

**Fish culture in household pond and dike cropping  
management**

Farmer's training manual

**Aquaculture for Income and Nutrition (AIN) Project**

**Fish culture in household pond  
And  
Dike cropping management**

Farmer's Training manual

Publication and rights

**Aquaculture for Income and Nutrition (AIN)**

## WorldFish-Bangladesh and South Asia

Dhaka, Bangladesh

Edited by: Dr. Manjurul Karim, DCOP, AIN Project, WorldFish-Bangladesh; Md. Masudur Rahman, Training Manager, AIN Project, Ahasan Habib, Research Associate, AIN Project, WorldFish-Bangladesh

Overall Support: Mr. Erik H J Keus, Chief of Party, AIN Project, WorldFish-Bangladesh; Dr. Craig A Meisner, Country Director, WorldFish-bangladesh; Abdullah-Al-Masum; Rafiqul Islam Khan; Mohammad Jakir Hossain; Kazi A Z M Kudrat-I-Kabir, Project manager, AIN Project WorldFish-Bangladesh.

Compilation: Arif Ahamed, Kazi Sany Ferdous, Khelada Parvin, Mostafizur Rahman, K M Harun-Ar-Rashid, Training and Aquaculture Specialist and Rasheduzzaman, Training Assistant, AIN Project.

Publication Period: February 2014

Cover page and photo credit: Md Masudur Rahaman and Rasheduzzaman.

Designed by: Kamruzzaman.

Funded by: USAID, Dhaka, Bangladesh

Publication and rights: Aquaculture for Income and Nutrition (AIN), WorldFish-Bangladesh and South Asia, Dhaka, Bangladesh.

Copyright: All Rights reserved by the Publisher.

**Not for sell**

**WorldFish**

Messages

**Country director**

**WorldFish**

Messages

**Chief of Party, AIN Project**

## WorldFish

Deputy Chief of Party, AIN  
WorldFish-Bangladesh and South Asia Office  
House # 22B, Road # 7, Block # F  
Banani, Dhaka – 1213  
Phone: (+880-2)8813250, 8814624  
Fax: (+880-2) 8811151  
Email: [M.Karim@cgiar.org](mailto:M.Karim@cgiar.org)

### Preface

From post-independent time the socio-economic development effort for the back-warded population of the country has been going on through non-government development projects of the country. One of the main tools of these development projects is training. Training sharpens the positive change of knowledge, skill and behavior of men. We have been trying to implement that sharpen task with acute and endeavor as per demand of the poor population. We had a great vision: the targeted population will learn the developed fish culture technology at their home according to their own way and the education will be joyful and not monotonous. For this reason we have run to the village people again and again with many questions before compiling the training process and the manual. We have wanted to know from them: what would be the process of training so that they will be able to attentive and will be able to keep the training subjects for a long time. Their answer was that to keep any subject memorable two particular aspects is necessary – a) an special event will have to be made which usually do not happen, and b) the subjects will have to be attractive and joyful. We have compiled the selection of training process and training manual by especially emphasizing on those two subjects, through which about one hundred thousand people has received several hundred thousand training and has kept that learning in their memory. Those two especial subjects of training are – firstly, to dig two small model ponds (ideal model pond and derelict model pond) at the courtyard by the farmer and the field worker on the day before the training day in a pleasant environment and secondly conduct the training through hook-board process.

Manifestation of the training manual with the title of “**Fish culture in the household pond and dike cropping management**” with the initiative of Aquaculture for Income and Nutrition (AIN) implemented by the overall and technical support of WorldFish with the financial support of USAID has taken place and arrangement is done to distribute the manual among field officers under the project area. My firm belief is that this training manual will remain as a milestone in the training field. In spite of editing the manual acutely there can be some limitation and errors. Information used in the manual is not final at any measurement. We have been waiting for your support in achieving development and cause to improve the manual in the next publication.

I have been expressing my gratitude to all people eager to have development, development worker and trainers and wishing wide success in overall fish development. Well wishes –

Dr Manjurul Karim.

## Gratitude

The manual “**Fish culture in household pond and dike cropping management**” is a complete crop of long cherished devotional performance, which will provide support as training manual, guide, and store of technical information among field workers under AIN project in this regard. This training manual is compiled with the help of manuals published by different projects and institutions for a long period, among them Bangladesh Fisheries Ministry, Bangladesh Fisheries Research Institute, Noboziban Program, PBAEP, FTEP-II, Cyclone Affected Aquaculture Rehabilitation Project (CARP) etc are mentionable. We have been expressing our especial gratitude to other related project along with these institutions.

Arief Ahamed, Khaleda Parvin, Mustafijur Rahman, K M Harun-ar-Rashid and Kazi Sany Ferdous, experienced members of Aquaculture for Income and Nutrition Project (AIN) have worked at the primary stage for compiling the training manual. Jamal Uddin, Safikul Islam, Shafi Ullah, A K M Nasiruddin, Iqbal Hossain, A B M Shahidul Haque, Jillur Rahman, Shahidul Islam Akhand, Badrul Alam, Masud Akter, Kamruzzaman, Tofayel Hossain, Nazmul Alam, Asraful haque, Azharul Haque, Balram Halder, and Achinto Kumer Sarkar, technical experts engaged directly at the field level and Sawkat Ali, consultant has made the manual powerful technically. Especial support was provided by Kazi A Z M Kudrat-i-Kabir, Team Manager of AIN team, Muhammad Jakir Hossain, Abdullah-al-Masum and Muhammad Rafiqul Islam to make the manual opportune. In the nutrition chapter of the manual especial support was provided by Rumana Akter, Nutrition Coordinator and an especial team of Helen Keller International. Dr. Manjurul Karim, DCOP of the project has his invaluable contribution through guideline, editing, magnification and refinement. And an important part was played by Mr. Erik H J Keus, COP of the project and Mr. Dr. Craig A Meisner, Director of WorldFish-Bangladesh and South Asia Office for publishing the overall manual. I have been acknowledging especial gratitude and congratulation towards all efforts of AIN team. USAID-Bangladesh has provided financial support in this publication, our hearty congratulation to them.

I have been expressing my hearty congratulation, gratitude and thanks to all involve directly or indirectly with the publication of the manual and at the same time my expectation is that the manual will maintain the role of a milestone in Fish culture movement. On behalf of AIN team –

### **Md. Masudur Rahaman**

Training manager

AIN Project, WorldFish-Bangladesh

## Index

Subjects	Page
<p><b>Module-1: Pre-stocking and stocking management, food and nutrition and classification of food according to function</b></p> <p>Session-1: Opening Discussion (Opening introduction, project goal and objective sharing)            Session 2: Fish and types of fish culture, site selection criteria of new pond (earthen pond, shaded pond, wish pond, Sorjan ditches, rice field), its construction and dimension            Session-3 (Old 2): Repairing dike and bottom of pond, eradicating of aquatic weed, removing carnivores and non-cultured fish            Session- 4 (Old 3): Water filling, application of lime and fertilizer during pond preparation            Session- 5 (Old 4): Natural food observation, water suitability test, determine different fish species, habitat and its stocking density            Session- 6 (Old 5): Identification of strong and weak fry, disinfection of fry, transportation, acclimatization, stocking and survival rate fry            Session- 7 (Old 6): Gender, role of women in fish culture, food and nutrition, components of food and classification of feed according to function            Special session: Practical and farmer's program implementation plan and farmer's training plan</p>	
<p><b>Module-2: Post-stocking management and Human nutrition: Fertilization, liming, feeding, sampling and essential micro-nutrient</b></p> <p>Session- 8 (Old 9 &amp; 12): Micronutrients- Vitamin- A and Iron?            Session- 9 (Old 15): Identification of local small fishes and nutrition value, and maintaining nutrition value/(nutrition value of sis)            Session- 10 (Old 7): Increasing pond productivity after stocking, water exchange and water quality test            Session- 11 (Old 8): Supplementary feeding and dragging chain            Session- 12 (Old 10): Sampling, some common problems (Sea bass and snake head fishes control and prevention) and its probable remedy            Session- 13 (Old 11): Disease prevention management of fish            Special session: Practical and farmer's program implementation plan and farmer's training plan</p>	
<p><b>Module-3: Post-stocking management and Human nutrition: Fish harvesting, marketing, nutritional value of small fishes, dike cropping management, complementary feeding and caring of women health</b></p> <p>Session- 14 (Old 13): Partial harvesting &amp; re-stocking and complete harvesting            Session- 15 (Old 14): Marketing of fish, income and expenditure account and yearly calendar of fish culture activities              Session- 16 (Old 17): Dike cropping, production season, seed bed preparation, fertilizer management in seed bed and compost preparation method</p>	

<p>Session- 17 (Old 21): Culture method of sweet orange potato and nutritional value  Session- 18 (Old 18): Crop management, disease protection and crop marketing, preservation for household consumption, cropping calendar, income and expenditure account. Session- 19 (Old 16): Women nutritional care and Service  Session- 20 (Old 19): Complementary feeding  Session 21 (Old 22): Importance of hand wash, steps and use of tippy tap_Special session: Demonstration and farmer's activity implementation plan</p>	
<p><b>Module- 4: Disaster management in fish culture, recap of aquaculture and nutrition</b>  Session- 22 (Old 20): Disaster management in fish culture  Session 23: Recap on post-stocking management on Aquaculture  Session 24 : Recap on Human nutrition  Session- 25 A (Old 23) : Food and nutrition and essential micro-nutrient iron and vitamin-A  Session- 25 B (Old 24) : Women nutrition and caring, supplement food for children,  Session- 25 C (Old 25) : Nutrition value of orange sweet potato and mola_Special session: Practical and planning for implementation of famer's activities</p>	

Formatted: Indent: First line: 0"

Formatted: Indent: Left: 0"

## **Overall Goal and Objective of the Training course on “Fish Culture in Household Pond and Dike Cropping Management”**

### **Overall Goal of the course**

To make positive change of knowledge, skill and behavior among trainees about Fish culture in the household pond and dike cropping management, gender, food, health and human nutrition; so that they will be able to become aware about gender and disaster etc and they will be able to ensure nutrition demand of their family through increasing income and production of fish and vegetable by taking effective steps of technical skills of the training.

### **Overall Objectives of the course**

At the end of the course on ‘Fish culture in household pond and dike cropping management’ under Aquaculture for Income and Nutrition (AIN) project the participants –

- Will be able to explain the importance of Fish culture in household pond and vegetable culture on fish dike
- Will be able to say and do all the activities of fish culture in household pond accordingly
- Will be able to say and do all activities of dike cropping accordingly
- Will be able to demonstrate practical subjects of all sessions
- Will know about health awareness and nutrition demand of family, gender and about disaster management and will be able to take initiatives to meet nutrition demand through eating locally available small fishes and vegetables





## Module 1

### Module Title

**Pre-stocking and stocking management, food and nutrition and classification of food according to function**

Day : 1<sup>st</sup>    Time 9.00-11.30    Duration 2.30 hours

### Module goal

To make positive change of knowledge, skill and behavior of the farmer's about pre-stocking management of fry in household pond; so that they will be able to take effective steps of pre-stocking management into their pond

To make positive change of knowledge, skill and behavior about management during fry stocking, food and nutrition and classification of feed according to activity among trainees; so that they can be able to take effective technological steps

### Overall Objectives of the module –

At the end of this Training the participants-

- Will be able to know different types of fishes and the possible culture systems
- Will be able to know the criteria to select site for new and different types of culture ponds and their dimensions
- Will be introduced among them and will be able to know and understand the current condition of their ponds.
- Will be able to understand and explain the benefit of technical subjects of all pre-stocking activities of fry.
- Will be able to say and demonstrate all activities of pond preparation consecutively

- Will able to say properly on how to observe natural feed and to conduct suitability test of the pond and demonstrate it.
- Will be able to say how to disinfect fry and transport, will know how to identifying weak and strong fry and demonstrate it.
- Will be able to stock fry, will know about density and ratio according different layer of a pond.
- Will know and say properly about food and nutrition and classification of food according to function.
- Will be able to say skillfully on practical works of sessions and will be able to show practical application
- Will be able to say skillfully and demonstrate practical works of all sessions.

**Module Title: Pre-stocking and stocking management, food and nutrition and classification of food according to function**

**Training schedule**

**Facilitator:** EF/FS

**Participants:** Household Farmers

**Date:**

**Venue:**

Day	Time	Discussion Subjects	Training process
	2.30 hours	--- Module-01 : <b>Pre-stocking and stocking management, food and nutrition and classification of food according to function</b>	
1 <sup>st</sup>	9.00-9.20	Session-1 : Opening discussion <ul style="list-style-type: none"> <li>• Registration, introduction and ice breaking</li> <li>• Opening speech and explanation of overall goal and objective of the course</li> <li>• Expectation and training rules</li> </ul>	Through speech, discussion and game
		Session 2: Fish and types of fish culture, site selection criteria of new pond (earthen pond, shaded pond, wish pond, Sorjan ditches, rice field), its construction and dimension <ul style="list-style-type: none"> <li>• Fish and types of fish culture</li> <li>• Site selection criteria for different types of ponds</li> <li>• New pond constructions and its dimensions</li> </ul>	Question and answer, sample pond, participatory discussion through exhibiting practical materials and hook board picture and practical
D	9.20-10.20	Session-3 (Old 2): Repairing dike and bottom of pond, eradicating of aquatic weed, removing carnivores and non-cultured fish <ul style="list-style-type: none"> <li>• Repairing dike and bottom of pond and eradicating of aquatic weeds</li> <li>• Carnivorous and non-cultured fishes</li> </ul>	Question and answer, sample pond, participatory discussion through exhibiting practical materials and hook board pictures and practical

		removal	
A	10.20-11.00	<p>Session- 4 (Old 3): Water filling, application of lime and fertilizer during pond preparation</p> <ul style="list-style-type: none"> <li>• Water filling</li> <li>• Ratio of lime during pond preparation and application technique</li> <li>• Ratio of fertilizer during pond preparation and application technique</li> </ul>	Question and answer, sample pond, participatory discussion through exhibiting practical materials and hook board pictures and practical
		<p>Session- 5 (Old 4): Natural food observation, water suitability test, determine different fish species, habitat and its stocking density</p> <ul style="list-style-type: none"> <li>• Natural food observation and water poisoning test</li> <li>• Determine species of different fry, density and ratio</li> </ul>	Question and answer, participatory discussion through showing practical materials and hook board picture, role play and dummy practical
		<p>Session- 6 (Old 5): Identification of strong and weak fry, disinfection of fry, transportation, acclimatization, stocking and survival rate fry</p> <ul style="list-style-type: none"> <li>• Identify strong and weak fry</li> <li>• Fry purification, transport, acclimatization and stocking</li> <li>• Observation of survival rate of fry</li> </ul>	Question and answer, participatory discussion through exhibiting practical materials and hook board picture, role play and dummy practical
		<p>Session- 7 (Old 6&amp;20): Gender, role of women in fish culture, food and nutrition, components of food and classification of feed according to function</p> <ul style="list-style-type: none"> <li>• Gender, sex and its difference</li> <li>• Gender equality and equity</li> <li>• Gender transformative approach (GTA)</li> <li>• Class of women and men works and production distribution</li> <li>• Women and men condition, position, and women empowerment</li> <li>• Women role in fish culture</li> <li>• Food and nutrition</li> <li>• Nutritious food and components of food</li> <li>• Task of food and source and classification of food according to function</li> </ul>	Questions and answers, participatory discussion by presenting poster in hook board, team work and role-play
Y	11.00-11.30	Special session : Practical and farmer's	Practically and through

	activity implementation and Farmers training plan <ul style="list-style-type: none"><li>• Practical</li><li>• Farmers activity implementation plan</li><li>• Farmers training plan</li></ul>	direct participation of farmers
--	--	---------------------------------

## Module-01

### Module Title: Pre-stocking and stocking management, food and nutrition and classification of food according to function

#### Supporting materials for training and practical

Practical materials used in field level training, practical and work list of using dummy:

Practical materials used in the training

Session title	Practical materials supplied by the project	Practical materials supplied by staff	Practical/practical with using dummy
<p><b>Session-1</b> : Opening discussion</p> <p>Session 2: Fish and types of fish culture, site selection criteria of new pond (earthen pond, shaded pond, wish pond, Sorjan ditches, rice field), its construction and dimension</p> <p><b>Session-3 (Old 2)</b> : Repairing dike and bottom of pond, eradication of aquatic weeds, removal of carnivorous and non-cultured fishes</p> <p><b>Session-4 (Old 3)</b> : Water filling,</p>	<ol style="list-style-type: none"> <li>1. Hook board</li> <li>2. Picture of hook-board</li> <li>3. Vibe card</li> <li>4. Measurement tape</li> <li>5. Rotenone</li> <li>6. Traditional towel</li> <li>7. PH paper</li> <li>8. Plastic jar</li> <li>9. Urea</li> <li>10. TSP</li> <li>11. MoP Fertilizer etc</li> </ol>	<ol style="list-style-type: none"> <li>1. Sample pond</li> <li>2. Candle</li> <li>3. Match/ lighter</li> <li>4. Water hyacinth</li> <li>5. Duck weed</li> <li>6. Water lily</li> <li>7. Swollen hyacinth</li> <li>8. Rat-ear hyacinth</li> <li>9. Belladonna</li> <li>10. Arail</li> <li>11. Petal</li> <li>12. Bind weed</li> <li>13. Helencha herb</li> <li>14. Arbor</li> <li>15. Polythene</li> <li>16. Tub/bowl (plastic)</li> <li>17. Different type of lime (good lime/temper less lime)</li> <li>18. Small earthen manger (yoghurt pot)</li> <li>19. Organic manure</li> <li>20. Mug</li> </ol>	<ol style="list-style-type: none"> <li>1. Making two sample ponds</li> <li>2. Exhibiting two types (useful and harmful) of aquatic weed to farmers and explain</li> <li>3. Measuring the pond area, showing rotenone powder, measurement of dose, liquefy rotenone and application</li> <li>4. Practical task of identifying good lime, liquefy lime and application.</li> <li>5. How pH value increased for lime application, make it done practically through pH paper.</li> <li>6. Practical task for identifying good manure, fertilizer dilution and application</li> </ol>

application of Lime and Fertilizer during pond preparation			technique
<p>Session- 5 (Old 4): Natural food observation, water suitability test, determine different fish species, habitat and its stocking density</p> <p>Session-6 (Old 5): Identification of strong and weak fry, disinfection of fry, transportation, acclimatization, stocking and observation of survival rate of fry</p> <p>Session -7 (Old 6&amp; 20): Gender and role of women in fish culture, food and nutrition, components of food, classification of food according to function</p>	<p>1) Hook board 2) Picture of hook board 3) Brown paper 4) Sieve (zooplankton observation) 5) Secchi disk 6) Sieve-glass 7) Traditional towel 8) Magnifying glass 9) Potassium – per - manganate 10) Food card set 11) Vibe card 12) Masking tape</p>	<p>1) Clear glass of water 2) Sponge wood/ sprout of water hyacinth/stick 3) Salt 4) Local cooking pot 5) Local oven 6) Seed of bean 7) Pulse 8) Egg 9) Arum greens 10) <i>Basella Alba</i> 11) Red potherb 12) Data potherb 13) Pumpkin 14) Carrot 15) Ripe mango 16) Ripe jackfruit 17) Ripe Papaya 18) lemon 19) Guava 20) Myrobalan/ Amla 21) Hog-plum 22) Shaddock/Pomelo (Which is available according to season).</p>	<p>1) Three practicals of Natural food observation (hand method, traditional towel/sieve- glass method and Secchi-disk method) 2) Making role play technique of different fishes from different level of water (by hand) 3) Showing way to identify strong and weak fry through dummy practical 4) Dummy practical of fry acclimatization and stocking 5) Showing two methods of fry disinfection through dummy practical 6) Role play about oven. 7. Tell and do practical about GTA 8. Short drama/role-pay related to responsibility for women during disaster, 9. Dummy practical of orange sweet potato culture method,</p>
<p><b>Special session:</b> Practical and farmers activity implementation and training plan</p>	<p>1. Art line, 2. Sign pen 3. Brown paper 4. Scale 5. Hard clip 6. Rope etc</p>		<p>Practically and through direct participation of Farmers</p>

## Session – 01

<b>1<sup>st</sup> day</b>	<b>Time : 9.00—9.20</b>	<b>Duration : 20 minuts</b>
---------------------------	-------------------------	-----------------------------

**Title** : Opening discussion

**Target group** : Household fish farmers

**Goal** : to accomplish registration of the farmers and to open formally the course on Fish culture in household pond and dike cropping management. Make opportunity for trainees to know and understand each other properly, so that they become encouraged to take part in overall activities of the course and can able to create friendly environment.

**Objective** : At the end of the course the trainees will be able to (a) sign on the particular form (b) Know about the back ground of the course through opening and welcoming speech (c) know and understand each other properly (d) inform about expectation of the trainees and will be able to say the objective of the course (e) trainees will take part in the evaluation phase for appraising their notion/idea (f) will be able to know about policies for obeying rules during training period and will be able to observe.

**Introduction** : 1. Exchange of greetings  
2. Describing goal and objective of current session  
3. Focus on current session

**Subject matter** : 1. Registration (Using particular format)  
2. Opening and welcoming speech (Introduction and discussion)  
3. Introduction and ice breaking (story/game and discussion)  
4. Goal and objective of module-1 of the course (brown paper and discussion)  
5. Participation in the evaluation phase (question and answer)  
6. Fixing the rules of the training and expectation collection (participatory process and

brown paper)

**Summary** : 1. Review on main subjects (question and answer)  
2. Establishing link with next sessions

**Training assistive materials:** Brown paper, art line/ sign pen, VIIP card, hard clip, rope etc

## Session method

<b>Introduction section and ice breaking</b>	<b>Technique: Story/game and discussion</b>	<b>Time: 5 minuets</b>
--	---	------------------------

### Working method:

- Facilitator will request farmers to take their own seats; will make farmers registered by following sample registration format and welcome and greet farmers for participating in the training.
- Facilitator will introduce such a new technique to the farmers for introducing them so that farmers will be happy. Facilitator will tell story of his own experience, introduce himself and will initiate for ice breaking of the farmers. In this way each of them will introduce themselves by telling the story of their own experience. They will clap at the end of introduction. He will tell his identity (name, marital status, number of children and will inform one of his wish) within three to five minutes.

