020 and Fish and fishery products Hazards and Controls Guidance June 2022 Edition were distributed to all participants. The technical sessions were handled by Mr. V. Vinod, Deputy Director (QC), Dr. Biji K. B., Junior Technical Officer (QC) from MPEDA Head Office and Mrs. Preetha Pradeep, Technical Officer, MPEDA Regional Office Kochi.

Dr. Ram Mohan M. K., Joint Director (QC) and HACCP Course Director of MPEDA, distributed the training certificates to the participants in the valedictory function held on 22nd July 2022.

Mr. V. Vinod, Deputy Director (QC), MPEDA handling the technical session

Dr. Ram Mohan M. K., Joint Director (QC) and HACCP Course Director addressing the trainees during the valedictory function

Dr. M. Karthikeyan, Director MPEDA, inaugurates the training programme

Group discussion by work groups

Trainers with the participants

MPEDA-NETFISH celebrated 'Swachha Sagar Surakshit Sagar' Beach Clean Up commemorating International Coastal Clean up day - 2022

As a part of "Azadi ka Amrit Mahotsav", MPEDA-NETFISH organized Coastal Clean-up programme commemorating International Coastal Cleanup Day 2022 at Arnala Beach, Palghar, Tuticorin, Tamil Nadu , Mangrol beach, Gujarat and Bhatye beach, Ratnagiri.

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3 R&D CENTERS

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>10000 SATISFIED FARMERS

HACCP

BAP CERTIFIED

ISO 9001:2015

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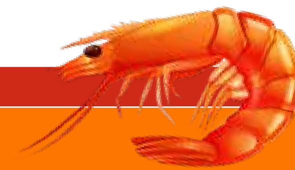
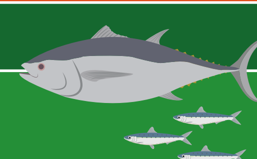
TRADE ENQUIRY

JISTE 2022



SHRIMP			
1	K. Nakada Koyoh Co. Ltd. Import Division Tel: +81- 593-55-2421 Email: nakada@koyohj.co.jp *Shrimp*	2	K. Azuma A-Line Inc. Tel: +81- 596-65-6130 Email: a-line.03@a-line-inc.jp *Shrimp*
3	T. Ao Marubeni Corporation Tel: +81-3-3282-7118 Email: ao-t@marubeni.com *Shrimp*	4	Ken Ibuka Kitajima Suisan Tel: +81- 58-274-8862 Email: ki.eagle610@gmail.com *Shrimp*
5	T. Sakai Okaya & Co. Ltd. Tel: +81-3-5323-3812 E-Mail: sakait@okaya.co.jp *Shrimp*	6	Dr. Zenith, Maruha Nichiro Corporation Email: zenithkumar@gmail.com *Shrimp*
7	Hiroki Yamamoto Benirei Corporation Tel: +81- 3-3769-0055, Email: hiroki-yamamto@benirei.co.jp *Shrimp*	8	Kyosuke Tanigawa Yokohama Reito Co. Ltd. Email: tanigawa.k@yokorie.co.jp *Shrimp*
FISH			
1	H. Hataya Saihoku Fisheries Corporation Tokyo Branch Tel: +81- 3-3527-2122 Email: h.hataya@saihoku-f.co.jp *Chilled fish*	2	Akihiro Haba S & J Office Email: akihaba@hotmail.co.jp *Sashimi Grade Tuna*
3	Satoru Funawatashi Senior Executive Director Kaneshichi Co. Ltd. Tel: +81-76-478-1111, +81-3-3991-1618 Email: funawatashi@kane7.co.jp *Fish for soup stock purpose*	4	Shinsuke Tamaru Managing Director Email: shinsuke-tamaru@dainichi-ff.co.jp *YellowfinTuna* *Snapper*



TRADE ENQUIRY

MIXED ITEMS / OTHER			
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3	M. Tahara Matsuoka Co. Ltd., Osaka Office Tel: +81 -6-7167-5577 Email: tahara@matsuoka.co.jp *Shrimp, Cuttlefish, Squid, Surimi*	4	Hisanori Sugisaki Toyota Tsusho Foods Corporation Tel: +81- 3-4306-5129 Email: sugisaki@totsu-shokuryo.com *Seafood in general*
5	T. Yamanaka The Marine Foods Corporation Email: t.yamanaka@marinefoods.co.jp *Shrimp, Cuttlefish, Squid*	6	Okano System Kyokai Tel: +81- 3-6411-0021 Email: okano@systemkyokai.or.jp *General Seafood*
7	H. Odaira K.K. Oka Foods Tel: +81- 3-3543-9515 Email: odaira@okafoods.com *Seafood in general*	8	Yuka Komatsu UKA KOMATSU Executive Vice President Higashimaru International Corporation Tel:+81- 3-3863-5952, Email: yukakomatsu@hic-jp.com *Canned Tuna and general seafood*
9	Yoshiyuki Furuya C G C Japan Co. Ltd. Email: y-furuya@cgcjapan.co.jp *Black Tiger & Vannamei shrimps, Other seafood items*	10	Tadashi Tom Hamada General Manager, Sales Division Mitsui & Co. Seafoods Ltd. Email: t.hamada@mitsui-seafoods.com *Shrimp, Fish*

