



Training Report

on

Hatchery Management to Improve the Sustainability of the Hatchery Industry in Bangladesh



Project Title

Implementing Community Champion Scheme to Improve the Sustainability of the Hatchery Industry in Bangladesh

Funded by

Non-Aligned Movement Centre for South-South Technical Cooperation

Implemented by

Bangladesh Agricultural University, Mymensingh-2202
Bangabandhu Sheikh Mujibur Rahman Science and Technology University,
Gopalganj-8100



EXECUTIVE SUMMARY

This report details the training program "Hatchery Management to Improve the Sustainability of the Hatchery Industry in Bangladesh," conducted across three key locations: Bagerhat (03-05 May 2024), Gopalganj (24-26 June 2024), and Mymensingh (08-10 July 2024). Each training session targeted different types of hatcheries, specifically shrimp in Bagerhat, crab in Gopalganj, and finfish in Mymensingh. The primary aim was to enhance hatchery managers' and staff's skills and knowledge, with a strong focus on sustainable practices. Based on findings from previously conducted focus group discussions (FGDs), three critical topics for each zone were identified for the training program to increase the capacity in water quality management, disease prevention and control, and sustainable hatchery operations. These topics were chosen due to their high relevance and potential impact on the sustainability of hatcheries. In each training zone, ten to twelve participants, hereafter referred to as champion managers/owners, were selected. Selection criteria included their educational background, accessibility, and acceptability among common hatchery owners and managers. This community-based selection process ensured that the chosen participants, or champions, were well-regarded and could effectively disseminate their new knowledge and skills to the wider hatchery community. The champions committed to supporting their communities free of charge, thereby enhancing the overall impact of the training program. Training schedules were meticulously developed in collaboration with resource persons from a multi-national cooperation involving Bangladesh, Indonesia, and Malaysia. The training was conducted in both Bengali and English, ensuring comprehensive understanding. English lectures were transcribed into Bengali, and lecture notes were provided when necessary to facilitate learning.

Each three-day training session included a combination of theoretical lectures, practical demonstrations, and interactive discussions. The training effectiveness was assessed by evaluating the improvement in participants' knowledge on the trained topics. The assessments showed a significant increase in knowledge across all topics, with the exception of the live food culture topic, where further improvements are needed.



Participant feedback was collected at the end of each training session to gauge the program's effectiveness and gather suggestions for future improvements. The feedback was overwhelmingly positive, highlighting the relevance and practical applicability of the training content. Participants appreciated the comprehensive coverage of topics and the expertise of the trainers.

Overall, the training program was highly successful. Participants demonstrated significant improvements in their understanding and implementation of sustainable hatchery management techniques. The knowledge gained is expected to contribute significantly to the sustainability and productivity of the hatchery industry in Bangladesh.



1. INTRODUCTION

1.1 Background

While aquaculture in Bangladesh is almost exclusively dependent on hatchery-produced seeds (approx. 98%), the industry has been criticized for its sustainability considerations due to unplanned hybridization and inbreeding problems. There is also growing concern about disease outbreaks in hatcheries resulting from inadequate biosecurity implementation and poor disease management.

There are three main categories of hatcheries in Bangladesh: 1) finfish hatcheries, dominated by the production of carp and catfish seed, 2) tilapia hatcheries, and 3) shellfish hatcheries, mostly focused on prawn and shrimp production. Although the former two types are less pressured for biosecurity implementation, shellfish hatcheries are considered essential to ensure improved biosecurity for better health management and reduce the risk of disease transmission^{6,7}.

To help fish hatcheries, we conducted stakeholder mapping in the Mymensingh region to reveal the role and legitimacy of different stakeholders in pharmaceutical usage and biosecurity implementation. Later, we conducted three need-based training assessment workshops to identify possible interventions for fish hatcheries that could improve their viability and sustainability in Bangladesh. Among the interventions requested by the hatchery owners, the community champion scheme was listed as the most important one. In this scheme, community-nominated persons will be trained to become leaders in terms of knowledge, practice, and skills and will serve the entire community free of cost. This was expected to be a more acceptable and accessible intervention that could bring significant change.

