

## Report of the International Artemia Workshop

The purpose of the workshop is to exchange information among the researchers, hatchery consultants, *Artemia* farmers, representatives of government, non-government and research organisations to promote *Artemia* culture and research in different countries. The workshop was organized with both in person presence and a zoom conference meeting. More than 70 participants from 14 countries attended the workshop (Table 9 and 10). *Artemia* cyst and biomass production in the ponds/tanks initiated in the decades of 1970's. Locally produced *Artemia* cyst and biomass has contributed to the improvement of marine fish and crustacean farming in several countries. EU DeSIRA funded Artemia4Bangladesh project aims to enhance food and nutrition security in Bangladesh through climate smart innovation to introduce integrated salt-*Artemia* production system and increase marine aquaculture production and productivity in Cox's Bazar district of Bangladesh. The workshop emphasized on gender equity, social issues, women empowerment, malnutrition and policy reform during implementation of the project.

*Artemia* cyst production in Vietnam reached 20 -30 MT in 1000-1200 ha pond culture area. The technologies in *Artemia* culture covers organic and inorganic fertilisation, soil and water quality, cyst quality, biofloc, development of formulated feed, engagement of farmers' cooperatives. In India, *Artemia* cyst and biomass production reached 475 kg and 1300 kg in the last five years through a project in Tamil Nadu. In Iran, *Artemia urmiana*, *A. franciscana* and parthenogenetic strains culture has been initiated in Kerman, east and west Azerbaijan, Busher provinces. The annual cyst production is 8 MT and biomass is 30 MT. *Artemia* culture was started in Thailand in 1978. At present, *Artemia* biomass culture is ongoing in Samut Songkhram, Samut Sakhon, Petcha Buri and Chachoensao provinces. In 2020-2021, *Artemia* biomass production was 340 MT in Thailand. *A. franciscana* was inoculated in Kenya in 1984. In 2020, 38 kg cyst and 140 kg biomass was produced. *A. franciscana* Vinh Chau strain was inoculated in Bangladesh in 2021 and has produced 3 kg cyst and 110 kg biomass. In 2016, Cambodia started *Artemia* culture and was successful to produce 3 kg cyst and 84 kg biomass in 2017. *Artemia* was inoculated in ponds in Myanmar in 2014; and 10 kg of *Artemia* cyst was produced in 2020. *Artemia* biomass production in tanks was started in Malaysia in 2008. The biomass is fed mainly to ornamental fish in Malaysia. Palm kernel expeller is a cheap by-product in Malaysia used for *Artemia* biomass culture. In China, *Artemia* pond production started in Bohai Bay coastal solar saltworks in the 1980s. The present annual *Artemia* biomass production in China reached 60,000-70,000 MT and cyst 300-400 MT. The frozen biomass are sold to aquarium, shrimp nursery and broodstock maturation facilities, formulated feed ingredients and shrimp farms. The workshop was useful in better understanding about the trends in production of *Artemia* and its uses in different countries. For example, the production and uses of large amounts of biomass production in Thailand, China and Malaysia open the scope to various usage of *Artemia* biomass in Bangladesh aquaculture.

The challenges in *Artemia* culture are proper site selection, organizing small scale salt farmers, availability of suitable agricultural by-products, pond management for suitable and predictable *Artemia* production and ensuring pathogen free. Beside these, adaptation to the climate change is a big challenge and thus adaptive *Artemia* pond culture techniques are required.

## **Table 1: Agenda and list of speakers of international workshop on *Artemia* pond/tank production**

Place and Date: Cox's Bazar, June 15, 2021 at 1pm local time

### **List of speakers:**

- Bangladesh:
  - Christopher Price, Regional Director South Asia, WorldFish
  - Benoy Barman, Senior Scientist, WorldFish
  - Meezanur Rahman, Technical Team Leader, EU DESiRA funded “*Artemia4Bangladesh*”, Worldfish
- Belgium: Patrick Sorgeloos, *Artemia* Reference Center, Ghent University
- Cambodia: Veasna Ao, Marine Aquaculture Research and Development Center, Fisheries Administration, Sihanoukville
- China: Sui Liying, Asia Regional *Artemia* Reference Center, Tianjin University of Science and Technology, China
- India: Shanmuganathan Kandan, Rajiv Gandhi Centre for Aquaculture
- Iran: Naser Agh, *Artemia* & Aquaculture Research Institute, Urmia University
- Kenya: Betty Nyonje, Kenya Marine Fisheries Research Institute, Mombasa
- Malaysia: Yeong Yik Sung, University of Malaysia Terengganu
- Myanmar: U Soe Tun, Myanmar Shrimp Association
- Thailand: Montakan Tamtin Department of Fisheries, Samut Sakhon Aquaculture Research and Development Center
- Vietnam: Nguyen Van Hoa, Can Tho University