<b>Explaining goal and objective of the training, oral evaluation and expectation assay</b>	<b>Technique: Brown paper, VIPP card and participatory discussion</b>	<b>Time: 5 minuets</b>
---	---	------------------------

### Working method

- Facilitator will mention the goal and objective of the training to the farmers understandable.
- Facilitator will try to know the present of technical knowledge of farmers about fish culture through story in participatory process and will evaluate. And will note it down. Opportunity will be created to assess that at the end of training.
- Facilitator will mention and fix some rules of the training and will inform everyone about the expectation of the training and will give one VIPP card and an art line/sign pen to everybody, so that they can write down their expectation from the training session and afterwards the facilitator will read their expectations in front of everybody.

<b>Opening and team leader election</b>	<b>Technique: Participatory discussion</b>	<b>Time: 10 minuets</b>
---	--	-------------------------

### Working method:

- Will conduct an election and will elected one team leader in this training
- Will invite the team leader for opening the training. He/she will declare the opening by speaking few words about the training and wishing success of the training
- Afterwards the facilitator will make conclude the opening session by thanking the team leader and by giving special thanks to all participants
- Before concluding facilitator will tell few rules of the training (appendix-1)

Registration format (sample)

---

### Training registration

Training title: .....

Name of the group: .....

Group number: .....

Venue: .....

Union: .....

Upazilla: ..... Time: ..... Date: .....

Sl. No.	Farmer's name	Father's/husband's name	Village	Signature
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

Signature of team leader: .....

Signature of EF/SF: .....

Name: .....

Name: .....

At first the facilitator will let the trainees know by saying that as there are rules and regulation of every work, so some rules are necessary to follow during the training period. Afterwards he will ask to the trainees "whether the rules are essential or not". Trainees will say one by one and the trainer will note down that on a brown paper. At the end if there are rules untold by trainees the trainer will write down it on the brown paper. Generally the rules which will have to follow are given below –

- Everybody will honor time and will follow ie will attend in the training in time
- Everybody must ask questions to know anything maintaining friendly and helpful attitude
- Give everyone the opportunity to participate equally
- Try to be in a jovial/jolly mood
- If there is any problem then inform it to the facilitator immediately
- Being respectable to each other
- Speak up openly
- Ring tone of Mobile will have to keep silent so that it cannot cause to problem during the session
- Not to spend unnecessary time outside during the session
- Not to tell words unnecessary or not relevant with the subject
- Speak one by one without speaking all together
- Raise hand for questioning with the consent of trainer if any question occurs in mind
- Not to do side talking
- Be attentive to listen the training and try to answer if he ask any question
- Try to participate in group work or in practical session actively

When write down the rules will be accomplished, the trainer will explain why it is essential to follow these rules by all. Afterwards he will invite everyone to follow these rules during the training and will thank all for actively participate in this training.

**Session 2: Site selection criteria of new pond (earthen pond, shaded pond, wish pond, sorjan ditches, rice field), its construction and dimension**

Day: 1st	Time: 9.20-10.20	Duration: 60 minuets
----------	------------------	----------------------

**Title** : Repairing dike and bottom of pond, eradicating of aquatic weed, removing carnivores and non-cultured fish

**Target group:** Household fish farmers

**Goal** : To give trainees the concept about repairing dike and bottom of pond, removal of aquatic weeds, and about removal of carnivorous and non-cultured fishes, so that they are able to know about those works.

**Objective** : At the end of the session trainees will be able to say and do (a) importance of repairing dike and bottom of pond (b) type of aquatic weeds (c) repairing dike and bottom of pond and removal of aquatic weed with proper technique (d) identify carnivorous and non-cultured fishes (e) harmful effect of aquatic weeds, carnivorous and non-cultured fishes (f) proper dose of rotenone, application technique and carefulness and (g) about rotenone application with proper technique.

**Introduction** : 1. Describing the goal and objective of the current session and focusing on main session

**Subject Matter (SM):**

1. Importance of repairing dike of pond, problem of bush and big tree on the dike and clearing process, time of repairing dike and process and bottom repairing (question and answer, participatory discussion through exhibiting hook board picture)
2. Aquatic weed, name of different type of aquatic weed, harmful effect of aquatic weed (question and answer, participatory discussion through exhibiting practical materials and hook board picture)
3. Easy way to eradicate aquatic weeds, name of beneficial aquatic weed and their benefit (question and answer, participatory discussion through exhibiting hook board picture)
4. Carnivorous and non-cultured fish and their harmful effect (question and answer and participatory discussion through exhibiting hook board picture)
5. Technique to remove carnivorous and non-cultured fishes from the pond (question and answer and participatory discussion through exhibiting hook board picture)
6. Fixing dose of rotenone powder, pond measuring technique and dilution of rotenone, application process and time (question and answer, exhibiting hook board picture and practical)
7. Carefulness during rotenone application (question and answer and exhibiting hook board picture)

**Summary** : 1. Review on main subjects (question and answer and picture exhibited on hook board)

: 2. Evaluate objective of the session (question and answer)

: 3. Establishing linkage with next session.

**Training assistive materials:** Hook board, picture for hook board, sample pond, measuring tape, rotenone, traditional towel, water hyacinth, duck weed, rat-ear weed, water lily, belladonna, arail, petal, bind weed, helencha herb, arbor, polythene, tub/bucket (plastic) etc.

## Session method

<b>Repairing dike and bottom of pond (SM:1)</b>	<b>Technique: question and answer, sample pond, participatory discussion through exhibiting hook board picture</b>	<b>Time: 15 minuets</b>
---	--	-------------------------

**Working method:**

- At the beginning of discussion of this part the facilitator will thank the farmers and will invite them to listen with patience and to take part actively.
- Afterwards the facilitator will exhibit pictures on repairing dike and bottom of pond by hanging on the hook board, in this case the round picture is in the middle and other pictures will hang one after one and ask to the participants what is shown in pictures.
- Then going in the sample pond the facilitator will ask the importance of dike repairing focusing picture in hook board? Then by showing bush and big tree on dike he will ask what the problems of bush and big tree on dike are? Participants will inform their opinion.
- Again showing picture on hook board the facilitator will want to know – what the techniques of repairing dike and clearing bush and big tree are. What is the time and techniques of repairing dike? What is the importance of repairing bottom of pond? Facilitator will listen to their answer and will give them a clear idea about the subject matter.
- In the end he will conduct review and oral evaluation on pictures exhibited on hook board in a participatory process.

<b>Removing aquatic weeds (SM:2-3)</b>	<b>Technique: Question and answer, practical materials, sample pond and participatory discussion through exhibiting hook board picture</b>	<b>Time: 20 minuets</b>
--	--	-------------------------

**Working method:**

- What is aquatic weed and what are the names of different type of aquatic weeds? Facilitator will know it from the participants through question and answer. Then facilitator will show different type of aquatic weeds collected beforehand/hook board picture, and along with adding more with the answer of participants, he will give a proper idea about aquatic weeds. During exhibition he will ask – harmful effect of aquatic weeds and what are the process of eradicate aquatic weeds? He will collect their opinion and will conduct participatory discussion through exhibiting hook board picture
- Then the facilitator will want to know the names of beneficial aquatic weeds and their benefit; and showing practical sample and hook board picture he will discuss about beneficial sides through participatory process.
- In the end he will review and make oral evaluation on pictures exhibited on hook board through participatory process.

<b>Removal of carnivorous and non-cultured fishes (SM:4-7)</b>	<b>Technique: Question and answer, practical material, sample pond and participatory discussion through showing hook board picture</b>	<b>Time: 25 minuets</b>
--	--	-------------------------

**Working method:**

- Facilitator will ask to participants – which fishes are called carnivorous and non-cultured fishes? What are their harmful effects? What are the techniques to remove carnivorous and non-cultured fishes from pond? He will discuss these subjects in details by showing hook board picture through participatory process.
- Next he will give an idea about rotenone showing original rotenone. He will show hook board pictures on fixing dose of rotenone, different techniques of pond measurement, dilution of rotenone, application technique of rotenone, time, carefulness during rotenone application and will discuss on it and will measure the size of a sample/ any pond near to the training place and will calculate rotenone dose with the participation of farmers for fixing rotenone dose.
- Will dilute real rotenone and will show application process in participatory process. Then he will tell about carefulness of rotenone during application
- In the end he will review and make oral evaluation on pictures exhibited on hook board through participatory process.

Repairing dike and bottom of pond, eradicating of aquatic weed, removing carnivorous and non-cultured fish

### Repairing dike and bottom of pond

**1. Importance of repairing dike of pond:** If dike of pond is broken then fishes will go out during rain/flood. moreover—

\* Carnivorous and non-cultured fishes will enter into the pond which will make harm to culture fishes \*Rotten and poisonous materials will enter from outside and will ruin the pond water

\* If there is rat-hole into dike, it will be broken easily./ rat will make hole into the dike will break other part of the dike

\* Crab, frog, snake etc will take shelter into rat-hole and will make harm to fishes.

**Problems of bush and big tree on the dike:** Sun light cannot penetrate water, it will be difficult to walk through the dike and vegetation will not be possible if there are bush and big tree on the dike. Snake, frog, mongoose, kingfisher, otter etc will take shelter on the dike and they will make harm to cultured fishes.

#### Dike repairing and bush & big tree eradication technique:

- Dikes will have to make or repair strongly. Dike of pond will have to make properly so that there cannot be any hole or broken part. Broken dike have to repair well using extra mud from the bottom of pond or using soil from outside.
- Rat's hole on the dike will have to fill up with soil and will have to make strong beating on it so that any snake, frog, crab etc cannot come into there
- If the soil is sandy then the dike will have to make wide and slope ratio will have to be much more.
- Bush and big tree will have to clear by cutting with chopper-scythe . Branches of big trees on dike which shade the pond will have to cut regularly.

**Time for repairing dike:** It is better to do the task of repairing dike and clearing bush and big tree in the winter time or just after winter. During winter time pond and dike becomes dry helping to repair dike and eradicate aquatic weeds.

**Repairing bottom:** If there is black smelly mud at the bottom of the pond that will have to remove as far as possible, if the pond is old then one spade height (about 6 inches) of black mud will have to remove equally from all over the bottom of pond. Without that one part of pond water can be blocked at one side and dry up the other part of pond bottom and after that easy to remove pond bottom. At the end of the year the bottom of pond will have to make dry according to type of soil. Dry soil of the bottom of pond/gher will have to plough if necessary.

## Eradication of aquatic weeds of pond

**2. Aquatic weeds:** Some aquatic weeds obstruct and make harm to our fish culture in different ways as a result up to expectation production of fish cannot get. There are a few beneficial aquatic weeds which are helpful for our fish culture.

**Name of different types of aquatic weeds :** There can be different type of aquatic weeds in our pond, such as – water hyacinth, duck weed, swollen weed, belladonna, arail, petal, keshore dam, bind weed etc.

### Harmful effect of aquatic weed:

- Aquatic weeds used to consume pond nutrients for its growth
- It obstructs to penetrate sun light into the water as a result growth and multiplying of phytoplankton is hindered.
- Snake, frog like enemy of fish take shelter in it.
- Decomposed weeds create poisonous gases, ruins water quality which occurs different types of diseases.
- Obstruct to make natural food (Phytoplankton)
- It ruins water quality parameters
- Obstruct movement of fishes properly
- Obstruct to apply lime, fertilizer, feed
- Obstruct fish sampling
- Obstruct to harvest the fish

**3. Easy way to eradicate aquatic weeds:** The easiest and low cost process is physical labor process. Weed can be removed using chopper-scythe and family labour will reduce the cost.

**Name of beneficial aquatic weeds and their usefulness:** Just all weeds do not make harm to fishes. There are some weeds does not make harm at all if presence in less amount but those are used as feed of fish. Such as –

- Duck weed, soft grass and banana leaf is used as feed of Sarpunti and Grass-carp, which is very preferable feed for these fishes.
- Else, bind weed and small grass like plant is used as feed of fish.
- Sometimes water hyacinth is used for hatching eggs in natural breeding of Common/ Mirror carp but it might create inbreeding
- Aquatic weeds make shade if depth of water is less in the pond, but it is necessary to watch so that surface of the whole pond cannot get covered by more weeds.

**4. Carnivorous and non-cultured fishes:** Presence of carnivorous/predatory and non-cultured fishes are considered as harmful in different ponds of fish culture, because of predatory/carnivorous fishes can easily eat fry of other fishes. On the other hand, other natural fishes or non-cultured fishes do not eat other fish fries, but they compete with the culture fishes for shelter, food and use of oxygen; as a result expected production is hindered. So it is better to remove those types of carnivorous and non-cultured fishes from the aquaculture pond.**Carnivorous/Predatory fishes:** Fishes, which eat other fishes by chasing, are called carnivorous fishes. Such as Snake head, Gojar, Taki, sea bass, gobi, Bowal, Kakila, Bele, African cat-fish, Flat-fish and Chital etc. If they are in the pond they used to eat cultured fish.

**Non-cultured fishes:** Fishes which are not cultured in the pond plan wise and somehow get into the pond, eat cultured fishes, share pond space and create oxygen deficiency in the pond are non-cultured fish. Such as Punti, Chanda, Tangra, khalsa, Karhina, Bakthuria etc.

**Harmful effect of Carnivorous and non-cultured fishes:** Carnivorous fishes directly eat fry (egg, spawn, Dhani and fingerling) of cultured fish by chasing, such as a carnivorous fish eats 10-12 kg fries of cultured fish to become 1 kg in size.

- Compete for shelter and oxygen
- Non-cultured fish consume share of feed of cultured fish/fry, such as, 1 kg of non-cultured fish consume feed of 10-12 kg of cultured fish.
- Both Carnivorous and non-cultured fishes spread germs of disease in the pond.
- Else, presences of both carnivorous and non-cultured fishes reduce expected production of fish in the culture pond.

**5. Technique to remove carnivorous and non-cultured fishes from pond:** Carnivorous and non-cultured fishes can be removed from pond in three techniques. Such as –

**a) Using small mesh sized blue net, b) By drying pond, and c) through applying rotenone**

**a) Using small mesh sized blue net :** Sometimes Carnivorous and non-cultured fishes cannot be caught completely using net. Because of carnivorous fishes are very sneaky, many fishes remain hidden into the mud during netting, moreover, there are many crab holes, roots of dead trees in old ponds and if fishes remain hidden into it they will not be caught if net is used. But if the pond is new and flood water cannot enter into it then it is possible to remove carnivorous and non-cultured fishes just using small mesh sized net.

**Process:** Aquatic animal along with carnivorous fishes can be removed from the pond using small mesh sized net from one side of the pond to other side successively.

**Advantage and disadvantage:**

- This process is not harmful for environment
- Since all fishes are not possible to remove by this process so desired result is not achieved.
- Though not possible to uproot, yet it is possible to control carnivorous fish by reducing number.
- This technique can help for effectiveness of other processes to apply

**Carefulness:**

- It is necessary to watch so that fishes cannot get out from both sides during netting.
- It should be considered that net can reach up to the mud of bottom during netting That why enough weight/sinker will have to use with the net.
- Enough floaters will have to use so that the net remains floated properly on the water surface.

**b) Drying pond/removing water:** Fish can be removed drying pond and that is a very effective and useful process. All types of fishes will be caught if the pond is dried up. Else, different types of harmful insects, snail and oysters will be possible to remove if pond is made dry. Sun light will reach at the bottom and the pond will be free from harmful gases. Fish production will be good. As there is no system for entering and exiting water into most ponds of our country so application of this process is a bit time consuming and cost worthy. This process is helpful enough to apply at small to medium size of pond. But if the pond is big and deep then it will be difficult and costly to dry up the pond.

**Process:** Water is removed completely from the pond by portable shallow pump using diesel or electricity and carnivorous and non-cultured species of fishes hidden into mud are removed completely.

**Advantage and disadvantage:**

- In this state, bottom and dike adjacent places are ploughed to get better result.
- After removing pond water the pond will be dried up by sun for 1-2 weeks (7-21 days in such a condition that pond bottom and bottom adjacent dike will get cracked).
  
- There will be sunlight at the bottom of pond and harmful gases will remove.
- The pond will be refilled again using either removed water or water from other water source but must be filled filtering, using 2 layered small mesh sized filter net.
- If water is not possible to get from other sources then the pond can be refilled using rain water, which is completely nature dependent.

**Carefulness:** In the case of reuse of removed water or water from other sources it is must to enter water by filtering with net of small mesh sized carefully so that any larvae of any unexpected insects or insects or fish cannot enter into the pond. Just a lack of bit carefulness is enough to destroy the whole process in this case.

**c) By applying rotenone:** If it is not possible to remove carnivorous and non-cultured fishes completely by using net and pond drying then carnivorous and non-cultured fishes can be removed by applying rotenone . Rotenone powder is one kind of herbal type product made of roots (Derris tree) of a tree. It is remains as powder. Its withdrawal time remains into water for seven (7) days. Fishes killed by this powder is edible, there is no harm.

**6) Determine dose of rotenone:** 25-30 g (9.1 powers) of rotenone powder is necessary for per decimal per feet water depth. The withdrawal period is 7 days.

**Consideration during pond measurement:** Measurement of length and width will have to take of the parts where there is water. Then water area will have to find out by multiplying length and width. Suppose, length of water area is 40 feet and width is 33 feet. Therefore the area of the pond is 40 feet X 33 feet = 1320 square feet.

1 decimal = 435.6 square feet

So, 1320 square feet = 1320 square feet/435.6 square feet = 3 decimal (almost)

Determine average depth of water in the pond:

Suppose, the water depth of pond corner = 1 foot

A little far from the bank water depth is = 2 feet

In the middle the depth is = 3 feet

Then the average depth of the pond is = (1+2+3) feet/ 3 = 2 feet (Amount of rotenone will have to find out according to this average depth)

Amount of rotenone usable for that pond will be = 3 decimal X 2 feet X 25 g = 150 g.

**Pond measurement technique by hand:**

Suppose, length of a pond is 50 hands and width is 40 hands

So the area of the pond will be 50 hands X 40 hands = 2000 square hands

Therefore, 2000 square hands = 2000 square hands/196 = 10.2- or 10 decimal (1 decimal = 196 square hand)

**N.B:** For calculation orally instead of 196 it can be used 200 to divide.

**Dilution and application process:** Taking calculated amount of rotenone powder according to the area and depth of pond in a pot, dough will have to make by adding water in it. Then small marble like ball will have to make with one part by dividing the dough into three parts and the small balls will have to throw equally at all parts of the pond. Rest two parts will have to spray into water of the pond equally by diluting with water. Fishes will have to catch quickly after 20-25 minutes.

**Time of application:** Good result will be achieved if rotenone is applied at 10-11 AM in a sunny day.

#### 7) Cautiousness of rotenone application:

\* Use polythene in hand and cover nose, face with traditional mask during dilution of rotenone and application it into pond.\* It will have to spray in favor of wind.

\* Hands will have to wash properly by soap after rotenone application and pots also will have to wash properly.

\* Rotenone will have to keep always out of reach of children.

N.B: On bottles/boxes (such as Argulex, Potassium per-manganet, Sumithion, Formalin etc) of different type of medicines "ppm" doses are mentioned. It becomes difficult to calculate the needed amount (how much liter or kg) of medicine for farmer's pond. PPM doses are to change into liter or kg; that means how much kg or liter of that medicine is needed for farmer's pond, to calculate that two formulas are given below:

For Rectangular/square shape of pond amount of necessary chemical (kg/water body) = Length of water body (meter) X width (meter) X Average depth (meter) X Dose (ppm) / 1000

Necessary amount of chemical (kg/ water-body) for Round shape pond = 3.14 X radius square of water-body (meter) X average depth (meter) X dose (ppm) / 1000

Example:

Suppose length of a pond is 20 meters, width is 10 meters and depth is 1.5 meters. Fishes of the pond is attacked by Dectailogairus parasite so Formalin of 2 ppm rate will have to apply. How much formalin is necessary for that pond?

Amount of formalin = 20 meters X 10 meters X 1.5 meters X 2 ppm /1000

= 0.60 liter or 600 ml

If length, width and depth of a pond are measured by hand then the result will have to determine according to the above formula by changing measurement of hand into meter. (1 hand = 0.457 meters and 1 meter = 2.186 hands)

Day : 1st	Time : 10.20-11.00	Duration : 40 minuets
-----------	--------------------	-----------------------

**Title: Water filling, application of lime and fertilizer during pond preparation**

**Target group:** Household fish farmers

**Goal** : To give idea to the trainees about dose of lime and fertilizer and application process, so that they can learn those techniques.

**Objective** : At the end of the session participants will be able to do and tell about a) how to fill water b) consideration to fill water (c) Types of lime (d) Identification of good lime (e) Benefits of lime application (f) Dose of lime (g) Application process, time of application and carefulness (h) Variety of fertilizer (i) Necessity of fertilizer application during pond preparation and (j) Dose of fertilizer, application process, time of application and cautiousness during fertilizer application.

**Introduction** : 1) review of previous session.  
2) Description of goal and objective of the current session  
3) Focus on current session

**Subject matter (SM)** :

1. How and when to fill water and considerations during water filling
2. Lime and type of lime, way to identify good lime and benefit of lime (question and answer, lime show, participatory discussion through exhibiting hook board picture and practical)
3. Dose of lime during pond preparation and dilution of lime , lime application process and time (question and answer, participatory discussion through exhibiting hook board picture and practical)
4. Carefulness for lime use (question and answer, participatory discussion through exhibiting hook board picture)
5. Fertilizer and types of fertilizer, necessity of fertilizer application into pond (question and answer, real materials and exhibition of hook board picture)
6. Dose of fertilizer during pond preparation, time difference between rotenone application to fry stocking, liquefy fertilizer, application process and time of application (question and answer, hook board picture show and practical)
7. Considerable subjects of fertilizer application (question and answer, participatory discussion through exhibiting hook board picture)

**Summary** : 1. Review on main subjects (question and answer and hook board picture show)  
2. Determine goal of the session (question and answer)  
3. Establish linkage with the next session

**Training assistance materials:** Hook board, hook board picture, sample pond, variety of lime, pH paper, small earthen pot (yoghurt pot), sample jute sack, tub/bucket (plastic), mug, traditional towel, inorganic fertilizer (Urea, TSP), organic fertilizer (compost etc).