TRADE ENQUIRY

11	Noboru Morimoto President Hamasho Co. Ltd. Seiichiro Kondo GM, Sales Department morimoto-n@hamasho.co.jp Email: kondo@hamasho.co.jp *Shrimp, Cuttlefish, Squid, General seafood*	12	Maple Foods Limited Tel: +81-3-5565-7001 Fax: +81-3-3545-4059 Email: teto-tsukiji@maplefoods.co.jp *Crab / soft shell crab*
13	Sonia Ito Food Dept. 3 Hanwa Co. Ltd. E mail: ito-sonia@hanwa.co.jp *Shrimp, General seafood*	14	Yukihito Harada Deputy Manager Hanwa Co. Ltd. Tel:+81-3-3544-2347 Fax:81-3-3544-2105 *Shrimp, General Seafood*
15	Pacific Agriculture Alliance Toshiro Shigaki Director website: www.ag-alliance.org *Eel fish, General Seafood*	16	Toshiyuki Shigeta Daikokutenbussan Co. Ltd. Tel :+81- 86-435-1181 Email: tshigeta@e-dkt.co.jp *Octopus*
17	Yoshiki Okamoto, Proprietor and Consultant, Email: tonnyandgaga@gmail.com Mobile: +81- 90-6934-4004 *Seafood in general*			

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West Bengal bans use of 20 antibiotics in the shrimp sector

The ban, which was reported in the Millennium Post on 8 August, comes after India's main drug regulatory body asked states and union territories to restrict the availability and use of regulated veterinary antibiotics in the aquaculture sector. The ban focuses on India's shrimp industry, where concerns over antibiotic residues and the potential for developing antimicrobial resistant bacteria have been long documented.

The Fisheries Department has formed district level task force committees (TFCs) with eight members to tackle the issue. They are headed by District Magistrates from the affected areas. The decision to ban the antibiotics came after the chairman of the Marine Products Export Development Authority (MPEDA) wrote to the secretary of the Ministry of Health, requesting that the agency take "effective measures" to restrict the availability and usage of restricted antibiotics in all food-producing animals – including shrimps and other finfish.

The TFCs will make frequent raids or random checks at shops, manufacturing units and suppliers of drugs, probiotics, chemicals feeds and other farm goods and take action on any unauthorised possession of the antibiotics.

"The TFC should ensure that the aqua shops do not sell veterinary grade products and encourage aqua grade drugs registered with CAA (Coastal Aquaculture Authority) only. Use of banned aqua products will attract huge penalty or cancellation of license for the concerned aqua shop," a senior official of the department told the Millennium Post. According to sources in the state Fisheries department, shrimp importing nations have become stricter about India's aquaculture practices. The EU has increased spot tests for antibiotic residue in Indian shrimp exports and US regulators have rejected some shipments of Indian shrimp after detecting antibiotic molecules.

www.thefishsite.com

Rabobank: Global seafood demand has peaked and will now weaken

According to the Rabobank during the second half of 2022, the demands of Seafood will decline and the rest of the months of 2022 also will be challenging for salmon and Shrimp farmers.During the first half of 2022 salmon's demand is cool down and expected that the supply will increase in the second half. In European market Salmon consumption is high and in Norway the 1H supply was weak, which was the highest negative growth since 2016. Also Chile's salmon supply is expected to grow in the second half. It is also expected that the supply dynamic will reverse during 2H.

U.S and EU increased shrimp demand in 2021 and early part of 2022. But there is a chance to decrease the demand as inflation reduced in the second half of 2022. However shrimp import is increased but the growth is still showing below the pre-pandemic rates. Indonesia, Vietnam and Ecuador shrimp market is growing and the second half of 2022 could be challenging for shrimp farmers. The high cost of feeds, freight and energy are expected to remain high in the second half of 2022 and expecting a challenging period. In the last year and a half world Salmon farmers had more than the expected profit because of the high price level and the report predicts that until the end of 2022, salmon prices will partially normalize but remain elevated.

The report says that U.S seafood demand is very strong but there foodservices demand is decreasing. In Europe the emerging recessionary trend creating new market is not predictable. In the fourth quarter of 2022, China has the potential to increase the demand of Shrimp and Salmon.

The report expects that, in the second half of 2022 Fish meal supply will be same or slightly below as the last year and the price of fish meal and fish oil is increased. Global aquaculture industry will have minor growth in second half. High fish and piglet prices in China could be the driver of fish meal demand. It is not expected that Peru's fishmeal production increase. Higher production in other parts of the world will not compensate for lower production in Peru.


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