### **Agenda of the meeting:**

- Inauguration of the workshop and welcome speech by Christopher Price
- History of pond production of *Artemia* cysts and biomass: Patrick Sorgeloos
- Introduction, purpose of workshop, scope of collaboration: Meezanur Rahman
- Social, gender, policy issues in implementing projects: Benoy Barman
- Country experiences in *Artemia* pond/tank production:
  - Vietnam: Nguyen Van Hoa
  - India: Shanmuganathan Kandan
  - Iran: Naser Agh
  - Thailand: Montakan Tamtin
  - Kenya: Betty Nyonje

### **Tea break**

- Country experiences in *Artemia* pond/tank production (continuation):
  - Bangladesh: Meezanur Rahman
  - Cambodia: Veasna Ao
  - Myanmar: U Soe Tun
  - Malaysia: Yeong Yik Sung
  - China: Sui Liying
- Q&A session, discussion, recommendations: facilitated by Patrick Sorgeloos
- Closing remarks by Meezanur Rahman

**Table 2: List of virtual participants in international *Artemia* workshop**

Serial number	Name	Designation, Institution	Country
1	Christopher Price	Regional Director – South Asia, WorldFish	Bangladesh
2	Akhil Ranjan Tarafder	GM, BSCIC	Bangladesh
3	Sarowar Hussain	DGM, BSCIC	Bangladesh
4	Dr. Abdullah-Al Mamun	Professor, Noakhali Science and Technology University (NSTU)	Bangladesh
5	Mousumi Das	Assistant Professor, Department of Aquaculture, BSMRAU	Bangladesh
6	Dr. SM Rafiquzzaman	Professor, Fisheries Biology and Genetics, BSMRAU	Bangladesh
7	Prof Dr. Imran Parvez	Professor, HSTU	Bangladesh
8	Dr. Md Faruque Miah	Professor SUST	Bangladesh
9	Tanwi Dey	Assistant Professor, SAU	Bangladesh
10	Sarowar E Mahfuz	Professor, JSTU	Bangladesh
11	Dr. Abul Farah Md. Hasanuzzaman	Professor, KU	Bangladesh
12	Dr. SM Sharifuzzaman	Professor, CU	Bangladesh
13	Dr. Md. Sazedul Haque	Associate Professor , PSTU	Bangladesh
14	Dr. Md. Shamsur Rahman	Professor, DU	Bangladesh
15	Dr. Md. Nurul Absar Khan	Professor , CVASU	Bangladesh
16	Dr. Helena Khatoon	Assistant Professor, CVASU	Bangladesh
17	Dr. Md. Abdus Salam	Professor, BAU	Bangladesh
18	Dr. Shahrear Hemal	Lecturer, Department of Aquaculture, SAU	Bangladesh
19	A. M. Shahabuddin	Professor, SAU	Bangladesh
20	Meezanur Rahman	Scientist, WorldFish	Bangladesh
21	Dr. Benoy Barman	Senior Scientist, WorldFish	Bangladesh
22	Dr. Patrick Sorgeloos	Emeritus Professor, Ghent University	Belgium
23	Elaheh	Ghent University	Belgium
24	Nickolai Shadrin	IAAC	Russia
25	Dr. Elena Anufrieva	Head of the Laboratory of Extreme Ecosystems, Russian Academy of Sciences	Russia
26	Veasna Ao	Marine Aquaculture Research and Development Center, Fisheries Administration, Sihanoukville	Cambodia
27	Fidero Kuok	Ministry of Science and Technology	Cambodia
28	Sui Lying	Professor, Tianjin University of Science and Technology	China
29	Gao Song	Tianjin INVE Aquaculture	China
30	Wang Jing	Tianjin INVE Aquaculture,	China
31	Sun Shichun	Ocean University of China	China
32	Han Xuekai	Tianjin University of Science and Technology	China
33	Ma Yingchao	Tianjin University of Science and Technology,	China
34	Md Rayan Ali	Tianjin University of Science and Technology,	China
35	Wang Moran	Tianjin Agriculture University	China
36	Shanmuganathan Kandan	Project Director, MPEDA, Rajiv Gandhi Centre for Aquaculture	India
37	Dr. Samaya kannan	Rajiv Gandhi Centre for Aquaculture	India
38	Dr. Naser Agh	Professor, Urmia University	Iran
39	Betty Nyonje	Kenya Marine Fisheries Research Institute	Kenya
40	Dr. Yeong Yik Sung	Professor and Director, Institute of Marine Biotechnology, Universiti Malaysia Terengganu	Malaysia
41	U Soe Tun	Myanmar Shrimp Association	Myanmar
42	Francisco Hontoria	Instituto de Acuicultura de Torre de la Sal, CSIC 12595 Torre de la Sal, (Castellón - SPAIN)	Spain
43	Kartik Baruah	Associate Senior Lecturer, Group Leader - Aquaculture Nutraceutical Research Group	Sweeden
44	Montakan Tamtin	Department of Fisheries	Thailand