<b>Dose of lime during pond preparation and application process (1-3)</b>	<b>Technique: question and answer, sample pond, real materials, participatory discussion through exhibiting hook board picture and practical</b>	<b>Time: 20 minutes</b>
---	--	-------------------------

**Working method:**

- Facilitator will ask trainees –what is lime? How many types of lime are available in the market? What is the way to identify food lime and what are the benefits of lime? And will ask about lime dilution process, application process and time.
- Afterwards facilitator will show real lime. He will discuss ways to identify good lime by showing stone lime/brunt lime and dust lime and will do practical diluting lime in a glass
- He will explain about lime dilution and application process showing picture on hook board through participatory discussion.
- How pH value increases for lime application and he will show it practically using pH paper.
- Now facilitator will ask -- what carefulness is necessary during use of lime? The problems can occur during lime dilution. Simultaneously he will describe that and exhibiting hook board picture, he will discuss about cautiousness through participatory way.
- At the end he will review and will make oral evaluation on hook board pictures through participatory discussion.

<b>Dose of fertilizer during pond preparation and application process (4-6)</b>	<b>Technique: Question and answer, sample pond, real materials, participatory discussion through exhibiting hook board picture and practical</b>	<b>Time : 20 minutes</b>
---	--	--------------------------

**Working method:**

- Facilitator will ask trainees – what is fertilizer? How many varieties of fertilizer are available in the market? What is the necessity of fertilizer application during pond preparation? Dose of fertilizer and what is the time distance from rotenone application to fry stocking? What are the considerable subjects about fertilizer dilution, application process, suitable time for fertilizer application?
- Showing Urea and TSP to participants he will acquaint with chemical fertilizer and at the same time he will inform them how many varieties of fertilizers are available in the market and will show practically how to identify corrupt TSP fertilizer .
- Then facilitator will make the farmers understand about necessity of fertilizer application in the pond and will discuss on dose of fertilizer.
- Then facilitator will explain about fertilizer dilution and application process and will make them understand by exhibiting hook board picture, in this case he will hang the round picture in the middle and rest pictures surrounded one by one and will ask the participants what does indicate each picture. TSP is not possible to dilute into water easily and he will try to dilute TSP with water in a bucket and will tell the participants that tomorrow we dilute TSP here. Now taking water into another bucket he will tell that yesterday we made TSP wet into this bucket which has diluted eventually. Now we shall dilute Urea along with the TSP. When Urea will be diluted then he will have to show with the participation of farmers how to spray it into the pond. He will inform farmers about dilution of compost as the same way of TSP dilution and will do practical task of spraying compost into sample pond.
- To make the farmers understand about effectiveness of fertilizer he will show them the bucket with water with the mixer of Urea and TSP that were diluted two days ago which still did not possess green color and will explain the farmers that water color used to get changed within 5-7 days. And to tell them that at the last day of our training we will be able to see the change of water color.
- Then through participatory discussion and showing hook board picture he will describe to participants what they will have to consider during fertilizer application.
- In the end he will review and make oral evaluation on hook board picture through participatory process.

## Lime and fertilizer application during pond preparation

### Dose of lime and application process during pond preparation

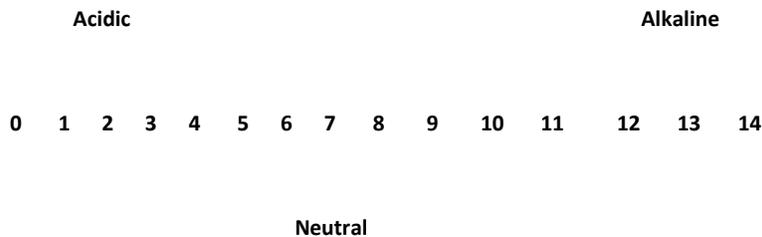
**1. What is lime and type of lime:** What is eaten with betel leaf is lime; its color is white and it is a compound of calcium. Different types of limes are available in the market, such as oyster-shell lime  $\text{Ca}(\text{OH})_2$ , burnt lime ( $\text{CaO}$ ), agriculture lime ( $\text{CaCO}_3$ ), dolomite ( $\text{CaMgCO}_3$ ) etc. Among this burnt lime is the best for fish culture, which looks like stone. Good result is achieved if burnt lime is applied in the pond.

**Way to identify good lime:** The test can be done by putting a piece of lime into small amount of water in an aluminum jar/glass. There will be reaction consequently bubble and heat will be produced. If the lime is good or bad it can be tested by placing lime and water in a tea glass while purchasing lime from the market, good lime will produce heat and bubble.

**Usefulness of lime:** (a) Lime clears water (b) removes turbidity of water (c) removes acidity of water and soil (d) removes bad gases (e) increases pH value (g) increases effectiveness of fertilizer (h) creates necessary environment for increasing plankton (i) supply calcium (j) helps to compost organic materials quickly (k) destroy parasites, germs and bacteria.

**What is pH and what sense does it makes:**

- When pH value is 7 then the solution or liquid is neutral.
- When it is less than 7 then it is acidic.
- If the value is more than 7 then it is alkaline.



Picture: pH scale

---

## 2) Lime application dose in aquaculture

**Dose during pond preparation:** Burnt lime (looks like stone) 1 kg/ decimal will have to apply during pond preparation.

**Liquefy lime into water:** Measured amount of lime will have to put into steel bucket or earthen pot, or digging a hole on the dike or any place of dried pond or a little far from water into the pond with water. Afterwards the pot or the hole will have to cover by jute sack. The face will have to bind if it is a pot or weight of brick or mud bolder will have to place surrounded by the sack if it is a hole so that after pouring water on lime it cannot splash out while boiling and cannot get into eyes and face. Then add water three times of lime will have to pour into the pot or into the hole from over the sack. The reaction will start just after pouring water and it will have been boiling with bubble. The lime will melt within 10-15 minutes and possibility of accident will be dispersed. But it takes almost 2-3 hours to become the lime cold.

### **Lime application process:**

**In dry pond:** Powdered lime will have to splash on properly up to the level where water rises in the rainy season along with bottom in a dried pond. More lime will have to split at places where feed are used to fed fishes , the place remains wet even after drying up the pond.

**In the pond full of water:** After 1-2 days of rotenone application and 3-4 days before fertilizer application, lime will have to apply into pond full of water. More water should be added to dilute lime and mixing it properly by a stick, the lime will have to splash on all over the pond (on dike and in bottom) by mug or by bowl.

**Application time:** Lime will have to apply into pond during sunny morning.

**3) Cautiousness:** during use of lime: The following cautiousness are necessary to follow –

- a) A cloth mask will have to use to cover nose and face.
- b) Lime will have to toss in favor of wind
- c) Lime should not dilute into plastic bucket or tub.
- d) Hot-lime should not apply.
- e) Lime should not apply in the cloudy/rainy day.
- f) Lime should not apply if pH value is more.
- g) Lime will have to apply in the sunny morning.
- i) Lime will have to keep reach out of children.

### **Dose of fertilizer during pond preparation and application process**

**4. What is fertilizer and varieties of fertilizer:** Fertilizer is the substance which increases the soil and water fertility. Two types of fertilizer can be applied into pond, such as – organic and inorganic fertilizer.

\* As organic fertilizer –compost, some seed cakes are applied.

\* As inorganic fertilizer – urea, TSP and MOP are applied.

**Necessity of fertilizer application in the pond:** Natural feed of fish such as – plankton, small insects, earth worm like small insects grow more into pond when fertilizer is applied, which are the main food for fish. If sun light can fall in the pond properly and fertilizer is applied properly then a lot of natural feed grows in the pond. As a result less amount of supplementary feed are needed to supply.

**5. Dose of fertilizer during pond preparation:** 3-5 days after lime application and at least 4-5 days before releasing fry, fertilizer will have to apply as per following dose at per decimal –

\* Compost : 6-10 kg (1 basketful),

\* Urea : 150-200 g (5-7 fistfuls)

\* TSP : 75-100 g (2-3 fistfuls) and

\* MOP : 25 g It is strongly prohibited to use any duck, chicken or pig dung in the fish pond

Commented [Sunny1]: We don't suggest MoP for aquaculture

**Interval in between releasing fry and application of rotenone, lime and fertilizer:**

Rotenone --- after 1--2 days --- lime --- after 3--5 days --- fertilizer--- after 4--5 days – fry stocking

**Fertilizer dilution and application process:** The way fertilizer will have to apply in the pond –

- TSP fertilizer will have to dilute just before the previous night of application fertilizer during pond preparation, in the next morning (at 10-11 am) it will have to splash over at shallow portion by mixing Urea in it.
- In the case of dry pond, necessary amount of organic fertilizer according to pond size will have to splash over all parts of the pond (bottom of pond and inner slope of pond) equally.
- Compost can be diluted and splashed at the same day of inorganic fertilizer using.

**Time of application:** Within 9-10 in the morning on a sunny day fertilizer will have to apply.

**6. Considerable subjects for fertilizer application:**

\* Fertilizer should not apply if the sky is cloudy and in the rain.

\* Fertilizer application will have to stop if water color is too much green.

\* Less dose of fertilizer will have to apply during winter time (half or less than half of the dose compare to summer season)

\* Fertilizer application will not be done if water is turbid.

\* Fertilizer application will not be done in very hot days if depth of water is less.

\* Fertilizer should not apply 2-3 days before and after of netting.

\* It will have to watch carefully that all fertilizers have been diluted well prior to apply.



Commented [Sunny2]:

Formatted: Highlight

Module - 01

**Session -05 (Old 04)**

Day : Second	Time : 9.00 –9.45	Duration : 45 minutes
--------------	-------------------	-----------------------

**Title : Natural food observation, water suitability test, determine different fish species, habitat and its stocking density**

**Target group** : Household fish farmers

**Goal** : Provide practical knowledge to trainees about different methods to observe natural feed in the pond, water suitability test, determine different species of fishes, and about density and ratio; so that they become able to take necessary technical steps for the mentioned technologies.

**Objectives** : At the end of the session participants will be able to say properly and to do practically a) the way of detecting natural feed in the pond properly b) water suitability test c) main considerable subjects to select different species of fishes d) recommended size and density of fry stocking and e) stocking ratio.

**Introduction** : 1. Exchange of greetings  
 2, Review of previous sessions  
 3, Participation in farmer’s evaluation part  
 4, Description goal and objectives of the current session and focus on the main session

**Subject matter:** 1. Natural feed (question and answer and participatory discussion through exhibiting hook board picture  
 2. Natural feed observation method (question and answer and participatory discussion through exhibiting hook board picture and practical  
 3. Water suitability test (question and answer, hook board picture exhibition and practical  
 4. Species can be cultured in ponds (question and answer and participatory discussion through exhibiting hook board picture)  
 5. Availability of natural feed according to the layer and niches (question and answer, participatory discussion though exhibiting hook board picture and role play by hand)  
 6. Importance of species selection and considerations (question and answer and participatory discussion)  
 7. Consideration during stocking density determination (question and answer and participatory discussion through hook board picture)  
 8. Species and size, stocking density and ratio of different fry (question and answer and participatory discussion through exhibiting hook board picture)

**Summary** : 1, Review on main subject (question and answer and pictures exhibited on hook board)  
 2, Determine objective of the session (question and answer)  
 3) Establishing connection with the next session

**Training assistive materials:** Hook board, picture of hook board, sieve (benthos observation), Secchi disk, Sieve-glass, traditional towel, magnifying glass, clear water glass, Sponge wood/hyacinth etc

Session-05 (Old 04)

Session method

Natural feed observation (1-2)	Technique : Question and answer, participatory discussion through exhibiting hook board picture and practical	Time : 15 minuets
--------------------------------	---	-------------------

Working method:

- In the beginning the facilitator will thank and welcome farmers and will exchange greetings
- Then the facilitator will ask – what do we understand about natural feed? At first facilitator will know from farmers through question and answer
- Afterwards he will show the difference by taking clear water in a glass and green water in a glass and will provide realistic idea about natural feed.
- Facilitator will ask – how many ways and what are the methods of observing natural feed? Facilitator will provide the idea that there are four methods we can apply to detect natural feed availability in the pond and even facilitator will show hook board picture to let them understand.
- As practical part the facilitator will bring all the farmers beside any pond and will let few farmers to move into the shallow part of the pond. The facilitator will try to explain and show practically how to observe the natural food.
- In the end he will review on exhibited picture in participatory process and will make an oral evaluation.

Water suitability test (3)	Technique: Question and answer, participatory discussion through hook board picture and practical	Time; 10 minuets
----------------------------	---	------------------

Working method:

- What is water suitability? And why it should be tested? Facilitator will learn answers from the trainees through question and answer. Then he will provide proper idea to farmers about the subject.
- What are the methods to test water suitability? And how that is to be done, facilitator will learn in this regard from trainees through question and answer. Then through exhibiting pictures on hook board he will describe about water suitability test and its importance in details.
- In the end he will make a review on hook board pictures and oral evaluation through participatory process.

Determine different fish fries, density and ratio (4-8)	Technique: Question and answer, participatory discussion through exhibiting hook board picture and role play by hand	Time; 20 minutes
---	--	------------------

Working method:

- What are the suitable species can be cultured in ponds? Facilitator will learn it from trainees through question and answer and will provide a proper idea about species among trainees
- He/she will ask the participants about the fish niches and pond layer according to natural feed distribution and trainees will tell their traditional idea. Then the facilitator will exhibit hook board picture on shelter of fishes and feed according to water level and will explain it through role play by hand.

- He/she will want to know about importance of selecting supportive species, considerations of species selection and stocking density. Moreover he/she will learn farmer's idea about what should be the species and size of different fries for stocking, stocking density and ratio. Afterwards facilitator will conduct participatory discussion in detail on the subject through exhibiting hook board picture.
- In the end he will make a review in participatory way showing pictures and will make an oral evaluation.

#### Session- 5 (Old 4)

### Hand out

---

Natural food observation, water suitability test, determine different fish species, habitat and its stocking density

Natural feed observation in the pond and water suitability test:**1. Natural feed:** A very small kind of algae used to grow when fertilizer is applied in the pond. Algae are so small that it cannot be seen with bare eyes, it can be comprehended only by watching color of water. Such as color of water with natural feed will be light-green or brownish-green or light-brown. Else, small insects are also used to grow for applying fertilizer; these are the natural feed for fishes in the pond. Natural feeds are of two types, such as –

- Botanical – Very small algae
- Zoological – small insects

**2. Natural feed observation method:** Natural feed in the pond can be measured with four methods-

- Observation with eyes
- Observation by hand
- Test by traditional towel/sieve-glass
- Test by Secchi-disc

• **3. Water suitability test:**

- Prior to stocking fry, water suitability test should perform releasing 8-10 fries into a Hapa installed in the same pond or into a pot outside the pond taking water from the target pond to observe for 4-5 hours. If fries survive all and will remain healthy which indicates the pond water are ready to stock.
- If fries died during the test, in that case few more days will have to wait and fries will have to release after testing suitability condition again. Water suitability removes quickly if chain or net is dragged for several times in the pond.

Determine different species, density and ratio of fries:

⇒ **4. Species cultivable in ponds:**

- Local species: Rohu, Catla, Mrigal, Kalibaus etc.
- Exotic species: Silver-carp, Big-head-carp, grass-carp, carpio, mirror-carp, Thai-cat-fish, Thai-punty, Mono-sex Tilapia, Thai/Vietnamese climbing fish etc.

⇒ **5. Natural feed and niches for fishes according to different pond level (role play):**

Silver/Big-head carp : upper level	Carpio/Mirror-carp: Lower level
Catla : Upper and middle level	Grass-carp: Upper, middle and lower level
Rohu: Middle and lower level	Mrigal: Lower level
Thai/local cat-fish: Lower level	Thai punty : Upper and middle level
Mono-sex Tilapia: Upper, middle and lower level	Thai/Vietnamese climbing fish: Lower level

⇒ **6. Importance of species selection:** Selecting species is an important subject prior to release. Species will have to select according to the pond condition. Usually a pond is divided into three levels depend upon niches and food availability for fishes, such as – upper level, middle level and lower level. Highest/proper utility of feed of all levels and fish production becomes more if fishes are released by keeping proper ratio according to level. Such as – if only Silver-carp is released in a pond it will eat only feed from upper level. Feed of middle and lower level will remain unused. So, it is a very important a subject to select species according to difference of water level.

**Considerations during species selection:**

- ⇒ a) Rapid growing b) Demand of fish species is more in local market c) More immune power d) A species which does not compete for feed e) A species which is not carnivorous.

**7. Considerations for stocking density:**

- ⇒ a) Availability of fry b) Productivity of the pond c) Size, depth and duration of water in the pond d) Age of the pond and technique of culture etc. Besides, the additional aspect will have to consider are—
- Upper level fishes will have to release more if the pond is new, for old pond lower level fishes which eat feed from lower level will have to release more
- In shallow pond and where water does not remain more than 5-6 months, Thai punti, mono-sex Tilapia, Thai-Vietnamese climbing fish, silver-carp, carpio fishes will have to release more.
- Production of Thai-punty and silver-carp will be good in a pond with sandy soil.

⇒ **8. Species and size, stocking density and ratio of fry:**

Size: Information of different species, proper size and stocking ratio for stocking fry is given in the table. Stocking ratio can be more or less considering different aspects.

Noticeable for stocking density: a) Fry will grow slow due to overstocking b) Feed, shelter and oxygen deficiency will be occurred c) Fishes will be attacked by disease more and on the other hand d) Utility of feed will not be proper, income will be less compare to expense if less fries are released.

Ratio: a) In common rule 40% upper level feed taker fish, 30% middle level feed eater fish and 30% lower level feed eater fishes will have to stock in a new digging pond. b) For old pond 30% upper level fish, 30% middle level fish and 40% lower level fish will have to stock. Sample of some ideal stocking ratio is given below –

Table-01: Stocking ratio in mix culture of Carp mix culture, tilapia-carp and Catfish-carp per decimal-

Species	Residing level of water	Size (inch)	Number/ Sample-1	Decimal Sample-2	Sample-3	Sample-4
Rohu	Middle and lower level	6-8	8-10	10-15	0	0
Catla	Upper and middle level	4-6	6-7	6-8	3-4	3-4

Mrigal	Lower level	6-8	10	0	0	0
Silver-carp	Upper level	3-5	8-10	10-15	7-8	5-6
Grass-carp	Upper, middle and lower level	8-9	0	1-2	0	0
Thai-punty	Upper and middle level	2-3	15	15-20	0	0
Common-carp	Lower level	3-4	0	4-6	0	0
Catfish	Lower level	6-8	0	0	0	20-25
Mono-sex tilapia	Upper, middle and lower level	3-4	8	0	80-100	12-15
		Total	55-60	46-66	90-112	40-50

N: B: 80-100 Mola fishes can be stocked along with stocking density of sample 1 and 2. Sample-3 is the mix culture of Tilapia-carp; sample-4 is the mixed culture of catfish-carp.

Noticeable: Stocking density can be different according to the place and culture difference.

## Module-01

### Session-6 (Old 05)

Day: second	Time: 9.45-10.30	Duration: 45 minuets
-------------	------------------	----------------------

Title: **Identification of strong and weak fry, disinfection of fry, transportation, acclimatization, stocking and survival rate fry**

Target group: Household fish farmers

Goal : To provide practical knowledge to trainees about techniques of identifying strong and weak fry, fry disinfection, transport, acclimatization and stocking process; so that they become able to stock quality fry by using their achieved knowledge.

Objective: : At the end of the session trainees will be able to say and to do about a) characteristics of strong and weak fry and fry identification b) Importance of releasing strong and quality fry in the pond c) fry disinfection d) Proper technique of fry transportation e) acclimatization process f) rules and techniques of stocking fry into pond and g) Observation of fry survival rate.

Introduction : 1. Review on previous session

2, Describing goal and objective of the current session

3, Focus on current session

**Subject matter (SM)** : 1, Characteristics of strong and weak fry and identify (question and answer, participatory discussion through exhibiting hook board picture and dummy practical)

2, Importance of stocking strong fry (question and answer and participatory discussion)

3, Importance of fry disinfection (Question and answer and participatory discussion)

4, Fry disinfection technique (question and answer, participatory discussion through exhibiting hook board picture and dummy practical)

5, Fry transportation process, time of transportation and density and carefulness during transport (question and answer, participatory discussion through exhibiting hook board picture)

6, Fry acclimatization and stocking (question and answer, participatory discussion through exhibiting hook board picture and dummy practical)

7, Importance, time and process of observing survival rate of fry (question and answer and participatory discussion)

Summary: 1. Review on main subjects (question and answer and hook board picture)

2, Determine objective of the session (question and answer)

3, Establish connection with the next session

Training supportive materials: Hook board; picture, brown paper, sponge-wood/sprout of water hyacinth/stick, potassium-per-manganate, salt, bucket/bowl, traditional towel, polythene bag, hapa etc.

Session-05

### Session method

Identify strong and weak fry and importance of fry stocking (1-2)	Technique: Question and answer, participatory discussion through exhibiting hook board picture and dummy practical	Time: 20 minuets
---	--	------------------

Working Method:

- Just in the beginning the facilitator will invite participants to listen to this session attentively and will invite them to take part.
- What are the characteristics to identify strong and weak fries? At first facilitator will learn the answer from trainees, then he will describe in details about characteristics of strong and weak fries by showing hook board picture and will give a proper idea to identify strong and weak fry to trainees through participatory discussion and will make them dummy practical.
- Afterwards the facilitator will listen about the importance of stocking strong fry from trainees and will provide proper idea about importance of stocking strong fry through participatory discussion.
- In the end he will make review on pictures exhibited on hook board in participatory process and will make an oral evaluation.

Fry disinfection, transport, acclimatization, stocking, observe survival rate of fry (4-7)	Technique: Question and answer, participatory discussion through exhibiting hook board picture and dummy practical	Time: 25 minuets
--	--	------------------

Working Method:

- Facilitator will invite participants to listen to this part of the session attentively and to participate.