However, due to funding and time limitations, we were unable to implement the scheme and see how it works in the community. Therefore, within the proposed sub-project, we are interested in engaging the community in nominating leaders, developing and delivering cross-country training based on their needs to share better knowledge and expertise, motivate trainees, and widen networking among countries.

1.2 Objectives

- i) Developing training manual through multinational collaboration and delivering training to community leaders;
- ii) To improve the technical skills of hatchery owners/managers; and
- iii) Assessing the training effectiveness through evaluating improvement in knowledge and skills of participants.

1.3 Scope

The report covers the training program's objectives, content, activities, outcomes, and recommendations for future training sessions.



2. TRAINING PROGRAM DETAILS

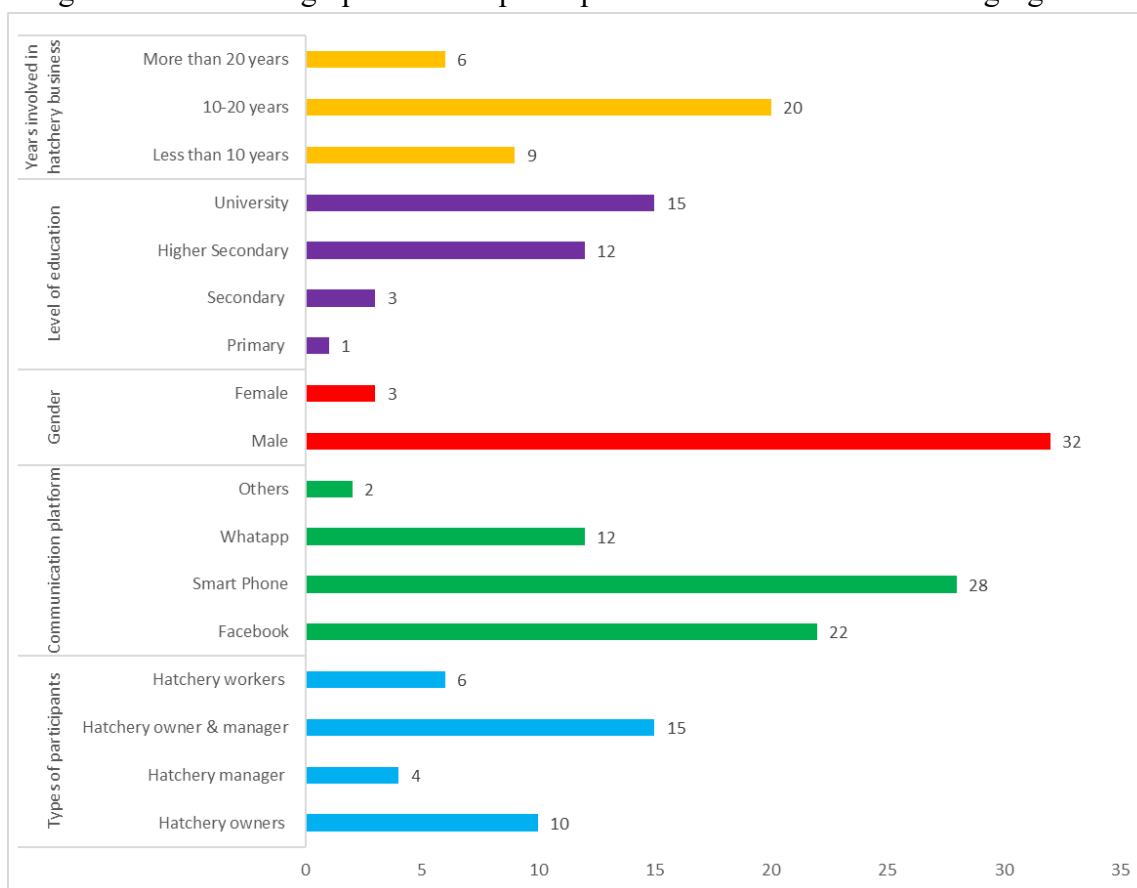
2.1 Date and location of the program

Bagerhat (Shrimp zone) : 03-05 May, 2024
 Gopalganj (Crab zone) : 24-26 June, 2024
 Mymensingh (Finfish Zone) : 08-10 July, 2024