Serial number	Name	Designation, Institution	Country
45	Nguyen Van Hoa	Can Tho University	Vietnam

**Table 3: List of in person participants in international *Artemia* workshop**

No.	Name	Designation, Institution	Country
1	Mr. Ridwanur Rashid	Extension officer, BSCIC	Bangladesh
2	Mr. Tarapodo Chowhan	SUFO, Cox`s Bazar Sadar, Cox`s Bazar	Bangladesh
3	Ahmed Fazley Rabbi	SSO, MFTS, BFRI	Bangladesh
4	Md. Zafar Alam	Branch Manager, Mukti, Cox`s Bazar	Bangladesh
5	Md. Ayub Ali	Branch Manager, Eidgaon, Mukti, Cox`s Bazar	Bangladesh
6	Md. Mikhlesur Rahman Bablu	GM, Bengal Bay Hatchery	Bangladesh
7	Uma Sankar Paul	Consultant, Bengal Bay Hatchery	Bangladesh
8	Sujan Barua	Manager, Niribili hatchery ltd.	Bangladesh
9	Sahidul Alam Chowdhury	MD, Golden Aqua Hatchery	Bangladesh
10	Mission Dutta	DGM, Modern Hatchery	Bangladesh
11	Bedarul Alam	<i>Artemia</i> Farmer	Bangladesh
12	Md Nurul Islam	<i>Artemia</i> Farmer	Bangladesh
13	Md Rasel	<i>Artemia</i> Farmer	Bangladesh
14	Md Belal	<i>Artemia</i> Farmer	Bangladesh
15	Md Ismail	<i>Artemia</i> Farmer	Bangladesh
16	Saleha Akhter	Potential <i>Artemia</i> Woman Farmer	Bangladesh
17	Umme Sauda Runa	Potential <i>Artemia</i> Woman Farmer	Bangladesh
18	Mr. S.Shahid	Director, Prottayashi	Bangladesh
19	Md Ibrahim Hossain	Shusilon	Bangladesh
20	Md Jahangir Alam	Coast trust	Bangladesh
21	Dr. Meezanur Rahman	Scientist, WorldFish	Bangladesh
22	Al-Shahriar	TA, WorldFish	Bangladesh
23	Himangshu Biswas	JRA, WorldFish	Bangladesh
24	Probin Kumar Dey	JRA, WorldFish	Bangladesh
25	Kazi Golam Tashfiq	M&E, WorldFish	Bangladesh
26	Khin Ma U	RA, WorldFish	Bangladesh
27	M.U.M Abu Zakaria	JRA, WorldFish	Bangladesh
28	Md Monirul Islam	Messenger cum Office Assistant, WorldFish	Bangladesh
29	Md. Azharul Islam Shabuj	RA, WorldFish	Bangladesh
30	Seikh Razibul Islam	RA, WorldFish	Bangladesh
31	Md. Shariful Alam	RA, WorldFish	Bangladesh
32	Md. Kabir Hossain	Senior Finance and Admin Officer, WorldFish	Bangladesh
33	Rezaul Haque	RA, WorldFish	Bangladesh