- What is the importance of fry disinfection before stocking into pond? Facilitator will learn the answer about fry disinfection process from trainees through question and answer, then he will provide proper idea about the subject and will conduct practical task with the participation of trainees.
- Through question and answer the facilitator will learn about what are the techniques of fry transportation. Then he will tell about noticeable subjects during fry transport to trainees, will show different pictures on hook board about fry transportation and will provide proper idea through participatory discussion.
- When the time of fry transportation and what is the density of fry during transportation? What carefulness will have to adopt during transport? Facilitator will learn from trainees through question and answer then through participatory process he will provide proper idea about density during transport, time and carefulness.
- How fries are made acclimatized and stock? Facilitator will learn from trainees through question and answer and then through exhibiting hook board picture he will show techniques to release fries through acclimatization after transport, afterwards he will make them dummy practical.
- He will provide proper idea among trainees about importance of observing fry survival rate, time and process after making acclimatization and stocking through participatory process.
- In the end he will review on hook board pictures in participatory process and will make oral evaluation.

Session-- 6 (Old 5)

### **Handout**

---

Identify strong and weak fry, fry disinfection, transport, acclimatization, stocking and observing survival rate of fry

#### **1. Identify strong and weak fry**

Characteristics of strong fry:

- Bright and glittering body
- Slippery scales
- As usual shape of body
- No blood spot on body and on gill
- Moves head quickly when tail is hold tight upside down
- Fries start to jump when knocked on the pot
- Remains restless always and runs against current when current is made.

Characteristics of weak fry:

- Red or black spot on scale or on gill
- Body color is pale and scale is rough
- Always remain still and moves head slowly when tail is hold tight
- Fries remain unmoved when knocked on the pot
- Always remains unmoved and moves just in favor of current when current is made in the pot.

**2. Importance of strong fry:**

- Mortality rate will be less if strong fries are stocked
- Fries will not be attacked by diseases easily
- Production of fish will be more

**3. Importance of fry disinfection:** Mortality rate will be reduced if the fries are treated in an easy method prior to transportation and stocking. Because of fries get hurt in different ways during transport, sometimes scales are removed, lesion is made over the body. Fries can be attacked by diseases if it is released into pond in this state. So mortality rate will be less if fries are transported or released into pond after disinfection.

**4. Fry disinfection technique:** Fries will have to stock in pond after keeping for about 30 seconds into 5 g or 1 spoon full of potassium per manganate solution or 200 g or a little less than one fistful of salt into one bucket (10 liters) of water. During the bath the fries will have to release on a dense net placed over the bucket. It is better to do the task just before fry transportation. 300-500 fries can be made bath for 3-4 times into the mentioned solution.

Session-05

### Handout

- ❖ **5. Fry transportation process:** In general fries are transported in two processes. Such as—
- ❖ Traditional process—
  - Into aluminum pot
  - Into plastic drum and—
- ❖ Modern process—
  - Into polythene bag full of oxygen

Time of fry transportation: It is better to transport fries during cool weather in the morning or in the afternoon.

Density during fry transportation: According to the traditional system death rate will be less if 1-2 kg of fingerlings is transported into 10 liters of water. But sometimes fingerling hawkers used to transport 3-4 kg fingerlings. Density and time of different process during transporting fries of different species in commercial fish culture are given below-

Table-01: Transportation of carp-species fingerlings—

Transportation process	Transportation pot	Amount of water	Size of fry	Transport density	Time (hours)
Shoulder of fry hawker	16 number Aluminum pot	8-10 liters	1 inch	1,500-2,000 Dhani	2-3
			2-3 inch	400-500 fingerlings	6-8
			3-4 inch	300-400 fingerlings	6-8
Engine run van	Plastic drum	100-120	1 inch	3,500-5,000 Dhani	2-3

		liters	2-3 inch 3-4 inch 4-5 inch	2,000-3,000 fingerlings 1,500-2,000 fingerlings 800-1,200 fingerlings	3-5 3-5 3-5
Bag full of oxygen	Polythene bag	3-4 liters	Spawn	200-250 g	10-12

Table-02: Transportation of Tilapia fry-

Transportation process	Transportation pot	Amount of water	Size of fry	Transport density	Time(hours)
Shoulder of fryhawker	16 number aluminum pot	20-25 liters	3-4 inch	200-250 fingerlings	6-8
Engine run van	Plastic drum	200 liters	4-5 inch	500-800 fingerlings	6-8
Bag full of oxygen	Polythene bag	2.5-3 liters	0.3-0.4 g	250-300 fries	6-8

Session- - 6 (Old 5)

## Handout

Cautiousness in fry transportation: a) Continuous care will have to take so that the temperature of water into the fry transported pot remains cool always and clean cold water will have to add if water into the pot becomes warm, b) Fry will have to transport during cool hours of the day, fry will have to transport in less density into transport pot, dead fries will have to remove from the pot, c) Before transport, fry will have to sorted into hapa and stomach of fries will have to make empty, d) Face of the transported pot should not cover by wet traditional towel instead it should covered by net with small mesh hole and water will have to stir carefully by hand, e) Special care will have to take so that cigarette fire or ant sharp object cannot touch the oxygen bag.

- ❖ **6. Fry acclimatization and stocking:** Fries should not be released into pond soon after transport. Pot full of fry will have to keep afloat into the ponds water for at least 15-20 minutes. Then water will have to splash into the pot by two hands or by a mug and excess water will have to leave away if necessary. In this way after at least 20-25 minutes when water temperature of pond and pot will be felt same in two hands then little weaves made by hand will have to push towards the pot by making the pot in a sloping position then fries will run freely against the current. To accomplish this at least 25-30 minutes are needed.

- ❖ **7. Observing survival rate of fry:**

Time and process of observation: Movement of fries close to the bank will have to observe for 6-8 hours after releasing fries in the pond. It will have to notice if fries had died or not. Dead fries used to float close to the bank, which will have to remove from the pond quickly. The number of fries has died the same number or 10% more fries will have to release in the pond.

Importance of observation: A lot of pressure used to fall upon fries, which became difficult to bear for the small fries. Sometimes fries can die if acclimatization is not done properly before releasing them in the pond. Expenses usually take place for fertilizer and feed after death of fries in the pond in reality where there are less fishes. In the end, production of fish will be less and production cost will be more if survival rate of fries are not noticed. This is why it is important to observe survival rate of fry to keep proper production cost and to keep stocking ratio of fish according to pond size.

Module-01

**Session – 7 (Old 6)**

Day :2nd	Time : 10.30-11.00	Duration : 30 minutes
----------	--------------------	-----------------------

**Title** : Gender, role of women in fish culture, food and nutrition, components of food and classification of feed according to function

**Goal** : To make positive change of knowledge, skill and behavior about management during fry stocking, food and nutrition and classification of feed according to activity among trainees; so that they can be able to take effective technological steps about mentioned subjects.

To provide practical knowledge among trainees about food and nutrition, components of food and classification of food according to function; so that they become able to increase awareness about food and nutrition of family by using this knowledge.

**Objective:** In the end of the session trainees will be able to say about  
 (i) gender (ii) Difference between gender and sex (iii) gender equality, equity, and gender transformative approach (iv) daily work activities of women and men, condition and position of women and men (v) gender discrimination, possible way of removing discrimination of women and men relationship and women empowerment, (vi) women role in fish culture and huge participation technique  
 a) food and nutrition b) components of food c) function and source of food and d) classification of food according to function and can implement.

- Introduction:**
1. Review on previous session
  2. Describe goal and objective of the current session
  3. Focus on current session.

**Subject matter :**

1. Gender, difference between gender and sex and gender equality, equity, and GTA (questions and answers, participatory discussion by presenting poster in hook board).
  2. Daily work activities of women and men, condition and position of women and men (questions and answers, team work and participatory discussion).
  3. Gender discrimination, possible way of removing discrimination of women and men relationship and women empowerment (questions and answers, and participatory discussion).
  4. Women role in fish culture and huge participation technique (questions and answers, participatory discussion, and acting)

1. Food and nutrition (Question and answer, participatory discussion through exhibiting hook board picture and practical)
  2. Components of food (question and answer and participatory discussion)
  3. Classification of food according to function (question and answer and participatory discussion)

- Summary:**
1. Review on main subjects (question and answer and pictures exhibited on hook board)
  2. Determine objective of the session (question and answer)
  3. Establish connection with next session

**Training supportive materials:** Hook board, picture for hook board, brown paper, food card set, vibe card, masking tape, local cooking pot/oven, bean seed, pulse, egg, arum green, *basella alba*, red potherb, data potherb, pumpkin, carrot and ripe mango, ripe jack-fruit, ripe papaya, lemon, guava, myrobalam/amla, hog-plum, shaddock/pomelo etc (which is available locally)

Session-7 old 06

**Session method**

---

Gender, role of women in fish	Technique: Question and answer, participatory	Time : 30
-------------------------------	---	-----------

Formatted: Font: 11 pt

culture, Food and nutrition, components of food and classification of food according to function (1-3)	discussion through exhibiting hook board picture and practical	minutes
--	--	---------

**Working method:**

At the beginning of training, facilitator (EF/FS) greets and gives thanks to farmers. At the beginning of discussion, will ask farmers; what is gender and sex? Farmers will tell their idea, and he/she will discuss with participants by presenting pictures in hock board after get explanation of gender and sex. At this stage, facilitator will gives thanks to farmers for participation and interested to know difference between gender and sex.

At this stage of discussion, facilitator will discuss why need to know difference between gender and sex, and present condition of gender in society and family. Facilitator will always give priority of participant speech.

At this stage of discussion, facilitator will ask farmers idea about gender equality and equity, will listen their idea carefully. After that, facilitator give thanks to farmers for participation and will give clear idea about gender equality and equity and get feedback.

After that, facilitator will ask farmers whether they have idea about gender transformative approach. If they have then will listen carefully their idea. Now facilitator will give idea about GTA. Out of four steps of GTA, will teach them two examples and practice more real examples with farmers.

At the end, do re-discussion on pictures presented in hock board by participatory methods and do verbal evaluation.

At the beginning of discussion the facilitator will thank participants for listening to discussions of previous sessions with patience and will invite them to participate in the current session.

- What means food and nutrition? What is nutritious food? What is balanced food? At first facilitator will learn answers from trainees through questioning then through exhibiting hook board picture he/she will discuss in detail about foods we are used to eat usually in a participatory process.
- Afterward he will know about what are the components of food and its importance from trainees through question and answer and will provide proper idea to them in this regard through participatory discussion.
- Then facilitator will demonstrate practical work through showing cooking oven and will ask everybody to notice at the oven and will compare three foods (food that provide heat and energy, for growth, healer and disease preventive food) with three corners of the oven and will place an empty pot on the oven and will ask what will happen if one corner of the oven is broken? The pot will fall down by losing its balance; in this way he/she will make them understand how we become sick for the lack of three types of food.
- Facilitator will know earnestly from trainees about particular work of different food and source of food through questioning and will provide proper idea among participants through participatory discussion.

- Then the facilitator will learn from trainees - what can be the classification of food according to function –through question and answer and will provide proper idea among trainees through participatory discussion.
- In the end he/she will review on pictures exhibited on hook board in participatory process and will make an oral evaluation.

Daily work activities of women and men, condition and position, gender discrimination, way of removing discrimination of women-men relationship and women empowerment; (2-3)	Technique: questions and answers, pictures presentation in hock board, participatory discussion and team work;	Time : 10 minutes
--	--	-------------------

**Working method:**

- At this stage, facilitator will ask question to farmers what are the daily activates of women and men? After that, the facilitator will divide farmers into two groups. One group will tell what type of works they do daily by a man and another group will mention the daily works of a women, facilitator will note down the works and will explain daily works of a woman by presenting picture “my wife doesn’t work” in hock board.
- After that, facilitator will ask farmers about condition and position of women and men, gender discrimination and its reason and what is their idea about them? Farmers share their ideas. Facilitator will listen farmer’s idea carefully and then will discuss details about men and women condition and position. He/She is interested to know that what is women and men condition in current society and if there is any condition and position problem? Farmers will do discussion and facilitator helps to vibrant their discussion.
- After that, facilitator will ask farmers-what is the way to reduce discrimination between women and men relationship and what do they understand about women empowerment? Participants continue to discuss details on this matter then he will ask what kind of disadvantage is going on in society due to discrimination of men and women and how its possible to remove, and how its possible to achieve women empowerment.
- At the end, do re-discussion on pictures presented in hock board by participatory methods and do verbal evaluation.

Women role in fish culture and huge participation technique; (4)	Technique: questions and answers, flip chart, participatory discussion and acting;	Time : 20 minutes
--	--	-------------------

**Working method:**

- Facilitator will ask farmers; what are the women roles in fish culture? Farmers will share their idea. At this stage, facilitator gives thanks to farmers for participation and will invite everyone to participate in actively. After that, facilitator will invite a farmer for acting directly with him.
- At first, will inform topics of acting to farmer and ask for acting. Acting will be between one farmer and one extension officer (EF/FS).
- Acting topic is, one extension officer (EF/FS) going to one farmer’s house and encourage to engage for his wife’s participation in pond fish culture and other fish culture activities, and inform that its possible to increase production and gain more profit by engaging women. Farmer didn’t listen any words from extension officer even he said bad words to him, and show sample/dummy ponds, “there are 15000-20000 taka fish in my pond and there is no participation of any women there. I can’t do that type of your illegitimate work” and shout. He tells to his wife who is inside the house, “Jamal’s mother, never interfere in men works”. Farmer’s wife listen conversation between her husband and extension officer (EF/FS) and stay quiet.
- After that, they will leave and farmers make storm sound and shout saying storm storm. All fishes gone away breaking the pond dike by heavy flood in absence of farmer. After disaster when farmer came home then he was very upset and realized that it would reduce most of the damage if get help from his wife. From this damage from disaster farmer feels the importance of his family and wife’s engagement in pond fish culture and other works, and contact with extension officer, include his wife with different activities of fish culture by extension officer. Call extension office to home. Again they do conversation, “brother what you said all are

correct, I can understand it now. Forgive me.” As a result men family member can easily participate work in outside while women family members take parts in different activities of fish culture.

➤ After that, facilitator will know from farmers by questions and answer, what kind of information got from presented acting, and will show more different contribution of women in fish culture using flip chart by participatory method.

➤ After that, facilitator will ask farmers, what can be huge participation techniques of women in fish culture? Will know from farmers by questions and answers and do details discussion by participatory method.

➤ At the end, do re-discussion by participatory methods and verbal evaluation.

Session-07 old 06

---

#### Handout

---

##### Gender, women role in fish culture and disaster preparation in fish culture

**1. Gender:** grammatical/dictionary meaning is male, female, both or none of them. Social scientist use gender word to identify existing differentiation between women and men in society. Gender is an identity of women and men who grown up socially; relationship among women and men determined according to society, contribution of women and men defined by society, which is changeable and according to society-culture is different/differs. They have different position in society due to birth difference between women and men and gender is the combined contribution of it.

In other words, gender indicates an identity or activity of a woman and man in society. Contribution of women and men in society, behavior, dress etc; determined by gender-relationship. So, gender is difference between women and men created by society. For example-

**Activities:** cooking, rearing children along with other home activities are women’s work; on the other hand, income, ruling, judgment and politics etc outdoor works are for men.

**Contribution:** men will take different decision, do politics and ruling, and women wouldn’t contribute to these works.

**Behavior:** women are softhearted, emotional, quite, gentle and men would be strict, logical etc.

**Dress up:** sari for women, shalwar kameez etc but shirt, pant, sarong for men but these can be different in terms of country, culture, and race.

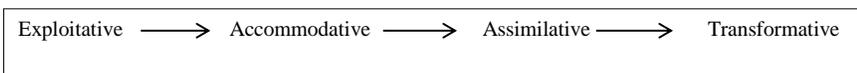
**Gender and sex (social difference between women and men and physical difference):** physical difference between women and men is sex and social difference is gender. Sex is characteristics difference of women and men created naturally, physical appearance of women and men is unchangeable, which is given by God or naturally. This can't be changed if someone or society wish but relationship among women and men in different matters which is specified socially, women and men contribution specified by society are changeable and is different in terms of society-culture. For example, activities, contribution, behavior, dress etc for mentioned women and men.

Sex	Gender
1. physical difference of organ	1. social difference
2. given by God	2. created socially
3. unchangeable	3. changeable
4. same in whole world	4. differs according to country, society, culture

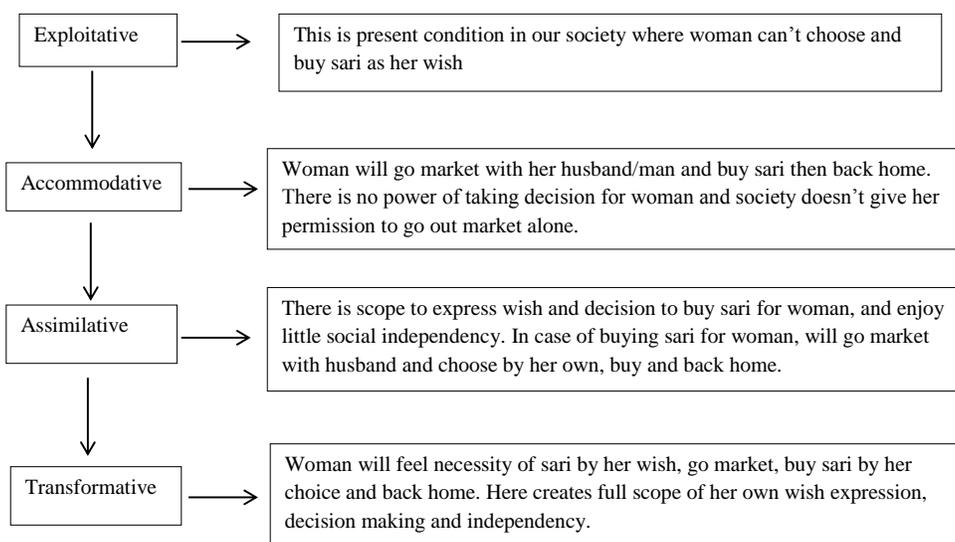
**Gender equality and gender equity:** we use equality and equity two words in different fields. At present, these two words have been used to improve women and men relationships. Equality expresses the principle of equal-rights, dignity and respects each other between women and men. Simply equality stands for same-condition. And generally equity or justice meaning is the way of acquiring equality, the procedure which correct inequity or remove from society using rules and regulation when its increase, equity is that create force on creating equality. Here equality meaning is equal facilities for women and men, such as food, education, medical, work, movement etc. Women and men both have rights to get equal facilities in society. Cheating, torturing will reduce from society if there are equal facilities and rights, and we all can live well. As women are behind, for that men have to sacrifice in some fields and help them to go ahead. If women can come forward with qualification and dignity in society and for their family development and if improve their condition, then only can establish equality of women and men in society.

**Gender transformative approach (GTA):** there are many social hindrances for women empowerment, decision making and free movement in our society. The main aim of GTA is to create social friendly environment by removing those social culture for women empowerment. Can be seen in our society, when women want to take a decision then they need permission from her father, husband or brother, which is main hindrance of

women empowerment. Apart from that, there are many obstacles for women for free movement. GTA approach is needed to identify main reasons of these problems and solve. For example, need to give feed for fish in pond, from this feelings of needs a woman will take decision to buy feed, and will go there by own where feed sales and buy required feeds and apply it. GTA works for women for their decision making and execute works independently in every activities, social contribution, dress up, behavior etc. Have to cross these following three steps to work on GTA approach-



Steps/stage are shown by giving an easy example of buying sari for women-



**2. Condition and position of women and men:**

**Condition:** condition is material site. For example, food, nutrition, education, healthcare, income power, living standard etc. The meaning of condition improvement is improvement of living standard, so women condition meaning improvement of women material conditions (such as, women health, education, income etc).

**Position:** position is related to direct power, control, property, rights, choice, dignity etc. So if someone's condition improved, position may not improve. Women position meaning dignity of women, control, rights, power etc. It might be like that, women condition improved meaning women life standard improved but may not improve position; in that case her position in society is same as other normal women. For example, if wife of a rich person can't spend according to her own wish or can't buy dress, on the other hand, wife of a poor person can do these mentioned works according to her wish, then that rich person's condition changed but in terms of position, she is under wife of poor person.

**3. Gender discrimination, way of removing discrimination of women and men relationship and women empowerment:** discriminations of women and men in family, society and state are-

Stage	Women	Men
Family	<p>To do more household works</p> <p>Nutrition, education, health care and other less facilities</p> <p>Less scope of earn money</p> <p>Tolerate long working day</p> <p>Less scope for leisure and enjoyment</p> <p>No control on money, property</p> <p>Deprive from taking family decision</p> <p>Deprive from own choice</p> <p>No control on income</p> <p>Overall, they are careless, no freedom, lower.</p>	<p>Have to manage household works</p> <p>Nutrition, education, gain skill, and more training facilities</p> <p>More scope of earning money</p> <p>Comparatively less working day</p> <p>Comparatively more scope for leisure and enjoyment</p> <p>Fully controlled</p> <p>Take main role for family decision</p> <p>Give priority of own choice</p> <p>Independent and upper</p>
Society	<p>Limited scope for participation and facilities in social activities</p> <p>Deprive from the scope of policy making and decision making in social activities</p> <p>Socially absence in leading</p>	<p>Comparatively more scope than women to participate in social activities</p> <p>Play main role in policy and decision making</p> <p>Give lead</p> <p>Powerful and has dignity</p>

	Power and dignity less	
State	<p>Limited scope to enjoy citizen rights</p> <p>Voting rights is recognized by state but most of the time is hindrance</p> <p>Less scope to participate state functions</p> <p>There is very little scope to contribute in country's politics and economy</p> <p>Less scope to participate in policy and decision making for state</p> <p>Get discrimination in profession</p> <p>Less scope to participate national politics</p> <p>Deprive of legal affairs</p> <p>Deprive of heritage matters</p>	<p>More scope to enjoy citizen rights</p> <p>No problem at giving vote</p> <p>More scope to participate in state functions</p> <p>There are enough scope to contribute in national politics and economy</p> <p>Get priority in profession</p> <p>More scope</p> <p>Priority in legal affairs</p> <p>Priority in heritage matters</p>

Women are dignity less in every field or deprive from proper respect for mentioned above discriminations. To remove all above discriminations, all women need to work her own and try combined.