To see the overall schedule of the training programs, we refer to the Appendix of the report.

2.2 Participants

A total of 35 participants (12 in Bagerhat, 12 in Gopalganj, 11 in Mymensingh) attended the training, including hatchery managers, technicians, and staff from various hatcheries across Bangladesh. The demographics of the participants are shown in the following figure:



Participants were selected by the community people based on their level of education, experience, and acceptability. However, another important criterion considered for the selection of the participants was the types of communication platforms. Among the selected participants, 80% of people had access to smart devices among which 22 people communicated with people



through Facebook groups. Twelve participants used WhatsApp groups as a tool to communicate with fellow hatchery personnel.

2.3 Trainers

A total of seven resource persons from Bangladesh, Indonesia, and Malaysia listed below delivered lectures on one or more topics:

Resource Person	Affiliation	Involvement
Mr. Abul Bashar	Lecturer, BAU	Breeding, Nutrition, Water quality
Dr. Neaz Al Hasan	Asst. Prof, BSMRSTU	Disease, Biosecurity, and Water quality
Mr. Checep Sugianto	Manager, Vanamei Shrimp Hatchery Division, Brackish Water Aquaculture Development Center Jepara	Disease, Breeding, and Water quality
Mr. Rakib Hasan	Senior Scientific Officer, Shrimp Station, BFRI	Disease
Mr. Shoyeb Hasan	Scientific Officer, Shrimp Station, BFRI	Hatchery sustainability, Disease
Dr. Khor Waiho	Researcher at Universiti Malaysia Terengganu	Disease, Biosecurity
Mr. Ikbal Hossain	Scientist, Quality Limited	Breeding and Nutrition

3. TRAINING DEVELOPMENT AND DELIVERY

The training methods employed in the program were diverse and designed to cater to the varied learning preferences of the participants. These methods included in-person lectures, online lectures, group discussions, Question-Answer sessions, and case studies. The lectures were delivered in both Bengali and English. For sessions conducted by foreign trainers in English, immediate translation was provided to ensure comprehensive understanding for all participants. This approach facilitated effective communication and learning, bridging any language barriers. Each training session concluded with a dedicated Question-Answer segment, allowing participants to seek clarifications and engage deeply with the content. Questions raised by participants were translated into English and conveyed to the trainers, ensuring that all queries were addressed satisfactorily.



To evaluate the effectiveness of the training program, a robust assessment method was implemented. Before the commencement of the training, participants were given a set of multiple-choice questions to establish a baseline of their knowledge. The same set of questions was administered again at the end of the training program. The improvement in participants' knowledge was then determined using the difference-in-difference (DiD) method, which allowed for a precise measurement of the training's impact. This method provided a clear indication of the knowledge gains attributable to the training program, demonstrating its efficacy in enhancing participants' understanding of sustainable hatchery management practices.

3.1 Training Content Development

Based on the insights gathered from our previously conducted focus group discussions (FGDs), we meticulously selected and covered a range of crucial topics tailored to address the specific needs and challenges of each hatchery zone. In the shrimp hatchery zone, the training focused on three main areas: managing and preventing disease outbreaks, ensuring optimal water quality, and mastering the techniques of first feeding to enhance the survival and growth of shrimp larvae. These topics were chosen to address the most pressing issues faced by shrimp hatcheries and to promote sustainable practices that can lead to healthier and more productive hatchery operations.