**Possible way of removing discrimination of women and men relationship:**

- ❖ Have to bring huge change in 'family' definition. Have to recognize women as head of the family as men, and separate family leading by a woman should give full family respect as man.
- ❖ Have to establish equal rights by introducing criminal law for women and men in marriage, guardianship, and ownership.
- ❖ Have to redesign educational materials again. Training materials have to prepare the way that can contribute to explain women and men unequal relationships and solve it.
- ❖ Women and conscious men have to work together to influence policy making of sex indiscrimination in government and non-government level.
- ❖ Identify current family structure as the primary source of women-torturing and have to take necessary steps from own family to come out from that structure.
- ❖ Women get discrimination from raring the family which is given by force, have to change the idea of sex related labor classification to overcome it and destroy the old idea.

- ❖ Have to use media and give importance to make awareness of common people.

**Women empowerment:** women empowerment is the process which can remove all inequality and discrimination existing among women and men from whole over the world, and women can be established as equal power as men in society. There are two main facts behind existing inequality and discrimination among women and men in world. Such as-

- difference in women and men
- limited rights for women compare to men

Women empowerment is not an issue for women, it's a social matter. Because the benefits of women empowerment also makes men to become realistic, mental release, and hand over power, and also contribute to release men from traditional torturer.

**4. Women contribution in fish culture:** women have been working with skills in their homestead pond fish culture without getting any help from their men. Women have been earning some extra income engaging with fish culture, besides they can get firm position in their family. Women are engaged in all works in pond fish culture. Below are normal works related fish cultures where women are engaged-

- women have been taking part in pond construction in village
- women participate in preparing pond
- making fish feed
- feeding fish and apply fertilizers in pond
- pull nets in pond for taking care of fish
- overall, they catch fish if necessary

**Women huge participation technique in fish culture:**

- have to provide training and loan for both women and men for fish culture in same pond
- have to engage women in combined ownership pond
- have to give priority for women for leasing government, unused ditches
- have to engage more women fish farmers to take combined decision
- have to manage separate loan with easy condition for interested women for fish culture
- have to take more extension activities for women fish farmers
- have to give equal value for women and men works
- both women and men have to be aware about all contributed reproduction works
- have to realize equal importance for women and men works and distribute duty keep positive thinking in mind of gender labor classification

- have to help to create combined decision making environment for women and men to culture fish in ditches and its practical
- Have to provide assistance to direct nursing in small pond in backyard to confirm for fry production, preservation and supply by equal participation of women and men.

## Basic Nutrition & Food Groups

### ➤ Purpose:

- To introduce what macronutrients and micronutrients are, and importance of them for our body
- To identify foods from each major food group
- To learn about the roles and food sources of some of the key micronutrients

🕒 **Time:** 1 hour

### ✍ **Materials:**

- About 60 small pieces of paper (2 or more per participant)
- Flipchart with the main nutrient groups drawn
- 2 clear drinking glasses
- Spoon
- Salt
- 4 sets of food cards\*
- Small prize for card game
- Flipchart paper & markers
- Blue tack
- Handout 3.1: Goiter
- Handout 3.2: Food Groups
- Handout 3.3: Daily Nutrient Requirements
- Handout 3.4: Nutrient Composition of Selected Foods
- Handout 3.5: Micronutrient deficiencies

---

### **Action**

*Food Groups & Basic Nutrient groups* – 30 minutes

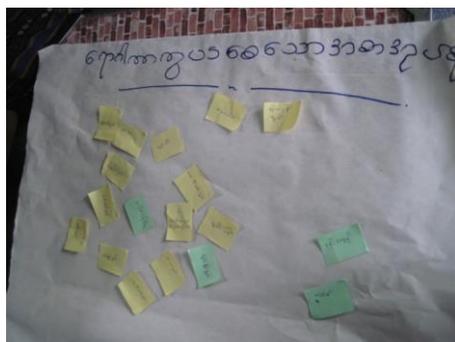
1. Give the example of a stove and ask: What do you need to make a fire for cooking?

Explain: If we want to use a stove, it needs kindling and a match, fuel such as wood, and air. When the fire has lots of dry wood it burns well and makes good coal, and when it runs out of fuel/wood, it burns down. Our bodies are the same: they need fuel to keep going and if the food we eat is not enough or adequate we get tired and weak and can get sick. The fuel for people is the nutrients in the food we eat.

2. Explain that a healthy diet is one that includes a variety of foods from every food group every day. Ask the participants if they know what the different food groups are. Explain (or summarize) that there are three groups of foods: energy foods, growth foods and protective foods.

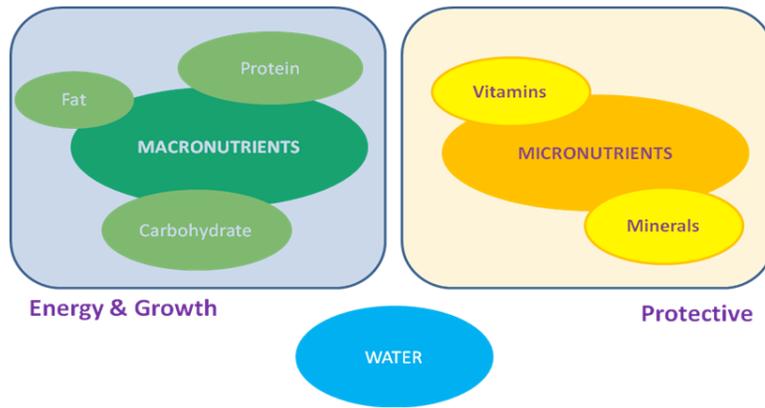
3. **Group Exercise**

Provide each participant with 2 or more small pieces of blank paper. Ask them to write the name of a locally available ingredient on each piece of paper. Explain that they should not write down foods that include many ingredients (e.g. mohinga). Collect all the pieces of papers and mixed them up together in a bowl. Meanwhile write the names of the 3 food groups on the flip charts (one food group per flip chart). Lay the flip chart on the floor or on three separate tables and ask each participant to take two small pieces of paper from the bowl. Get them to place each piece of paper into the food group to which it belongs. Ask the rest of the group to say whether they are correct. Let them look at the 3 groups with all the different foods.



take  
Get  
food  
the

4. Explain the different food groups, using a flip chart already prepared ahead of time. Explain that in Myanmar, we use 3 food groups (protective, energy & growth), but that there are other more technical names for the food groups. Point to the examples of foods from the previous exercise when explaining the different groups.



- a. Macronutrients are nutrients that we need in large quantities (“macro” means large). They include carbohydrates (which provide us with the main source of energy), fat (which we can use to store energy and which also helps our bodies absorb some vitamins), and protein (which is needed for growth and immune function).
- b. Micronutrients are needed in small quantities. There are over 30 types of vitamins & minerals, each of which has a specific function in the body. We will discuss this more later.
- c. Water is also essential, even though it is not a nutrient group
- d. Carbohydrates + Fat = Energy group  
 Protein = Growth group  
 Micronutrients = Protective group

Micronutrients - 15 minutes

1. Explain that we will now look more at micronutrients. We only need a little bit of each micronutrient, but they are so important that not having enough of certain micronutrients means a person can get very sick or become disabled.
2. **Demonstration**  
 Ask a volunteer to help you do a taste test. Ask him/her to close his/her eyes. Put a large pinch of salt into one of the cups of water and stir to dissolve. Ask the volunteer to open his/her eyes and examine the two cups of water for the differences in content and smell. Then ask the volunteer to drink a sip of each and ask him/her about the difference in taste.  
 Ask the other participants to describe how much salt you put into the cup. Explain that such a small quantity made such a difference in taste. This is similar to micronutrients, that are needed in small quantities but which make a big difference (and are essential) to the health of an individual.

3. Ask: Can anyone name any micronutrients?
4. Focus on a few micronutrients and briefly explain their roles:

MICRONUTRIENT	FUNCTION
Vitamin A	Important for vision, growth and development, immune function and reproduction
Vitamin B1	Important for nerve function
Vitamin C	Important for immune system and healing of wounds
Iron	Important for delivering oxygen to different cells in the body and for proper functioning of muscles and the brain
Iodine	Important for hormones produced by thyroid gland

Explain that Vitamin A, B1, and iron are three of the micronutrients that are lacking in many people's diets in Myanmar.

5. Show the picture of a person with a goiter. Point out that a lack (deficiency) of any micronutrient can make a person sick. For example, goiters are usually the result of insufficient iodine in the diet (especially if a person does not use iodized salt.)

Micronutrient Game – 15 minutes

1. Divide the group into 4 teams.
2. Hand out a set of food cards to each team and tell them that you will play a game to see who can identify food sources for some of the main micronutrients. Explain that you will name a micronutrient and the team that is first to holds up a food rich in that micronutrient, wins a point. Once a card is used, it cannot be used again.
3. Call out the following 4 micronutrients two or three times each. Possible answers within the set of cards include:

Vitamin A	Egg, dark green leafy vegetables, pumpkin
Vitamin B1	Beans/lentils, tofu, groundnut, fresh fish,
Vitamin C	Orange, lime, pineapple, bitter gourd, mango, moringa
Iron	Chicken, dark green leafy vegetables, beans/lentils, tofu, fresh & dried fish, groundnut, egg

4. Explain that these are some examples of food sources of micronutrients. It is not necessary to memorize which foods have which micronutrients, but it is important to eat a variety of foods every day, especially fruits and vegetables of different colors. It is especially important for young children and pregnant and lactating women to eat foods with protein and foods rich in micronutrients.

\* 4 sets of food cards for the micronutrient game can be made by taking photos of local foods, including:

*Eggs, chicken, tofu, fresh fish, dried fish, groundnut, beans, lentils*

*Various dark green leafy vegetables, pumpkin, bitter gourd*

*Pineapple, mango, orange, lime*

*Rice, noodles, sweets*

Alternatively, the names or pictures of these foods can be written or drawn on cards made of paper and the micronutrient game can be played using these cards.

#### Food and nutrition:

Food : What people eat to keep the body sound, active and free from diseases is food. Food is the collectiveness of such necessary components intake of which maintains natural growth and activity of the body, provides necessary energy for different works and healings and makes preventive power against diseases. Such as rice, fish, pulse etc. Nutrition: Nutrition is a process through which, ingested food are absorbed by the cells and produces heat and energy to the body, provide growth of the body and creates immune power or resistance power in the body.

Commented [Sunny3]: Food is any kind of edible substance consumed or ingested by an organism and assimilated by the organism's cells to provide energy, maintain life, increase the growth and increase resistance power against disease.

⇒ 2. Components of food: Chemical components of food which accomplish activity of the body properly those are known as food components. Food components are divided into six parts according to chemical nature, those are—

I. a) Carbohydrate b) Protein c) Fat d) Vitamin e) Minerals f) Water

Presence of these six components will have to remain in our daily food with particular amount and with proper proportion. The symptom of lack of particular ingredient is expressed over our body if there is absence of the ingredient in our daily food. People become ill and become the pray of malnutrition if this demand continue for a long time.

⇒ **3. Classification of food according to function:**

According to the work mainly three type of food are necessary for our body:

❖ **Heat and energy providing food:** Foods which produce heat in our body and we get working energy are called heat and energy providing food. Such as: Rice, bread, potato, sweet potato, molasses, sugar, bread, oil, butter, ghee, fat, honey, biscuit, nuts, coconut etc.

- ❖ **Growth and healing food:** Foods which helps us to grow up and helps us to heal are called as growth and healing foods. Such as: Small fishes, big fishes, meat, liver, egg, pulse, milk, bean seed, soya-bean, and other seeds type foods.
- ❖ **Disease preventive food:** Foods which make disease preventive power in our body are called disease preventive food. Such as: Different types of deep and red colored vegetables and fruits, ripe mango, ripe palm, ripe papaya, ripe jack-fruit, pineapple, guava, amla, hog-fruit, banana, lemon, carrot, pumpkin, orange sweet potato and its green leaves, country bean, milk, liver, small fishes particularly mola fish etc.

Noticeable:

- Health remains sound when food is taken properly. So, we shall have to take all types of food with proper quantity.
- There are different types of nutritious components in food. Different types of food contain different types of nutrient components. To keep our body sound and healthy we have to eat all types of nutrient components food every day.
- We shall have to take food like fish, meat, egg, liver or pulse, nuts and seed type of food everyday (what type of protein will be eaten that have to be decided according to ability of family) which helps to heal up the body.
- Deep green vegetables, red and yellow colored fruits and different type of vegetables and fruits (such as arum green, basella alba, red potherb, data potherb, pumpkin, carrot, and ripe mango, ripe jack-fruit, ripe papaya, lemon, guava, amla, hog-fruit, shaddock etc) one of these vegetables and fruit will must have to eat daily because of those different type foods contain different types of vitamin and minerals which protect our body from diseases.
- Iodized salt must be used during all types cooking.

**Supplementary hand-note for facilitator**

**Nutritious food:** Foods which produce heat and energy in the body, helps to build and develop the body and make the body strong and active are nutritious food.

Food and nutrition is related with each other. Just taking of any food will not do, foods must have to be nutritious and safe. Disease preventive power reduces and infection of different diseases used to take place in the body if nutritious foods are not received. Both body and mind remains sound if nutritious food is eaten.

Balance food: Keeping measurement of all ingredients of nutrition as per demand of age, profession and gender the food is made is balanced food.

Components of food, source and main functions:

There are different components in food and different type of food used to do different type of function in our body. Such as—

- Developing and healing
- Produce heat and energy and increase disease preventive power
- Brought together different activities inside body

**Technique to prepare balanced diet**

Food prepared by keeping all components of nutrition as per demand of age, profession and gender is balanced food

**Heat and energy provider food  
healer food**

**b) Body developer and**

Carbohydrate-1, Oil or fat-2

Protien-3

Food made of rice, wheat, barley, corn type ingredients Pulse, fish, meet, bean seed, egg,

All type of food like sugar, molasses, honey and sweet food, Milk etc.

Root and bulbous root (potato, arum, bulbous root akin to arum etc)

Vitamin-4, mineral salt-5 and water-6

All type of vegetable and fruits

**c) Disease preventive food**

**Mixing three becomes one food, is called**

**balanced food**

Commented [MK4]: Figure

## Module-01

### Extra hand note for Facilitator

---

Food components, main source and main functions are mentioned below—

Food ingredient	Main source	Main functions
Carbohydrate	a) Food grains- rice, wheat, corn etc b) Root/trunk- potato, arum, bulbous arum etc c) Other- sugar, molasses, honey etc	a) Works as source of energy, supplied almost 4 kilo-calorie/g energy b) helps to use fat type of food in the body
Protein	a) Animal: Fish, meet, egg, milk b)Vegetable: pulse, bean, soya bean, pea-seeds etc.	a) Body building, healing and growth and protects tissue b) makes antibody and hormone for attaining resistance power c) produces energy d) supplies oxygen at each cell of body and take part in forming hemoglobin in blood
Fat	a) Animal: Fish, meet-fat, egg-yellow, milk-cream, ghee, butter etc b) Vegetable: Edible-oil	a) Fat exists as deposited energy in cells of body b) Fat in food works as carrier of vitamin A, D, E, K.
Vitamin-A	a) Animal: Liver, egg-yellow, fish fat and butter b) vegetable: All type of colorful vegetables and fruits	a) Works as remedy of night-blind disease b) Keeps growth of covering tissues and strong bondage among tissues c) helps to prevent diseases d) helps to develop bones and teeth.
Mineral-salt	a)Animal: Fish, meat, liver, egg yellow b) vegetable: Molasses and vegetables	a) helps to create red blood cell in blood
Zinc	a)Animal: Small fishes, egg yellow, milk	a)Helps in digestion process into body

	b) Vegetable: Vegetables, fruits and spices	
Iodine	a)Animal: Marine fishes and Freshwater fish b) vegetable: vegetables from coastal belt c) Iodized salt	a) Helps in making thyroid hormone

**Food list/menu planning:** Food list or menu planning is a very important subject which is almost unknown to rural people or they ignore it. All type of food will have to include in everyday food list of a family. Same amount of nutriment can also be attained from cheap food rather than that of expensive food. Such as sufficient amount of protein can be gotten from local small fishes (Mola, Dhela, Darkina, punti etc) and vegetables (bean, Jack-fruit seed, pulse etc.) which are cost effective and available. It should consider that any member of a family can be provided one kind of food more because that member would need those kinds of food more.

Module-01

### Special session

#### Practical and farmers activities implementation plan

Day: 2nd	Time : 11.00-11.30 am	Duration : 30 minutes
----------	-----------------------	-----------------------

#### Farmer's activity implementation plan

Sessi on No.	Name of session	Main activities	Time to accomplish		Remarks
			Day	Date	
2	Fish and types of fish culture, site selection criteria of new pond (earthen pond, shaded pond, wish pond, Sorjan ditches, rice field), its construction and dimension	1. Fish and types of fish culture 2. Site selection criteria for different types of ponds 3. New pond constructions and its dimensions			
3	Repairing dike and	1. Repairing dike and bottom			

(Old 2)	bottom of pond, eradicating of aquatic weed, removing carnivores and non-cultured fish	of pond and eradicating of aquatic weeds 2. Carnivorous and non-cultured fishes removal	
4 (Old 3)	Water filling, application of lime and fertilizer during pond preparation	1. Water filling 2. Ratio of lime during pond preparation and application technique 3. Ratio of fertilizer during pond preparation and application technique	
5 (Old 4)	Natural food observation, water suitability test, determine different species of fry, density and ratio	1. Natural food observation 2. Water suitability test 3. Determine different fry species, density and ratio	
6 (Old 5)	Identify strong and weak fry, fry disinfection, transportation, acclimatization, stocking and fry survival rate observation	1. Identify strong and weak fry 2. fry disinfection, transportation, acclimatization and stocking 3. Fry survival rate observation	
7 (Old 6)	Gender, role of women in fish culture, food and nutrition, components of food and classification of feed according to function	1. Inform family members and neighbors about food and nutrition 2. Components of food, inform other fish farmers about different activities of food through exhibiting oven 3. Make neighbors known about classification of food according to activities.	

**N: B.** Number of work in main activities column can be more or less as per current state/work and decision of farmers. Activities mentioned here are written only for example.

**Special suggestion about gender:**

Active participation of women in discussion of each mentioned activities will have to ensure. Apart from that, have to encourage and engage women by creating the field to enjoy complete freedom at each field of implementation especially at subjects like income and expenditure and decision taking

## Post-stocking management and Human nutrition: Fertilization, liming, feeding, sampling and essential micro-nutrient

Day : 3rd	Time : 9.00-11.30	Duration : 2.30 hours
-----------	-------------------	-----------------------

### Overall goal of the module:

Increase knowledge, skill and make positive change among trainees through providing training on increasing post-fry stocking productivity of pond, supplementary feeding , chain dragging , sampling, some common problems in fish culture and remedy essential micronutrients for Human (Vitamin A and Iron) so that they will be able to take effective technical steps about the learning subjects

### Overall objective of the module:

At the end of the training trainees –

- Will be able to say about post-fry stocking lime application, dose of lime, lime liquefying, application time, application process and cautiousness during lime application and will be able to do practically.
- Will be able to say about post-fry stocking fertilizer application, dose of fertilizer, time of application and about application process and will be able to do practically
- Will be able to say about importance of supplementary feed, types, making and application and will be able to do practically.
- Will be able to say about importance of chain dragging and will be able to do practically.
- Will be able to tell about sampling and will be able to do practically.
- Will be able to tell about common problems in fish culture and will be able to take necessary measurement to protect that.
- Will be able to take effective steps to protect diseases of fish
- Will be able to know about deficiency symptom of vitamin-A.
- Will be able to take effective steps to meet demand of essential nutrient iron.
- Will be able to analyze reasons of vitamin-A deficiency.

- Will be able to identify food enriched with high power vitamin-A; and will be able to understand importance of taking vitamin-A capsule.
- Will be able to say and do accordingly the practical activities of all sessions skillfully.