For the crab hatchery zone, the training program was designed to tackle the critical aspects of disease management, improving larval survivability, and implementing effective biosecurity measures. Disease control remains a paramount concern in crab hatcheries, as it directly impacts larval survival rates and overall productivity. Therefore, equipping hatchery managers and staff with the latest knowledge and techniques in these areas was essential for fostering a sustainable and resilient hatchery environment.

In the finfish hatchery zone, the focus was on addressing the genetic and environmental challenges that affect hatchery performance. The selected topics included inbreeding prevention, disease management, and water quality maintenance. Inbreeding can lead to genetic defects and reduced vitality in hatchery stocks, so it was crucial to educate participants on best practices for maintaining genetic diversity. Additionally, comprehensive training on disease prevention and



water quality management was provided to ensure that finfish hatcheries can maintain healthy and thriving populations.

Shrimp zone	1. Disease 2. Water quality, and 3. First-feeding
Crab zone	1. Disease 2. Larval survivability, and 3. Biosecurity
Finfish zone	1. Inbreeding 2. Disease, and 3. Water quality

3.2 Materials used

- ✓ PowerPoint presentations
- ✓ Handouts and manuals
- ✓ Visiting sites (model hatchery)

3.3 Training Activities

03-05 May, 2024 (Bagerhat):

Day 1: Registration; Overview of the training program; shrimp hatching and breeding; QA

Day 2: Live-food and microalgae culture; shrimp hatchery disease; QA

Day 3: Shrimp Hatchery management; successful case from Indonesia; QA; Evaluation; Closing ceremony.

24-26 June, 2024 (Gopalganj):

Day 1: Registration; overview of the programme; crab breeding; causation and prevention of crablet mortality; QA

Day 2: Crab disease, epidemiology, control, and prevention; lesson learned from Malaysian crab hatchery; QA

Day 3: Crab biosecurity and economy; QA; Evaluation; and Closing ceremony

08-10 July, 2024 (Mymensingh):

Day 1: Registration; overview of the programme; Finfish breeding programs; Inbreeding and its control; QA

Day 2: Disease outbreak in finfish hatchery and its control; QA

Day 3: Water quality management in finfish hatchery; QA; Evaluation; and Closing ceremony



4. EVALUATION

The improvement in participants' knowledge was then determined using the difference-in-difference (DiD) method, which allowed for a precise measurement of the training's impact. The improvement in results are shown below:

Topics	Pre-training score (10)		Post-training score (10)	
	Avg. score	Score range	Avg. score	Score range
Shrimp disease	3.6	0-6	6.9	4-10
Water quality in shrimp hatchery	4.8	0-8	7.2	3-10
First feeding of shrimp larvae	2.1	0-5	2.2	0-6
Crab disease	1.3	0-4	5.4	1-7
Larval survivability	2.3	0-6	6.7	2-9
Crab biosecurity	4.3	1-8	7.9	4-10
Inbreeding	4.6	3-7	8.1	6-10
Finfish disease	4.5	2-8	7.5	6-10
Water quality in finfish hatchery	5.6	2-8	8.8	7-10

4.1 Participant Feedback on Knowledge Gain

Shrimp Hatchery

- Pre-Training Confidence: Low to moderate, with participants rating their confidence in hatchery management knowledge at an average of 3 out of 10.
- Post-Training Confidence: High, with participants rating their confidence at an average of 7 out of 10.

Crab hatchery

- Pre-Training Confidence: Low, with participants rating their confidence in hatchery management knowledge at an average of 1 out of 10.
- Post-Training Confidence: Moderate, with participants rating their confidence at an average of 5 out of 10.

Crab hatchery

- Pre-Training Confidence: Medium, with participants rating their confidence in hatchery management knowledge at an average of 5 out of 10.
- Post-Training Confidence: High, with participants rating their confidence at an average of 8 out of 10.