**Module- 02**

**Module Title: Post-stocking management and Human nutrition: Fertilization, liming, feeding, sampling and essential micro-nutrient**

**Training schedule**

---

**Aquaculture for Income and Nutrition**

Facilitator : EF/FS

Participants: Household farmers

Date :

Venue :

	<b>Module-02 : Post-stocking management and Human nutrition: Fertilization, liming, feeding, sampling and essential micro-nutrient</b>	
	Session-8 (Old 9&12): Micronutrients- Vitamin A and Iron <ul style="list-style-type: none"> <li>• Vitamin-A and its source and function</li> <li>• Deficiency symptom of vitamin-A and reason</li> <li>• Prevention and remedy of vitamin deficiency problem</li> <li>• Iron and its source and function</li> <li>• Deficiency symptom of Iron and reason</li> <li>• Prevention and remedy of iron deficiency problem</li> </ul>	Question and answer, participatory discussion and group work through food card
	Session- 9 (Old 15): Identification of local small fishes and nutrition value, and maintaining nutrition value/ <b>(nutrition value of sis)</b> <ul style="list-style-type: none"> <li>• Identification of local small fishes</li> <li>• Nutritional value of small fishes</li> <li>• Maintaining nutritional value</li> </ul>	Question and answer, practical materials, hook board picture exhibition, practical and participatory discussion

	<p>Session-10 (Old 07): Increasing post-fry stocking productivity of pond, water exchange and water quality test</p> <ul style="list-style-type: none"> <li>• Post- stocking lime and fertilizer application in fish culture</li> <li>• Considerations for water exchange</li> <li>• Determine water quality and suitability of water for fish culture according to water color</li> </ul>	<p>Question and answer, practical materials, hook board picture exhibition, practical and participatory discussion</p>
	<p>Session-11 (Old 08) : Supplementary feeding and chain dragging</p> <ul style="list-style-type: none"> <li>• Different type of supplementary feed and its necessity</li> <li>• Type of commercial feed and test of its durability into water</li> <li>• Making and application of supplementary feed and chain dragging.</li> </ul>	<p>Question and answer, practical materials, hook board picture exhibition, practical, participatory discussion and practical and role play</p>
	<p>Session-12 (Old 10): Sampling, some common problems( Sea bass and snake head fishes control and prevention) and its probable remedy</p> <ul style="list-style-type: none"> <li>• Sampling</li> <li>• some common problems in fish culture and its possible solution</li> </ul>	<p>Question and answer, practical materials, hook board picture show, dummy practical and participatory discussion</p>
	<p>Session 13 (Old 11) : Disease management of fish in aquaculture</p> <ul style="list-style-type: none"> <li>• Diseases of fish in aquaculture</li> <li>• Prevent disease of fish and remedy management</li> </ul>	<p>Question and answer, hook board picture show and participatory discussion</p>
	<p>Special session : Practical, farmer's activity implementation and revised farmers training plan</p> <ul style="list-style-type: none"> <li>• Practical</li> <li>• Farmers activity implementation plan</li> <li>• Revised farmer's training plan</li> </ul>	<p>Practically through direct participation of farmers</p>

**-stocking management and Human nutrition: Fertilization, liming, feeding, sampling and essential micro-nutrient**

---

**Supporting materials for training and practical**

**Practical materials used at field level training, practical work list of dummy practical:**

Title of the session	Practical materials supplied by the project	Practical materials supplied by staff	Practical/dummy practical
<p>Session- 8 (Old 9 &amp; 12): Micronutrients- Vitamin- A and Iron?</p> <p>Session- 9 (Old 15): Identification of local small fishes and nutrition value, and maintaining nutrition value/ (nutrition value of sis)</p>		<p>Different type of food ingredients (especially colorful vegetables and fruits)</p>	
<p>Session-10 (Old 07): Increasing pond productivity after stocking, water exchange and water quality test</p> <p>Session -11 (Old 08): Supplementary feeding and dragging chain</p>	<p>1. Hook board, 2. Picture for hook board, 3. pH paper 4. Secchi disk 5. Floating pellet feed 6. Sinking pellet feed 7. Flour 8. Mustard cake 9. Rice husk 10. Wheat bran 11. Dried fish powder 12. Food card-2 sets</p>	<p>1. Play-card with illustrated fish 2. Contaminated gas and nutrient written pieces of paper 3. Bucket/ bowl (plastic) 4. Clear water glass, 5. Green feed (Banana leaf, duck weed, soft grass) 6. Feeding ring, 7. Plastic bottles (a few empty plastic bottles), 8. chain, 9. Tray for placing made feed, 10. Different type of food ingredients (especially colorful vegetables and fruits)</p>	<p>1. Practical of water quality test through Secchi-disk and pH paper. 2. Practical of durability of floating and sinking pellet feed. 3. Practical on hand made feed making technique by mixing different ingredients of feed. 4. Practical on fish feed preservation and application. 5. Practical role play on chain dragging. 6. Food-card game in two farmer's groups.</p>
<p>Session- 12 (Old 10): Sampling, some common problems (Sea bass and snake head fishes control and prevention) and its probable remedy</p> <p>Session- 13 (Old 11): Disease prevention management of fish</p>	<p>1. Hook board, 2. Pictures for hook board, 3. Steel made scale, 4. Weights, 5. Sumithion, 6. Color pencil (particularly yellow, orange, deep green)</p>	<p>1. Sponge wood/sprout of water hyacinth, 2. Bucket/ bowl (plastic), 3. Scale, 4. Weights, 5. Bowl (250 ml), 6. Different type of food items (especially color vegetables and fruits)</p>	<p>1. Make dummy practical in sampling, 2. Illustrate picture of any fruit in yellow on white paper</p>
<p>Special session: Practical, Farmer's activity implementation</p>	<p>1. Art-line. 2. Sign pen. 3. Brown paper. 4. Hard clip. 5. Scale. 6. Rope etc</p>		<p>Practically through direct participation of farmers.</p>

and revised farmers training plan			
-----------------------------------	--	--	--

Module-02

### Session –08 (old 09 &12)

<b>Day : 3rd</b>	<b>Time : 10.30-11.00</b>	<b>Duration : 30 minuets</b>
------------------	---------------------------	------------------------------

**Title :** Source of Iron, function, deficiency symptom, prevention and remedy

**Target group:** Household fish farmers

**Goal:** To make positive change of knowledge, skill and behavior of trainees through providing practical training about source of iron, function, deficiency symptom, and about prevention and remedy

**Objective:** At the end of the session trainees will be able to tell about a) source of Iron and function, b) deficiency symptom of iron, c) reason for iron deficiency and about d) prevention from iron deficiency and remedy, and will be able to practice practically.

- Introduction:**
1. Review of previous session
  2. Describe goal and objective of the current session
  3. Focus on current session

**Subject matter:** 1. Iron, source of iron and function (question and answer, group work through food card and participatory discussion)

2. Iron deficiency symptom (question and answer and participatory discussion)
3. Reason for iron deficiency (question and answer and participatory discussion)
4. Prevent iron deficiency and remedy (question and answer and participatory discussion)

- Summary:**
1. Review on main discussion subject (question and answer and participatory discussion)
  2. Determine objective of the session (question and answer)
  3. Establish connection with next session

**Supporting materials for training and practical:** Hook board, pictures for hook board, brown paper, Darkina fish, liver, Nola fish, Puti fish, cone of banana, peas, red potherb, pulse, green peas, arum green, tamarind, orange sweet potato, spinach, bindweed, Basella alba etc and pictures of nutrition and iron enriched vegetables and practical sample.

Iron, Source of Iron, function and deficiency symptom (1-3)	Technique : question and answer, participatory discussion and group work through food card	Time : 15 minuets
---	--	-------------------

**Working method:**

- Just at the beginning of this part of the session the facilitator will thank to participants for listening the previous sessions with patience and will invite to attend this session.
- Then he/she will question to farmers – what is iron and what is the source of iron? He/she will ask in this regard and will listen to their answers attentively and will inform them in details through participatory discussion.
- Afterwards facilitator will ask participants to seat being divided into two small groups; He/she will deliver a set of food card to each group and will ask them to find out foods which are necessary to eat for getting a lot of iron for us. At the end of group work participants will insert food card on brown paper and will help to select iron-enriched foods.
- Then the facilitator will want to know one by one-- what the function of iron is, what are the symptoms of iron deficiency etc. He/she will listen to the answers attentively and will note down; then the facilitator will discuss one after another subjects to farmers with their participation.
- At the end he/she will review the subjects in participatory process and will make an oral evaluation.

Reason of Iron deficiency and prevention and remedy (4)	Technique: Question and answer and participatory discussion	Time : 15 minutes
---	---	-------------------

**Working method:**

- Facilitator will ask to farmers – what can be the reasons of Iron deficiency? Listening to their opinion he/she will make them understand properly in a participatory process.
- Afterwards facilitator will want to know from farmers through participatory discussion what are the preventives and remedies of iron deficiency, he/she will listen to the answers attentively and will note down.
- Facilitator will make the farmers understand about one after another subject through participatory process.
- In the end he/she will review on the subject in participatory process and will make an oral evaluation.

---

**Iron, source of Iron, function and deficiency symptom**

A very small amount of micro nutrient components are necessary for body. Iron is so important among micro nutrients necessary for our body to be active properly that if sufficient amount of particular nutrient is not taken then a person can be sick or can become physically or mentally disabled.

**1. Iron, source of iron and function:**

**Iron:** Iron is a mineral ingredient, which is indispensable for making hemoglobin in blood. Hemoglobin carries oxygen into tissue from lung through blood, for this reason body remains active.

**Source of Iron:** In general iron is collected from two sources. Such as –

**a) Animal source:** Usually from the animal sources of food we get iron is the animal source of iron. Such as— Darkina fish, liver, mola fish, puti fish etc.

**b) Vegetable source:** Usually from the vegetable foods we used to get iron those are the vegetable source of Iron. Such as – cone of banana, peas, red potherb, pulse, green peas, arum green, tamarind, and sweet orange potato, spinach, bind weed, basella alba etc.

**Function of Iron:**

- Hemoglobin carries oxygen into tissue from lung through blood and sends carbon dioxide from tissue to lung.
- Defense disease transmission.
- Keeps the body active.
- Helps to physical growth.

**2. Iron deficiency symptom:**

\* Conjunctiva, change take place in the bottom of nail and nail, palm, face, gum of teeth and tongue becomes pale.

\* The heart palpitates.

\* More fatigue is felt with a small labor.

\* Mood remains tempered.

\* Loss of appetite occurred.

\*Children become restless and less attentive to their study.

**3. Reason of Iron deficiency:**

- \* For loosing blood from injury or for menstruation.
- \* For diarrhea or for stomach problem.
- \* Small worm.
- \* Not taking iron enriched food every day.

And if these reasons continue for a long time then iron deficiency appears.

**4. Protection and remedy of Iron deficiency:**

**Protection:** Hygienic activities will have to take, such as—

- Washing hand properly with soap before and after eating food and after defecation for protecting diarrhea or stomach problem.
- Worm preventive tablets will have to take regularly for all ages.
- Iron enriched food will have to take every day.
- Women will have to take more iron-enriched food during menstruation.

**Remedy:**

Through taking iron tablets: Iron tablets will have to make intake to pregnant women, postnatal, newly married women, adolescent girl and children suffering from severe malnutrition as per suggestion of physician or health worker.

## Module—02

### Extra handout for Facilitator

**Anemia:** To tell anemia from malnutrition we mainly do understand just anemia from deficiency of iron, because of it is this type of anemia, which extensively exists among us. Necessary food, particularly for the want of iron enriched food, children, adolescent boy and girl, pregnant women, postnatal usually suffer more from this disease. Anemia of less than two years old children is appears mainly due to inadequate iron enriched food. Women used to suffer from anemia because of menstruation and also for giving birth of child every now and then.

**Reasons for anemia:** Anemia can appear for reasons given below—

1. for low intake of iron.
2. for inadequate absorption of iron in the body

Reasons for which inadequate absorption occurred:

- If tea or coffee is taken with main food
  - If food enriched with vitamin C is not taken
  - If chronic diarrhea and enteric disease is there.
3. If sometimes demand of iron increases in the body.
  4. If a lot of blood spilled out from body (surgery, delivery, severe burning).
  5. If there is abnormal hemoglobin in the blood (such as thelaseimia)
  6. Transmission: such as—for worm, dysentery, malaria etc.

Dose and duration of Iron tablets for preventing deficiency of iron are made fixed; which is as below—

Target people	Dose	Duration
Adolescent girl and women who are not pregnant	02 tablets per week	Continue for 03 months, will stop for 03 months then will continue for 03 months again
Pregnant women	01 tablet daily	For full pregnancy period from definite pregnancy
lactating mother	01 tablet daily	Up to 03 months after delivery
Children (06-24 months)	01 packet of micronutrient powder(MNP) one time with food daily	Will continue for 02 months, will stop for 04 months and will continue for 02 months again
Children (2-05 years)	01 time per week	Will continue for 03 months, will stop for 03 months and will continue for 03 months again
Children (05-12 years)	01 time per week	Will continue for 03 months, will stop for 03 months and will continue for 03 months again

Possible side effect from iron tablet intake:

- Someone can have vomiting tendency. This side effect reduces a large extent if iron tablet is taken with meal or just after taking meal.
- Defecation can be hard. This problem reduces if more vegetable is eaten and more water is drunk.
- Color of stool can be black for the medicine, which is very normal. There is nothing to be afraid.

Fit to be done:

- Iron enriched food will have to take every day
- Any one iron enriched food from animal source will have to take daily (as per ability of family)
- Food enriched with vitamin-C will have to take daily so that iron enriched food can easily work in the body; such as lemon or any sour fruit, green chili, guava etc.
- As adolescent girls and women used to suffer from anemia very often so they must eat a lot of iron enriched food.

List of food enriched with Iron and vitamin-A (amount of iron and vitamin-A in per 100 gm of taken food)

Sl. No.	Name of food	Vitamin-A (Amount in per 100 gm)	Iron (amount in per 100 gm)
1	Red spinach	793 mg	6 ml
2	Spinach	409 mg	2.2 ml
3	Bind weed	199 mg	2.2 ml
4	Arum green	596 mg	4.9 ml
5	Orange sweet potato green	308 mg	2.7 ml
6	Orange sweet potato	719 mg	0.6 ml
7	Sweet guard	369 mg	0.7 ml
8	Carrot	329 mg	0.4 ml
9	Banana cone	0	56.4 ml
10	Bassela alba	170 mg	2.2 ml
11	Pulse	3 mg	5.1 ml
12	Peas	3 mg	8.8 ml
13	Green peas	3 mg	4.8 ml
14	Meat	15 mg	2.2 ml
15	Chicken lever	3296 mg	9 ml
16	Mola fish	2680 mg	3.8 ml
17	Darkina fosh	0	12 ml
18	Puti fish	59 mg	2.6 ml
19	Mango	292 mg	0.2 ml
20	Tamarind	1 mg	4.0 ml

**Special session : Practical, Farmers activity implementation and revised farmers training plan**

Day : 3rd	Time : 11.00-11.30	Duration : 30 minutes
-----------	--------------------	-----------------------

**Farmer's activity implementation work-plan**

Session No.	Name of session	Main activities	Time to accomplish		Remarks
			Day	Date	
7	Increasing post-stock productivity of pond and water quality test	1. Post-stock lime application 2. Post-stock fertilizer application 3. Water quality test			
8	Supplementary feeding and chain dragging	1. Supplementary feed purchase 2. making feeding tray and feeding ring 3. Application of supplementary feed 4. Making/purchasing chain and pulling			
9	Iron and its source, function, deficiency symptom, prevention and remedy	1. Discuss with family members about Iron, source of iron and its function. 2. Hanging a list of available iron enriched food. 3. Make involve all family members in producing available iron enriched food.			

**NB:** Number of work in main activities column can be more or less as per current state/work and decision of farmers. Activities mentioned here are written only for example.

**Special suggestion about gender:**

Active participation of women in discussion of each mentioned activities will have to ensure. Apart from that, have to encourage and engage women by creating the field to enjoy complete freedom at each field of implementation especially at subjects like income and expenditure and decision taking.

Session—12

Day : Fourth	Time : 10.30-11.00	Duration : 30 minutes
--------------	--------------------	-----------------------

**Title :** Vitamin- A and its source, deficiency symptom, prevention and remedy

**Target group:** Household fish farmers

**Goal :** To provide idea among trainees about food enriched with vitamin-A and work of vitamin-A as part of micronutrients, so that they become acclimatized to eat available food enriched with vitamin-A by using this knowledge and through increasing awareness.

**Objective:** At the end of the session participants will be able to say and will be able to practice practically about (a) Deficiency symptom of vitamin-A (b) analyze reasons of vitamin-A deficiency and about (c) prevention and remedy of vitamin-A deficiency.

Introduction: 1. Review on previous session.

2. Describe goal and objective of the current session.

3. Focus on current session.

**Subject matter:** 1. Essential micronutrient vitamin-A, its source and function (question and answer, participatory discussion through showing hook board picture)

2. Vitamin-A deficiency symptom (question and answer, participatory discussion through showing hook board picture and game)

3. Reasons of vitamin-A deficiency (question and answer, participatory discussion through showing hook board picture)

4. Prevention and remedy of essential micronutrient vitamin-A (question and answer, participatory discussion through showing hook board picture).

**Summary:** 1. Review on main subject (question and answer, hook board picture show)

2. Determine objective of the session (question and answer)

3. Establish connection with the next session.

**Training supportive materials:** Hook board, picture for hook board, brown paper, hard clip, color pencil (yellow, orange, deep green), different type of vegetables and fruits (ripe jack-fruit, ripe mango, ripe papaya, carrot, pumpkin, sweet orange potato, sweet orange potato green, arum green, reddish green, helencha green, bessela alba, bind weed, sajne leaf, red potherb, jute leaf, spinach, thankuni leaf, pudina leaf), egg etc.

Session—12

### Session method

Vitamin-A and its source and function (1-2)	Technique: question and answer, participatory discussion through showing hook board picture	Time: 10 minutes
---	---	------------------

**Working method:**

- In the beginning facilitator will thank farmers for listening to previous session attentively and will invite them to attend in this session.
- Facilitator will ask to farmers—what are the main components of micronutrients? What harms can occur in the body due to micronutrients deficiency? And what is micronutrient vitamin-A? Then facilitator will listen to answers of farmers attentively and will make participatory discussion on the subjects by exhibiting hook board pictures.
- Facilitator will want to know even more – what are the sources of vitamin-A? What are the works of vitamin-A? He/she will listen to answers attentively and will note down.
- Then facilitator will make participatory discussion on all subjects one by one by showing hook board picture.
- In the end he/she will review on pictures shown on hook board in participatory process and will make an oral evaluation.

Deficiency symptom of vitamin-A, prevention and remedy (3-4)	Technique: question and answer, participatory discussion through showing hook board picture	Time : 20 minutes
--	---	-------------------

**Working method:**

- Facilitator will question to farmers—what diseases occur due to vitamin-A deficiency? And what are the prevention and remedy managements to meet want of vitamin-A? He/she will listen to answers attentively and will discuss in details.
- Then the facilitator will request participants to divide into three groups inviting them to take part in drawing game. He/she will give a white paper and box of color pencil to each group. Then he/she will ask them to draw picture of all colorful vegetable and fruits they can remember. He/she will allow them 5 minutes time for drawing pictures and at the end will make each group to show their pictures and will discuss on pictures of fruits and vegetables they have drawn most. Then at one stage facilitator will ask which of the color is present among orange, yellow and deep green vegetables and fruits? Afterwards facilitator will say green and yellow color vegetables and fruits are enriched with vitamin-A. Vitamin-A deficiency symptoms can prevent by taking food enriched with vitamin-A.
- Therefore facilitator will make participatory discussion on all subjects through exhibiting hook board pictures
- In the end he/she will review on pictures shown on hook board in participatory process and will make an oral evaluation.

## Handout

---

### Vitamin-A and its source, function, deficiency symptom, prevention and remedy

#### 1. Vitamin-A, its source and function:

Vitamin-A: Vitamin-A is one of the vitamins soluble in fat or oil; which is very essential for body.

Source of vitamin-A: Usually it can get from two sources. Such as—

a) Animal source: Commonly the vitamin-A that we get from animal foods that is called animal source of vitamin-A. Such as – all types of liver, egg yellow, small fishes especially mola fish and head of the fish, fish fat, butter, cheese etc.

Vitamin-A is absorbed in our body when it is taken from animal source.

b) Vegetable source: Usually the vitamin-A that we get from different vegetables sources is called vegetable source of vitamin-A. Such as—ripe jack fruit, ripe mango, carrot, sweet orange potato and its green, arum green, reddish green, helencha potherb, coriander leaf, bassela alba, bind weed, shajne leaf, jute leaf, spinach, thankuni leaf, pudina leaf, etc.

Work of vitamin-A: a) Prevents night blindness (b) Preserves eye sight (c) Helps to reduce death rate of children. (d) Increases disease preventive power. (e) Helps in common growth of body. (f) Makes skin smooth and bright. (g) Helps in forming bones and teeth.

#### 2. Deficiency symptom of vitamin-A:

\* Night blindness goes down with the deficiency of vitamin-A.

\* Dryness of eye conjunctiva appears.

\* Beats spot in eyes appears.

\* Cornea becomes soft and ulcer appears

\* Disease preventive decreases and becomes ill now and then.

\* Hinders normal growth of body.

#### 3. Reasons of vitamin-A deficiency:

\* If less oil is used during cooking of vitamin-A enriched food.

\* If food enriched with vitamin-A is not eaten; such as deep green vegetables, yellow fruits, small fishes particularly mola fish, egg, liver, meet etc.

\* If beginning milk of mother is not feed to new born child.

\* If mother do not intake vitamin-A capsule within two weeks of delivery.

## Handout

---

### 4. Prevention and remedy of essential micronutrient vitamin-A deficiency problems:

#### Prevention:

- Demand of vitamin-A of mothers increase during pregnancy period, so to meet the requirement of vitamin-A pregnant mothers will have to serve vitamin-A enriched food, such as—deep green vegetables (sweet orange potato and it green), yellow fruits, fish-- if possible, small fishes particularly mola fish, egg, liver and meat, frequently and more in amount. Demand of vitamin-A will be fulfilled if these foods are eaten and no harm will occur to the child in the womb.
- Child will have to feed breast milk up to two years of age along with feeding beginning milk to new born child. Children will have to feed supplementary/extra food enriched with vitamin-A after full six months of age. Growing children will have to serve colored vegetables and fruits enriched with vitamin-A (fish, especially small fishes, meat, liver, egg etc). Food will have to prepare the way children like. Certainly vegetables will have cook with oil, because of oil is necessary to be absorbed in body.
- Postnatal will have to intake a red color vitamin-A capsule with 0.2 million IU power within two weeks (14 days) of delivery (If possible just after child birth).
- Children of 0-6 months will have feed only mothers breast.
- All children of 6-12 months of age will have to intake a blue color vitamin-A capsule with 0.1 million IU power.
- All children from 1 to 5 years of age will have to feed a red color vitamin-A capsule with 0.2 million IU in every six months successively.
- Along with it, nutrition training will have to provide to everybody about vitamin-A enriched food.

**Remedy:** Children who have been suffering from night blindness, measles, severe malnutrition, chronic diarrhea will have to treatment with vitamin-A capsule management according to age and disease.

#### Noticeable:

- Vitamin-A enriched foods are usually of bright color.
- Body cannot absorb vitamin-A easily from cook able food so vitamin-A enriched food will have to cook with oil.
- Vitamin-A is very essential to increase preventive power against illness and germs. It also prevents blindness among small children.
- Government of Bangladesh have been providing vitamin-A capsules free of cost among new born, children and postnatal to prevent and treatment of vitamin-A deficiency.
- Children after six months of age will have to feed vitamin-A capsule at least twice a year.