5. CONCLUSION AND RECOMMENDATIONS

The "Hatchery Management to Improve the Sustainability of the Hatchery Industry in Bangladesh" training program was successful in meeting its objectives. The program significantly enhanced participants' technical skills and knowledge in sustainable hatchery management practices. The difference-in-difference (DiD) method used to evaluate the training's effectiveness showed a substantial improvement in participants' knowledge across all topics. Participants' feedback further validated the effectiveness of the training, highlighting increased confidence and understanding in key areas of hatchery management.

5.1 Key Findings

- **Knowledge Improvement:** The pre-training and post-training assessments revealed significant knowledge gains in critical areas such as disease management, water quality, and biosecurity. For example, the average score for shrimp disease management improved from 3.6 to 6.9, and for water quality in shrimp hatcheries from 4.8 to 7.2.
- **Participant Confidence:** There was a marked increase in participants' confidence levels. For instance, confidence in shrimp hatchery management rose from an average of 3 out of 10 before training to 7 out of 10 after training.
- **Training Methods:** The use of diverse training methods, including in-person and online lectures, group discussions, and hands-on activities, facilitated effective learning. The immediate translation of sessions conducted by foreign trainers ensured comprehensive understanding.
- **Relevance of Content:** The training content was tailored to address the specific needs of each hatchery zone, covering topics like disease prevention, water quality management, and inbreeding control, which were crucial for the participants.
- **Engagement of Experts:** The involvement of resource persons from Bangladesh, Indonesia, and Malaysia provided a wealth of knowledge and international perspectives, enriching the training experience.



5.2 Recommendations

- **Follow-Up Training:** Conduct follow-up training sessions to reinforce and expand on the topics covered, ensuring continuous learning and skill enhancement.
- **Advanced Modules:** Develop advanced training modules in collaboration with foreign partners to provide deeper insights and more specialized knowledge.
- **Field Visits:** Include field and site visits to model hatcheries to demonstrate good practices and allow participants to observe successful implementations firsthand.
- **Extended Program Duration:** Consider extending the duration of the training program to allow for more in-depth coverage of topics and additional practical sessions.
- **Knowledge Sharing:** Encourage participants to share their knowledge with colleagues and peers to broaden the impact of the training and promote a culture of continuous learning within the hatchery industry.
- **Diverse Expertise:** Incorporate a broader range of experts and resource persons in future programs to provide a more comprehensive learning experience and address various aspects of hatchery management.

ACKNOWLEDGEMENTS

We would like to express our deepest gratitude to the Non-Aligned Movement Centre for South-South Technical Cooperation (NAM CSSTC) for their generous funding and unwavering support for the "Hatchery Management to Improve the Sustainability of the Hatchery Industry in Bangladesh" project. This initiative would not have been possible without their financial assistance and commitment to promoting sustainable development in the aquaculture sector.

Our sincere thanks to the entire team at NAM CSSTC for their dedication and efforts in facilitating this project. Their vision and support have been instrumental in enabling us to conduct comprehensive training programs, develop relevant training materials, and engage with experts and stakeholders across multiple countries.



APPENDICES

1. Training Schedule for shrimp hatchery owners

Time	Activities	Person involved
May 03, 2024		
8:30-9:00	Registration of the participants	
9:00- 9:45	Overview of the training program	Mr. Bashar
9:45-10:00	Break	
10:00-11:30	A brief introduction to shrimp hatching and breeding (lecture-based)	Mr. Checep Sugianto, Indonesia
11:30-11:45	Break	
11:45-12:30	Question and Answer	Mr. Checep Sugianto, Indonesia; Mr. Bashar
May 04, 2024		
8:30-10:00	Hands-on growing microalgae and diatoms	Mr. Checep Sugianto, Indonesia
10:00-10:15	Break	
10:15-11:00	Question and Answer	Mr. Checep Sugianto, Indonesia; Dr. Neaz
11:00-12:00	Disease of shrimp hatchery (lecture-based)	HM Rakibul Hasan, Senior Scientist, BFRI
12:00-12:15	Break	
12:15-1:00	Question and Answer	HM Rakibul Hasan, Senior Scientist, BFRI
May 05, 2024		
8:30-9:30	Hatchery activities (and visit if possible)	Mr. Md. Touhid, Scientist, BFRI
9:30-11:00	Disease management in shrimp hatchery (evidenced from Indonesia)	Mr. Checep Sugianto, Indonesia
11:00-11:15	Break	
11:15- 12:00	Question Answer	Mr. Checep Sugianto, Indonesia; Dr. Neaz
12:00-12:30	Evaluation	Mr. Bashar; Dr. Neaz
12:30	Conclusion and Certificate Awarding Ceremony	Dr. Md. Harun or Rashid, CSO, BFRI.