### Extra hand note for facilitator

#### Treatment management with proper dose of vitamin-A

Diseases	Dose			Feeding rules
	Age 6 months	Age 6-12 months	Age 12 months +	
Night blindness, beats spot, jeroftalmia	50 thousand IU	0.1 million IU	0.2 million IU	1 <sup>st</sup> day, 2 <sup>nd</sup> day, 14 <sup>th</sup> day
Measles	50 thousand IU	0.1 million IU	0.2 million IU	1 <sup>st</sup> day, 2 <sup>nd</sup> day
Severe malnutrition	50 thousand IU	0.1 million IU	0.2 million IU	Single dose
Chronic diarrhea	50 thousand IU	0.1 million IU	0.2 million IU	Single dose

#### Nutritious components of main foods

Name of food	Scientific name	Calorie	Protein	Fat	Carbohydrate	Vitamin-A	Iron
Rice	<i>Oryza sativa</i>	109	2.1	0.1	24.3	0	0.3
Potato	<i>Solanum tuberosum</i>	66	1.2	0.2	14	2	0.5
Bread	<i>Triticum aestivum</i>	246	7.5	1.2	49.6	0	2.7
Pulse	<i>Lens culinaris</i>	317	27.7	0.8	43.2	3	5.1
Peas	<i>Cicer arietinum</i>	375	20.2	6	59.2	3	8.8
Egg	<i>Gallus gallus domesticus</i>	158	13.3	11.6	0	213	1.7
Chicken	<i>Gallus gallus domesticus</i>	207	19.7	14.2	0	15	2.2
Oil	<i>Glycine max</i>	900	0	100	0	0	0
Cow milk	<i>Bos primigenius indicus</i>	63	3.1	3.7	4.3	32	0.1
Sugar	<i>Saccharum barberi</i>	398	0	0	99.5	0	0.2
Eggplant	<i>Solanum melongena</i>	24	1.9	0.1	2	0.4	4
Pumpkin	<i>Cucurbita moschata</i>	18	1.4	0.3	1.3	369	0.7
Water guard	<i>Lagenaria siceraria</i>	34	1.1	0.1	6.8	1	0.7
Cabbage	<i>Brassica oleracea</i>	24	1.5	0.3	2.6	5	0.5
Cauliflower	<i>Brassica oleracea</i>	27	2.6	0.3	2.5	1	0.8
Bitter-guard	<i>Momordica charantia</i>	31	2.1	0.3	3.6	24	1.8
Tomato	<i>Solanum lycopersicum</i>	16	1.1	0.2	1.4	9	0.2
Red potherb	<i>Amaranthus gangeticus</i>	32	4.5	0.3	0.5	793	6
Spinach	<i>Spinacia oleracea</i>	26	3	0.5	0.9	409	2.2
Arum green	<i>Colocasia esculenta</i>	51	4	1.1	4.4	596	4.9
Rohu	<i>Labeo rohita</i>	105	20.6	2.6	0	0	0.4
Tilapia	<i>Oreochromis niloticus</i>	110	20.8	3.0	0	2	0.5
Cat-fish	<i>Pangasius hypophthalmus</i>	162	15.9	11.0	0	5	0.1

Day : Fifth

Time: 10:15-10:35

Duration: 45 Minutes

- Title** : **Introduction of small indigenous fishes, its nutrients and measures to keep the nutrients**
- Group** : Household fish farmers
- Goals** : To give the practical knowledge to the farmers on small indigenous fishes, its nutrition and measures to restrain its nutrition, so that they will be able to apply those knowledge efficiently
- Objectives** : After the end of this session the farmers will be able to explain and apply a) Small indigenous fish b) Importance of small indigenous fishes, its nutrition c) Micronutrients of small indigenous fishes d) Measures to keep the nutrients
- Introduction** : 1. Review of last session  
2. Brief the goals and objectives of the current session  
3. Focusing on the current session
- Topics** : 1. Introduction small indigenous fishes (Hock board presentation and participatory discussion).  
2. Importance and nutrition of small indigenous fishes (questioning and answering, remember game and participation)  
3. Micronutrients of small indigenous fishes (questioning and answering and group work)  
4. Measures to keep the nutrients (questioning and answering, hock board presentation and participatory discussion)
- Conclusion** : 1. Review briefly the previous discussions (Feedback, hock board presentation and participatory discussions)  
2. Overview the objectives (Asking questions and feedback)

### 3. Linkage with next sessions

**Training materials:** Hock board, Different types of hock board pictures etc.

### **Session Method**

<b>Introduction of small indigenous fishes, its importance and nutrition (1-2)</b>	<b>Technique: Question and answer, participatory discussion through hock board presentation</b>	<b>Time: 10 minutes</b>
--	---	-------------------------

**Working method:**

- ❖ Facilitator (EF/FS) will thank to everybody first before starting this session and will request everybody to listen calm and to take participate in the discussion.
- ❖ The facilitator will ask about the small indigenous fishes, its importance and nutrition to the farmers and will discuss participatory way showing the hook board pictures and the facilitator will keep the answers
- ❖ At last the facilitator will review and evaluate showing the hook board pictures

<b>Nutrients of small indigenous fishes and measures to keep the nutrients (3-4)</b>	<b>Technique: Questioning and answering, remind game and group work participation</b>	<b>Time: 10 minutes</b>
--	---	-------------------------

**Working method:**

- ❖ Facilitator (EF/FS) will request everybody to listen calm and to take participate in the discussion.
- ❖ After this the facilitator will ask the farmers about the micronutrient of small indigenous fishes and the measures should take to maintain the nutrients and the facilitator will discuss in participatory was showing the hook board. Then facilitator will show how to cut the small fishes, how to wash and what is cooking method and facilitator will inform the farmers how to maintain the micronutrients
- ❖ At last the facilitator will review and evaluate showing the hook board pictures

## Handout

---

### Introduction of small indigenous fishes, its nutrients and the measures to keep the nutrients

**1. Small indigenous Species:** The indigenous fishes grow 10” or 25 cm at maturation period is refers to small indigenous fishes. There are 143 species out of our 260 freshwater species are called small species. Among them mola, dhela, darkina, chela, punti, shing, magur, pabda, gulsha, kajoli, batasi, tengra, bacha, taki, cheng, bata, gutum, bou mach, chapila, baim, kholisha, koi, bele, meni (Veda), chanda, icha (Shrimp) etc are well-known.

#### Mola

**Local Name:** Mola, maya, moya, moka, mouka, mude, molamngi and mouchi.

**Scientific name:** *Amblypharyngodon mola*

**General characteristics:** Body laterally flattened. Eyes are big and head in between the eyes is swollen, the upper lip is not clear, lateral line is not completed, a silver colored line of dorsal side is elongated from operculum to caudal fin, black spot is found on the side and top of dorsal fin and anal fin. Dorsal fin placed in the middle of eyes and caudal fin, it attains maximum 15 cm in length.

**Habitat:** It live upper layer of water body. It is found in canal, beel, river, haor, baor, pond and paddy field.

**Feeding habit and nutrition:** Mola eats on plankton, protozoa and organic material from the upper level of water body.

**Breeding:** It becomes matured and spawner in first year. Normally the breeding season is from the April to mid-October. Mola lays egg 2-3 times in a year and the fecundity is 1,000 to 8,000.

#### Darkina:

**Local name:** Darkina, Dankina, Darkinda, Dairka, Dadhika and pati chela.

**Scientific name:** *Esomus dannaicus*

**General characteristics:** Small mouth and upper turn, lower lip is meaty, two pairs of barbells and one pair is crossed the pelvic fin, dorsal fin is opposite side of anal fin and near to caudal fin, the outside first fin ray of pectoral fin is longer, one wide black line is elongated from eye to the base of caudal fin. It becomes 10 cm maximum.

**Habitat:** It lives upper layer of water column. It is found in river, canal, beel, haor ,baor, paddy land.

**Feeding habit and nutrition:** Normally the plankton small algae of upper layer and small water insects are the main food of darkina. It is high in Vitamin A and Iron.

**Breeding:** It becomes mature in the first year. Breeding season starts from March up to July but sometimes from April to May. Its fecundity is 500-2500.

### **Dhela**

**Local Name:** Dhela, keti, pithali, gila chaki, lohasur, bore chela, gunta, melanda and dipali.

**Scientific name:** *Osteobrama cotio*

**General characteristics:** Head lower, small mouth and eyes are big. Lower part of lateral line is silver and upper part is dark. Dorsal side of head is concave. One black spot is found on the base of dorsal fin. Anal fin is elongated up to caudal fin and dhela will attain maximum 15cm.

**Habitat:** It dwells upper layer of water column. It is found in river, canal, beel, tunnel, haor, baor, floodplain and monsoon paddy land.

**Feeding habit and nutrition:** Normally it lives on algae, crustacean and other small water insects. Dhela is high in Vitamin A and calcium.

**Breeding:** It becomes mature in the first year. Its peak breeding season starts from May to July. Fecundity is about 1,000 to 10,000.

## **2. Importance of small indigenous fishes and its nutrition:**

- ❖ Small indigenous species (SIS) fishes are source of protein
- ❖ Small fishes are high in Vitamin A, calcium, phosphorus, iron and zinc
- ❖ It contains essential Omega-3 fatty acid that reduces the cholestrarol from human body and reduces the risk of heart attack
- ❖ Small fish reduces blindness, night blindness, anemia, thyroid etc diseases
- ❖ Oil from small fishes reduces the chance of kidney stone
- ❖ Small fishes help to grow womb baby especially it is essential to develop the brain of baby
- ❖ Due to its high vitamin A, small fish helps to increase eye power and protect night blindness
- ❖ It can be cultured easily in any small/big sized pond. It breeds naturally so that if it is stocked one time in any pond then it can be found all time.
- ❖ Small fishes especially mola doesn't hamper the production of carp culture, rather extra income is possible
- ❖ It is sold even in small amount, so that low income people can buy and mitigate their nutrient demand through mola

**Nutrition of Small indigenous species:** Small fishes are full of animal protein and easily digestible. Small fishes are full of protein, vitamin, calcium and other nutrients. It contains more

nutrient than bigger sized fishes. Such as- mola contains high amount of vitamin A, calcium, phosphorus and iron, Darkina contains high amount of vitamin A and Iron and Dhela contains high amount of Vitamin A and calcium. These nutrients increase disease resistance in human body, reduced night blindness, anemia and malnutrition.

Animal fat and oil is bad for human body, on the other hand fish oil reduces the risk of kidney stone. As a result the educated conscious people always try to keep small fishes in their meal instead of animal meat.

### **3. Micronutrients of small indigenous species:**

Too much use of small fishes in the daily meal helps to reduce the malnutrition of pregnant women, lactating mother and baby. Among the SIS, mola, darkina and dhela are mentionable which contain high amount of micronutrient. Because their head, eyes and bones are full of calcium, iron, Vitamin A and Zinc. Zinc helps to increase body cell, increase resistance power against disease and protects from diarrhea of babies. Vitamin A increases eye power and iron removes anemia. The poor people of our country eat more small fishes rather than bigger fishes and animal meat. It was found from research that the contribution of small fishes is higher to the most poor people's (Who breaks stone and brick) nutrition. They consume around 69% of small fishes than other big fishes.

### **4. Measures nutrient loss of small indigenous fishes:**

It is harsh reality that during the cooking many people destroy nutrients by mistake. During dressing of small fishes especially for mola maximum time many people cut off head to avoid too much work. But it is mentionable that head and eye of small fish like mola contains 53% Vitamin A. Moreover there is a chance to destroy calcium if its fin and tail is removed. So, to utilize its micronutrients it is needed to prevent nutrient loss during handling and cooking. The preventive measures to protect nutrient loss are:

- ⇒ Fish head and abdomen portion should not be cut off during dressing
- ⇒ The stomach is bring out pressing gently on abdomen
- ⇒ Maximum portion of fin and tail should have to keep
- ⇒ The fish should not wash many times before cooking, after dressing fish should wash 1-2 times with tube well water gently
- ⇒ Should not cook long time and cooking time should be maximum 10-12 minutes
- ⇒ More nutrients can be obtained if fish is boiled with less heat than fry in high temperature
- ⇒ If small fish pickled is prepared then the pickled container should dry by sun once in a month and thus it is possible to get maximum nutrients

Day – 3rd	Time : 9.00-9:45	Duration -- 45 minutes
-----------	------------------	------------------------

**Title:** Increasing pond productivity after stocking, water exchange and water quality test

**Target group:** Household fish farmers

**Goal:** To provide idea among trainees about techniques of increasing post fry stocking productivity in the pond and about water quality; so that positive change of their knowledge, skill and behavior take place on the mentioned subjects.

**Objective:** At the end of the session trainees will be able to say properly about a) time of lime application, amount and application process after stocking, b) time of fertilizer application, type of fertilizer, dose and application process, c) considerable subjects and cautiousness during lime and fertilizer application and about d) water quality, and will be able to do practically.

**Introduction:** 1. Exchange of greetings

2. Review on previous session

3. Participate in farmer's evaluation

4. Describe goal and objective of the current session

5. Focus on current session

**Subject matter:** 1. Increase post fry stocking productivity in the pond, importance of increasing productivity and way (question and answer, participatory discussion through exhibiting hook board picture)

2. Necessity of lime application after stocking, dose, lime liquefying, application process and cautiousness during application (question and answer, participatory discussion through exhibiting hook board picture)

3. Necessity of fertilizer application after stocking fry, type of fertilizer, and dose of application, process, time and considerable subjects during application (question and answer, participatory discussion through exhibiting hook board picture).

4. Water quality test, suitable measurement of water quality and things to do for keeping water quality and determine suitability for fish culture according to water color (question and answer, participatory discussion through exhibiting hook board picture and practical)

**Summary:** 1. Review on main subject (question and answer and picture exhibition on hook board)

2. Determine objective of the session. (Question and answer)

3. Establish connection with the next session.

**Training supportive materials:** Hook board, pictures for hook board, brown paper, sample pond, lime, small earthen bowl, bucket (still and plastic), cooking pot, mug, country towel, measuring scale, tin jar, clean water glass, fertilizer (cow-dung, urea, TSP), pH paper, Secchi-disk etc.

**Session-10 (Old 07)****Session method**

Productivity of pond, importance of increasing productivity and way to increase post stocking productivity (SM-1)	Technique: Question and answer and participatory discussion through exhibiting hook board picture	Time:10.00 minuets
---	---	--------------------

**Working method:**

- At the beginning of training facilitator will thanks and welcome farmers and greetings.
- Then facilitator will question – what do you understand about productivity of pond? What is the importance of increasing productivity? Facilitator will listen to their answer attentively and note down. Afterwards through participatory discussion he will make them understand in details.
- Afterwards the facilitator will want to know – what is the way to increase productivity? Then honoring their idea he/she will discuss in details about ways to increase productivity through exhibiting hook board picture.
- In the end he/she will review on pictures exhibited on hook board in participatory process and will make an oral evaluation.

Post stocking dose of lime, lime liquefying, application process and cautiousness during application (SM-2)	Technique: Question and answer, practical materials and participatory discussion through exhibiting hook board picture	Time : 10 minuets
---	--	-------------------

**Working method:**

- Facilitator will invite trainees to listen to this part of the session attentively and to participate actively.
- Facilitator will question to farmers – what is the dose of lime application after stocking? How lime should liquefy into water? He/she will listen to farmer’s answers attentively. As discussion on lime has taken place beforehand, so he will learn answers from farmers through participatory process and will review on it briefly if necessary.
- To enquire memorizing rate of previous training, the facilitator will question – Lime application process and what cautiousness should adopt during lime application? How much you can remember? He/she will listen to farmer’s answers attentively. As discussion on the subject has taken place before, so he/she will learn the answers through participatory discussion and exhibiting hook board picture and practical lime will review briefly if necessary.
- In the end he/she will review on hook board picture in participatory process and make an oral evaluation.

Post-stock fertilizer application dose, fertilizer liquefy, application process and considerable subjects in fertilizer application (SM-3)	question and answer, practical materials and participatory discussion through exhibiting hook board picture	Time-10.00 minutes
--	---	--------------------

**Working method:**

- Facilitator will question to farmers – how many types of fertilizer are to apply in post stock pond? Afterwards facilitator will provide proper idea by showing different type of fertilizers in practical and exhibiting hook board picture and through participatory discussion.
- Then facilitator will question to farmers – what is the dose of fertilizer application after stocking fry? He/she will listen to farmer's answer attentively. Whereas discussion was done on the subject earlier so he/ she will learn the answers from farmers through participatory process and will discuss briefly if necessary.
- Afterwards facilitator will want to know – process of fertilizer application and when to apply? How much you can remember about these subjects? He/she will listen to farmer's answers attentively. Since discussion was done on fertilizer before, so he/she will learn the answers from farmers through participatory process and will review on the subject through exhibiting hook board picture if necessary.
- Then he/she will question to farmers – what are the considerable subjects I fertilizer application? Facilitator will learn answers from farmers through participatory process and will review in brief if necessary.
- In the end he/she will review on hook board pictures and will make an oral evaluation.

Water quality, suitable measurement of water quality and determine suitability for fish culture according to color (SM-4)	Technique: Question and answer, participatory discussion through exhibiting hook board picture and practical	Time :15 minutes
---	--	------------------

**Working method:**

- Facilitator will want to know from farmers – what do you understand to tell water quality in fish culture? What important suitable measurement of water quality (different organic-chemical ingredients) is better in fish culture? He/she will listen to answers from farmers attentively and will make them understand by discussing the subject.
- At the end of explaining about water quality, the facilitator will ask to farmers—how water quality is to test in fish culture? Then facilitator will demonstrate techniques of water quality test (through Secchi-disc, pH paper) practically by getting down into water with active participation of trainees.
- At this stage the facilitator will ask – How suitability for fish culture can be determine according to color of water. After learning from farmers he/she will conduct participatory discussion through exhibiting hook board picture. Then will question to farmers what things to do in keeping water quality? After learning from farmers he/she will discuss in details through participatory process.
- In the end, he/she will conduct review on pictures exhibited on hook board in participatory process and will make an oral discussion.

### Increasing pond productivity after stocking, water exchange and water quality test

**1. Increasing post stocking productivity of pond:** Increase productivity means to increase natural food for fish in pond, which means to increase intermediate productivity through increasing primary productivity of pond.

Importance of increasing post-stocking productivity of pond: Effectiveness of fertilizers those are applied into pond during pond preparation remains highest up to two weeks. That means sufficient natural food grows up to two weeks. Afterwards production of natural food decreases but fries continue to grow up so demand of natural food continues to increase. Afterwards production of natural food will decrease if fertilizer is not applied every second week regularly. Fries will not grow up if there is lack of food and in the end fries will die being affected by malnutrition diseases. This is why fertilizer will have to apply in the pond regularly in every second week to keep sufficient natural food production on going after fry stocking.

Way to increase productivity: Productivity will have to increase by applying lime and fertilizer (cow-dung or compost, urea and TSP) regularly.

#### 2. Post-stocking lime application:

Lime application: Different type of germ and harmful gases can create at the bottom of pond/in water after stocking fry. Sometimes feed and fertilizer collected at the bottom if applied excessive. And also leaf from trees used to fall into water and gradually get deposited at the bottom. Water quality and environment can be ruined by decaying those leaves and stored feed in the bottom. So, to keep the quality of water burnt lime 250-300 gm/ decimal will have to apply successively every 2-3 month into pond.

Liquefy lime into water: See details in page 29.

Time of lime application: Lime will have to splash properly into the whole pond during sunny morning.

Carefulness in lime application: See details in page 29.

Commented [MK5]: ??

**3. Post-stocking fertilizer application:** Application of cow-dung/compost, urea and TSP is suitable for fish culture in pond. Details about fertilizer application is given below—

Dose of fertilizer:

Name of fertilizer	Dose of application
Cow dung/compost	0.5kg-1kg/decimal/week
Urea	75-150g/decimal/week
TSP	50-75 g/decimal/week

Fertilizer application process: See details in page 30.

Time of application: Fertilizer will have to splash properly at all shallow portion of pond during sunny morning.

Considerable subjects of fertilizer application: See details in page 30.

#### 4. Water quality test:

Depth of water: Keep 4-6 feet depth of water in pond is best for fish culture and if a portion of pond is deeper is even better. Water temperature gets increased quickly if depth is less than 3 feet, as a result oxygen and pH into water gets decreased and ratio of CO<sub>2</sub> gets increased.

**Clearness and turbidity of water:** If water of pond is turbid and clearness of water reduces due to excess production of food at upper level of water then oxygen deficiency take place. If clearness of water is 10 inches or 25 cm then natural food is measured in water. Turbid water is not suitable for fish culture.

**Sunlight:** It is better not to have any tree by the bank of pond. But if there are some then branches of those trees will have to cutting off so that adequate sunlight can fall upon water.

**Temperature:** Ideal temperature for fish culture in pond is 28-32 degrees. Normal livelihood of fish is interrupted if the temperature is more than 35 degrees or less than 10-12 degrees i.e. fishes eat less feed and growth of fishes get stop.

**Dissolve Oxygen:** Growth of fishes take place well if dissolve oxygen in water remains at the rate of 5-8 mg/liter. But if for any reason dissolve Oxygen ratio goes down below 3mg/liter then fishes become afloat on water and start to suffocate and at a certain stage fishes get died. Deficiency of oxygen can occur if harmful bloom is created in water, if organic matters are rotten, if turbidity is too much and excessive fishes are stocked.

**Alkalinity of water:** Alkalinity of water depends on dissolving rate of calcium or magnesium carbonate or bicarbonate. 80-120 PPM alkalinity rate should keep in pond.

**pH:** Ideal pH value into water for fish culture is 7-8.5. Natural food production decreases, disease preventive power of fishes decreases and fishes stop to take food if pH value goes up or down.

**Carbon-di-oxide:** It is better for fishes if CO<sub>2</sub> in fish culture pond is less than 10mg/liter. Amount of dissolve oxygen reduces if amount of CO<sub>2</sub> increases into water.

**Ammonia:** Ammonia of 0.025mg/liter or less than that in pond water is not harmful for fish culture. Increasing of non-ionized ammonia is harmful for fishes.

**Hydrogen sulfide:** The highest rate is 0.002 PPM and higher rate of it is harmful for fish culture. Hydrogen sulfide becomes poisonous when pH value reduces.

**Water color:** A table of amount of natural food and suitability for fish culture based on water color is given below:

Water color	Amount of natural food and type	Fitness for fish culture
Clear	There is no plankton	Not suitable
Greenish	There is sufficient phytoplankton	Suitable
Deep green	There is excess amount of phytoplankton	Harmful
Brownish green	There are measured amount of phyto and zoo plankton	Good
Grayish green	A few phytoplankton and a few floating alluvium	Suitable

**Fit to be done for protecting water quality:**

- pH value can be measured once in every week. pH value will have to keep 7-8.5.
- Fertilizer application will have to stop if water of the pond is too much green.

Day : 3rd	Time : 9.45-10.30	Duration : 45 minutes
-----------	-------------------	-----------------------

**Title** : Supplementary feeding and dragging chain

**Target group** : Household fish farmers

**Goal** : Training will be provided to trainees about supplementary feeding in pond and about dragging chain; so that positive change of their knowledge, skill and behavior take place in this regard.

**Objective** : At the end of the session trainees will be able to say properly about a) Introduction of supplementary feed, b) Kind of supplementary feed, c) Stability test process of commercial feed, d) Supplementary feed making process and application rate, f) Application process of supplementary feed and carefulness, and g) Importance of chain dragging and will be able to do.