2. Training Schedule for crab hatchery owners

Time	Activities	Person involved
June 24, 2024		
9:30-10:00	Registration of the participants	
10:00- 11:00	Overview of the training program	Mr. Bashar
11:00-11:15	Break	
11:15-13:00	A brief introduction to crab breeding and hatching (lecture-based)	Dr. Neaz Al Hasan
13:00-14:00	Lunch Break	
14:00-15:30	Lectures on Causation and prevention of crablet mortality	Dr. Neaz Al Hasan
15:30-16:00	Question and Answer	Dr. Neaz Al Hasan
June 25, 2024		
10:00- 11:00	A brief introduction on crab pathogen, etiology and epidemiology	Dr. Neaz Al Hasan
11:00-11:15	Break	
11:15-13:00	Crab disease outbreak in hatchery, control and prevention measures	Dr. Khor Waiho
13:00-14:00	Lunch Break	
14:00-15:30	Crab hatchery sustainability: lesson learned from Malaysia	Dr. Khor Waiho
15:30-16:00	Question and Answer	Dr. Khor Waiho; Dr. Neaz Al Hasan
June 26, 2024		
10:00- 11:30	Biosecurity in crab hatchery: what, why and how.	Mr. Abul Bashar
11:30-11:45	Break	
11:15-13:00	Biosecurity and economic breakdown in crab hatchery	Mr. Abul Bashar
13:00-14:00	Lunch break	
14:00-14:30	Evaluation	Mr. Abul Bashar ; Dr. Neaz
14:30	Conclusion and Certificate Awarding Ceremony	Mr. Abul Bashar ; Dr. Neaz



3. Training Schedule for finfish hatchery owners

Time	Activities	Person involved
July 08, 2024		
9:30-10:00	Registration of the participants	
10:00- 11:00	Overview of the training program	Mr. Bashar
11:00-11:15	Break	
11:15-13:00	A brief introduction to finfish breeding program	Mr. Abul Bashar
13:00-14:00	Lunch Break	
14:00-15:30	Inbreeding in hatchery: impact and prevention	Mr. Bashar
15:30-16:00	Question and Answer	Mr. Bashar
July 09, 2024		
10:00- 11:00	Introduction to finfish disease with their causative agents	Dr. Neaz Al Hasan
11:00-11:15	Break	
11:15-13:00	Disease outbreak in finfish hatchery and their prevention measures	Dr. Neaz Al Hasan
13:00-14:00	Lunch Break	
14:00-15:30	Model hatchery visit	Dr. Neaz Al Hasan
15:30-16:00	Question and Answer	Dr. Neaz Al Hasan
July 10, 2024		
10:00- 11:30	Importance of water quality in hatchery.	Mr. Ikbal Hossain
11:30-11:45	Break	
11:15-13:00	Managing water quality in the hatchery	Dr. Neaz Al Hasan
13:00-14:00	Lunch break	
14:00-14:30	Evaluation	Dr. Neaz Al Hasan; Mr. Ikbal Hossain
14:30	Conclusion and Certificate Awarding Ceremony	Dr. Neaz Al Hasan; Mr. Ikbal Hossain



Action Pictures