**Introduction** : 1. Review on previous session.

2. Describe goal and objective of the current session

3. Focus on current session.

**Subject matter** : 1. Supplementary feed, importance of feed and type (Question and answer, practical materials and participatory discussion through exhibiting hook board picture)

2. Stability test of commercial feed into water (Question and answer, participatory discussion and practical through exhibiting practical materials)

3. Supplementary feed preparation and amount of feed application (Question and answer, participatory discussion and practical)

4. Supplementary feeding process and carefulness (Question and answer, practical materials and participatory discussion through exhibiting hook board picture and practical)

5. Chain dragging, importance of chain dragging in fish culture (Question and answer, participatory discussion through exhibiting hook board picture, practical materials and practical)

**Summary** : 1. Review on main discussion subject (Question and answer, exhibiting hook board picture)

2. Ascertain objective of the session (question and answer)

3. Establish connection with the next session.

**Training supportive materials:** Hook board, picture for hook board, several types of floating and sinking commercial feed, oil cake, rice husk, wheat bran, dried fish powder, dark black molasses, flour, water, tray for placing made feed, green food (duck weed, banana leaf), feed giver, feed ring, bowl, scale, tin pot, chain, boxes written with animal and vegetable, plastic bottle etc.

Session-11 (Old 08)

Session method

Supplementary feed, importance and type, stability test of commercial feed, feed making, application process and carefulness (1-4)	Technique: Question and answer, sample pond, participatory discussion through exhibiting hook board picture and practical	Time: 30 minutes
--	---	------------------

Working method:

- Facilitator will ask to farmers – what is supplementary feed? What is the importance of supplementary feeding ? How many kinds of supplementary feed can be? Facilitator will listen to farmers the answer attentively, afterwards facilitator will discuss about type of supplementary feed through exhibiting hook board picture along with showing practical materials. Facilitator will want to know – what do you understand about stability of commercial feed and how stability of supplementary feed is tested, he/she will listen to farmers attentively. Then, he/she will let them know in details through hook board picture show and through participatory discussion. Afterwards he/she will show stability test keeping some pellet into a glass full of water (floating and sinking) with active participation of farmers.
- Then the facilitator will want to know from farmers about – how feed can be made by hand at home? What is the amount of applied feed etc and will listen to their answers attentively and will let the farmers know in details in this regard through participatory discussion and will make a dough of feed by mixing measured amount of wheat bran, rice husk, a few amount of wheat flour and dark black molasses with oil cake. Now he/she will make food ball from that dough and will place it under the sunlight for drying.
- At this stage the facilitator will ask to farmers about application process of supplementary feed. Then showing hook board pictures and through discussion he/she will describe the subject in an easy way.
- For application process he/she will show feeding tray collected beforehand and will demonstrate in sample pond/real pond with the participation of farmers and will show how feed can be applied on feeding tray.
- Then what carefulness will have to follow during feeding he/she will discuss the subject through participatory process.
- In the end he/she will review on hook board picture through participatory process and will make an oral evaluation.

Chain dragging into pond, importance of chain dragging and technique (5)	Technique: : Question and answer, practical materials, participatory discussion through exhibiting hook board picture and role play	Time : 15 minutes
--	---	-------------------

Working method:

- EF/FS will want to know from farmers about chain dragging, importance of chain dragging in fish culture and technique. Facilitator will listen to farmer’s answers attentively and will ensure farmers take part in a game. He/she will decorate a few water bottles of 500 ml in the sample pond. ‘Poisonous gases’ and ‘necessary nutrient’ will be written on those bottles. He/she will call for some farmers (5-6 persons) for help and will hang a play-card with illustrated fish that will be hanged on their necks and will let them know what will be their behavior when chain will be dragged into sample pond. He/she will make the chain dragged into the sample pond with the help of two farmers. At the end of two times chain dragging all bottles will fall down and will be scattered. He/she will also discuss in details what kind of problems can be arisen when chain is dragged for more than two times.
- Then he/she will conduct participatory discussion on importance of chain dragging and process through hook board picture show.
- In the end he/she will review on hook board picture through participatory process and will make an oral evaluation.

### Supplementary feeding and chain dragging

**1. Supplementary feed:** For more production of fish into pond the feed along with natural feed is applied from outside is supplementary feed, such as – oil cake, rice husk, dried fish powder, ready pellet etc.

**Importance of supplementary feeding:** As a result of supplementary feeding –

- a) Growth of fishes takes place rapidly
- b) Fishes can be harvested within a short time and can be sold in the market
- c) More production can be achieved.
- d) More benefit is gained and overall socio-economic condition of farmers will be improved.

**Type of supplementary feed:** According to source feed can divide into two parts. Such as – Vegetable origin food and Animal origin food

- **Vegetable** origin food: Such as—rice husk, rice grain, wheat bran, mustard oil cake, sesame/coconut oil cake, banana leaf, duck weed, soft grass, cabbage leaf, epil-epil leaf, potato leaf etc.
- **Animal origin food:** Such as – dried fish, small shrimp and small fishes, meat of snail/oyster, silk-worm, cow-goat blood, intestines of duck and chicken, eggs of warm, earth warm etc.

According to preparation, feed can be divided into two types. Such as – hand/ homemade feed and pellet feed (made by machine). Pellet feed or made by machine, feed is called commercial feed.

**Hand /homemade feed:** Feed can make in home by mixing different types of food ingredients such as – wheat bran, rice husk, fishmeal, wheat flour, oilcake, dark black molasses etc.

**Commercial feed or machine made feed:** Now a day different fishmeal producing establishments have been marketing different grades of fish feed which is easy to preserve and carry. There is no substitute of quality feed in fish culture with developed technology. In case of improved culture technology (semi-intensive and intensive) it is better to apply commercial feed for fish culture because of wastage is less in commercial feeding and water quality also remain well.

**Type of commercial feed:** Commercial fish feed can be divided into two types according to kind of fish culture and strain difference. In general sinking commercial feed is applied for carp type of fishes and floating commercial feed is applied for Tilapia, climbing fish, and cat fish culture,

#### 2. Stability test of commercial feed into water:

**For sinking commercial feed:** Many kinds of sinking commercial fish feeds are available in Bangladesh. Water stability of commercial sinking feed with high quality for carp can be 1-2 hours that means it does not melt into water by this time. Sinking fish feed will have to put into a glass full of water, if the feed gets melted just before 25 minutes then the quality of the feed will be assumed not good.

**For floating commercial feed:** Many types of floating commercial fish feeds are available in Bangladesh for tilapia, climbing fish and for cat fish culture. Durability of good quality commercial floating feed into water will be up to 4-5 hours; i.e. it does not sink or melt into water by this time. 10-12 gm of floating fish feed will have to put into a glass full of water. If the floating feed got melted before less than 4 hours then the quality of the feed will be assumed not good. Farmers should test the durability of feed before purchase.

**3. Supplementary feed making process:** It is better to make separate kinds of feed based on type of mixed culture such as-carp, cat fish, mono-sex tilapia and climbing fish. Sample for making feed by mixing different ingredients is given below

**Usable rate of different ingredients for making supplementary feed (For making one kg of feed)**

Amount for carp strain of fishes

Ingredient for making feed	Sample-1	Sample-2	Sample-3	Sample-4
Mustard cake	200	250	200	400
Auto rice bran	150	300	500	250
Wheat bran	200	250	200	150
Fish meal	150	100	0	100
Corn powder	100	0	0	0
Flour	100	50	50	50
Vitamin premix	05	0	0	0
Soya bean cake	50	0	0	0
Dark black molasses	45	500	50	50
Total	1000	1000	1000	1000
Amount of protein (%)	23.55	21.26	16.50	23.52

Rate of protein in samples can be 23-25 %, 20-22 %, 16-18 % and 22-24 % accordingly for the quality difference of food ingredients.

**Process of making feed:** Depending on the culture system feed preparation will be different and that are mentioned on the table. Ingredients will have to measure separately based on how many kg of feed will be made. Oil cake will have to soak with twice amount of water overnight (for 12 hours). The rest ingredients will have to mix in a big pot during feed preparation. Later dark black molasses will be added with the dough as a binder. From the dough marble sized small seized feed balls will have to prepare and will let those balls dried by sun. These feed balls can be preserved and used for almost one month if feed are dried by the sun properly.

Many people prepared their required feed daily and use feeding tray. As quickly as the feed will be diluted into the water, fish will have less chance to eat.

**Feeding rate:** Feeding rate depends on water temperature, species of fish, age and average weight of fishes. Such as—Fishes usually eat more in the summer than winter. So, feed will have to apply considering all these. Usually 5-2 kg of feed is to apply for 100 kg of fish.

**N.B**

\*To feed carp species like Rohu daily amount of feed will be divided into two parts and one should provide in the morning (9-10 AM) while another portion should provide at the evening time (3-4 PM).

\* for handmade supplementary feed 1-2% more feed of the mentioned in the table can be provided.

\* Soft grass, banana leaf, duck weed, epil-epil leaf etc will have to apply for grass carp. Everyday 40-50 kg of feed will have to apply for each 100 kg of fish.

**4. Supplementary feeding process:** Feed wastage decreases and fishes can eat properly if handmade or sinking commercial feed is applied on feeding trays. Feed giving tray will have to place at some fixed places of the pond. Else, if floating feed is applied at some particular places in particular time the fishes become used to eat feed and wastage of feed decreases.

**Carefulness in supplementary feeding:**

- Feed more than required amount should not be applied, otherwise water quality will be destroyed when feed will remain unused.
- Stomach of fishes will not be fulfilled, fishes will suffer from malnutrition and growth/production will be less if insufficient amount of feed is applied.
- Amount of feed will have to reduce much in the winter (1/3<sup>rd</sup> compare to summer)
- Old and rotten feed should not apply.
- Banana leaf should apply in a bamboo made frame by making small pieces without applying as a floating way.
- Boiled meet of snail /oyster will have to apply by mixing with oil cake-bran without applying raw.
- Intestine of cow-goat or duck-hen will have to apply by making small pieces after boiling into hot water.

**5. Chain dragging:**

**Chain:** chain is made by knotting brick or any other weight on a rope. It is available in the market. Even we can make it by ourselves by knotting broken bricks one after another and bundle of bamboo branches hanging from a rope (show of chain made by hanging bricks)

**Importance of chain dragging :** a) Harmful gases (Ammonia, Hydrogen sulfide, carbon monoxide etc) from the bottom of pond are removed, b) nutritious materials comes up which was stack under mud c) as fishes move fast so their exercise is done, d) Digestion of fishes increases, e) Fishes eat more feed, f) development of fishes get well.

**Chain dragging process:** chain will have to pull from one side of the pond to other by two persons with the rope of hanging bricks in hand at opposite banks. It is better to pull chain successively two rounds at a time. Bundle of bamboo

branches can be pulled by knotting rope. Chain can pull twice a month i.e. fort nightly. Chain can be dragged for more times too if necessary.

**Session-11 (Old 08)**

**Handout**

**Problems those can arise from dragging of chain for many times:**

- Multiplying environment for benthos and different larvae dwells in the mud at the bottom of pond will be ruined.
- Natural food at the bottom of pond will become imbalanced.
- Frequency of fishes will be hindered if gasses from the bottom come up often.
- There will be no environment own for fishes will remain if the pond is made fit for fish culture by removing gases again and again.
- Natural food chain for fishes will be broken.

**Extra information for facilitator – Nutrition value of different ingredients used for fish feed**

Name of ingredients	Protein (%)	Fat (%)	Carbohydrate (%)	Calorie/ kg
Fish meal	55-65	10-12	1-2	4,754
Fish silage	50-55	15-20	6-8	5,432
Meat and bone meal	45-55	8-10	1-2	4,112
Shrimp powder	35-40	1-2	8-10	3,774
Crab powder	28-32	6-8	8-10	3,471
Oyster meet	30-34	2-3	45-50	4,285
Silk-warm meal	50-55	20-25	8-10	5,939
Blood meal	70-90	0.5-1.0	12-15	4,294
Cow intestine	45-50	18-20	10-12	5,566
Chicken intestine	55-60	15-18	10-15	5,750
Left over from kitchen	20-25	5-6	28-32	3,767
Rice husk	10-12	2-3	40-45	3,952
Wheat bran	12-14	3-4	55-60	4,394
Corn	8-10	3-4	65-70	3,854
Soya bean meal	35-40	10-15	30-35	5,499
Mustard cake	30-35	10-14	30-35	4,978
Sesame oil cake	30-35	10-15	30-35	4,753
Coconut oil cake	18-20	8-10	50-55	4,723
Little weed	15-20	1-2	60-65	3,939
Duck weed	18-20	3-4	50-55	3,912
Coarse flour	15-18	3-4	70-75	4,488
Wheat flour	18-20	0.5-1.0	70-75	4,368
Dark black molasses	4-5	--	80-85	3,628



---

Commented [Sunny6]: Merged with Module 2 part

**Module-02**

**Session—12 (Old 10)**

---

Day : fourth	Time : 9.00-9.45	Duration :45 minutes
--------------	------------------	----------------------

**Title :** Sampling, some common problems in fish culture and its possible solution

**Target group:** household fish farmers

**Goal :** To provide idea to trainees about sampling, some common problems in fish culture and its possible solution, so that they become able to take effective technical steps about the mentioned subjects.

**Objectives:** In the end of the session trainees will be able to take necessary steps about possible solution of problems like a) sampling and necessity of sampling b) sampling process c) common problems in fish culture d) find out reasons of problem e) harmful effect and f) possible solution of problems.

**Introduction:** 1. Exchange greetings.

2. Review on previous session

3. Participation at farmer evaluation session.

4. Describe goal and objective of the current session.

5. Focus on current session.

- Subject matter:**
1. Sampling, necessity of sampling and sampling process. (Question and answer, participatory discussion through exhibiting hook board picture and practical)
  2. Carefulness during sampling (question and answer)
  3. Some common problems in fish culture and possible solution (Question and answer and hook board picture show)
  4. Reasons of problem (Question and answer and hook board picture show)
  5. Harmful effects of problem (Question and answer and hook board picture show)
  6. Possible solution of problems (Question and answer and hook board picture show)

- Summary:**
1. Review on main subjects (Question and answer and hook board picture show)
  2. Determine objective of the session (question and answer)
  3. Establish connection with the next session

**Training supportive materials:** Hook board, pictures for hook board, brown paper, Steel scale, Scale, weights, sponge wood/hyacinth sprout, bucket/bowl (plastic), hard clip, marker pen etc.

**Session –12 (Old 10)****Session method**

Sampling (1-2)	Technique : Question and answer, participatory discussion through exhibiting hook board picture and practical	Time: 25 minutes
----------------	---	------------------

**Working method:**

- At the beginning the facilitator will thank and welcome farmers and greetings each other. The facilitator will try to learn current state of their technical knowledge through participatory discussion and will evaluate. He/she will note down their current evaluation. There will be opportunity to determine it at the end of the training.
- What is sampling in commercial fish culture and what is the necessity of sampling? Facilitator will learn answers from farmers through question and answer. Then he/she will provide proper idea about sampling through participatory discussion with hook board picture show.
- What are the techniques in commercial fish culture? What carefulness's should consider during sampling? Facilitator will know answers from farmers through question and answer. Then he/she will provide proper idea about sampling technique and carefulness during sampling to farmers through hook board picture show and through dummy practical work.
- In the end he/she will review on pictures exhibited on hook board through participatory process and will make oral evaluation.

Some common problems in fish culture and its possible solution (3-6)	Technique : Question and answer, participatory discussion through exhibiting hook board picture	Time: 20 minutes
--	---	------------------

**Working method:**

- Facilitator will know from farmers through question and answer-- what are the common problems of fish culture and the reasons are behind. After then the facilitator will mention some more problems that are not mentioned from the farmers .
- Through question and answer facilitator will know from farmers about harmful effects by the problems in the culture pond and about possible solution of problems and will know about their experience of loss and it possible solution. Then facilitator will provide proper idea to solve different problems through exhibiting hook board picture and through participatory discussion.
- In the end he/she will review on pictures exhibited on hook board through participatory process and will make oral evaluation.

## Handout

---

### Sampling, some common problems in fish culture and its possible solution

**1. Sampling:** Whether growth of fishes are going on properly or not, whether health of fishes are properly, whether there is any sign of disease over the body of fishes or not and what amount of supplementary feed will have to apply in the pond- to determine these, fishes are harvested by net successively after two to three weeks (length and weight of fishes are measured), this is sampling.

**Necessity of sampling:**

Sampling is essential to determine

- a) Fish growth rate
- b) Disease invasion or any lesion
- c) Size of individual fishes especially for marketable sizes
- d) Total standing biomass of the cultured fishes
- e) To calibrate or fixing the feeding rate
- f) To check the mortality rate

**Techniques for sampling:** Usually sampling is done by enclosure net if pond is big and by throwing net if pond is small. It is better to do sampling in the morning during the cool hour of day.

5-6% of fish is there in the pond, i.e. if there is 100 kg of fish then 5-6 kg of fish will have to harvest for sampling. Or if there are 100 fishes then 5-6 fishes will have to catch for measuring length and weight. But certainly each species of fish will have to consider for sampling. For it is not possible to determine growth rate and diseases of one species by the other. So 5-6 % of fishes from each species will have to make sampling. If there are five species of fishes in the pond then 5-6 % of each species will have to harvest. In this way sampling will have to do by following this rule whatever the fishes are there in whose pond. Amount of feed can be more or less depending on average weight of fish. But if the number of fishes is too much in any pond then sampling can be done by harvesting 30-40 fishes.

**Noticeable:** In the case of Climbing fish, Sing fish (*Heteroneustus sp*) and Magur (*CLarias sp*) it is better to stock fishes by purifying after sampling. For cat fish the less sampling is done is the better.

**2. Carefulness during sampling:** a) Fishes don't get hurt during harvesting b) water of the pond cannot get too much turbid c) The net thrower will be an experienced person d) Fishes will have to catch very carefully, will have to move and weighted very carefully and e) sampling should not make under hot sun. f) Fish should not be handled rough

**3. Some common problems in fish culture and possible solution:**

**Problem due to pH:** Changes of pH effects on fish physiology especially when pH reduces then fishes loses mucus from the body and gills will be affected. . Production of natural food in the pond reduces and food demand of fish is also

reduces if pH value is too high; else body of fish becomes rough to touch. As a result fish becomes weak and gets attack by diseases easily.

**Remedy:**

- 500 g/decimal of burnt lime will have to use if pH value is very low; or
- pH value can be increased also by using 1 kg of dolomite/ decimal or gypsum
- pH value can be reduced by applying 100-150 g/decimal of TSP if pH value gets high.

## Session—12 (Old 10)

### Handout

---

**Problem due to turbidity:** Too much floating materials and small soil particles creates turbidity in the pond. Generally washed away soil from the bank of pond during down pour of rainy season makes the water turbid; on the other hand turbidity is also created due to pulling net frequently. As a result sun light is hindered to enter into water and food does not produce in water, gill of fish gets ruined gradually.

**Remedy:**

- Burnt lime of 500 g/decimal will have to use; or
- Gypsum 1-1.5 kg/ decimal or dry rice straw 1-1.5 kg can be used, but the straw will have to remove from the pond after 2-3 days; or
- Alum 250 g/ decimal can be used.

**Oxygen deficiency problem:** If there is excessive organic decomposition at the bottom of pond, if the sky remains cloudy successively for a few days and due to excessive growth of plankton dissolve oxygen deficiency can appear in the pond; in that case amount of carbon- dioxide used to increase in water and if amount of dissolve oxygen rate goes down less than 4mg/liter in water of the pond then usually fishes can have to face this problem. As a result fishes roam about tiredly on the water surface and suffocate. And at one stage fishes start to die if oxygen is too short, and as a result mouth of fishes remain open and gills are severed.

**Remedy:**

- 5-7g/decimal of oxyflow/ oxylife can be used; or
- Movement of water will have to make in the pond by using cooking pot or by bamboo and
- Application of feed and fertilizer will have to keep stop for a few days and
- Gasses from the bottom of pond will have to remove by chain dragging and decaying things will have to remove from the pond if oxygen deficiency is occurred for organic decomposition.

**Alkalinity problem:** This problem creates if amount of calcium and magnesium is more or less in water; as a result fishes get attacked vary easily by acidity and water suitability.

**Remedy:**

- 500 g/ decimal of burnt lime or 1kg/ decimal of gypsum will have to apply; or
- Good result can be achieved by applying ash if alkaline rate is low.

**Organic decomposition and harmful polluted gasses:** Different type of poisonous gasses are used to create at the bottom of pond due to excessive organic decomposition, such as hydrogen-sulfide, carbon-dioxide, ammonia, methane etc; as a result fish fries are attacked by gas bubble disease.

**Remedy:**

- Use lime of 500 g/decimal or zeolite of 200-250g/decimal; or
- Pro-W gas-trap of 1 g/decimal can be used and
- Remove gasses by chain dragging regularly
- Stop application of supplementary feed and fertilizer temporarily.

## Handout

---

**Red bloom on water surface problem:** Red layer can appear on the water for red algae or for excessive iron. For this food and oxygen deficiency can be found in the pond.

**Remedy:**

- Remove the red layer by pulling rope made with spinning dry straw or dry banana leaf; or
- 100-150 g/decimal urea 2-3 times (successively after 10-12 days); or
- Alum of 100 g/decimal can be applied too.

**Green bloom on water surface problem:** If algae or excessive phytoplankton is produced on water surface and water color is deep green then green layer can appear on the water surface.

**Remedy:**

- Gypsum of 1kg/decimal can be applied; or
- 10-12 g of copper sulphate can be applied by making small bundles hanging with bamboo poles into 10-15 cm depth from water surface; or
- Organic control can be done through silver carp.

**4. Reasons of problem:** a) There are many farmers who do not have proper idea about fish culture; they are engaged in fish culture without following any rules. That means there is a pond where fish is to release so they do. But they do not know about problems that are to face to do fish culture without following rules, they do not understand and even they do they do not give importance to it, as a result they do not attained a good result in fish culture. b) They are less serious, less careful to the pond, so many problems appear in the pond. The possibility of this type of problems is much more if proper care of pond is not taken.

**5. Harmful effects of problem:** a) Fish can be attacked by different type diseases b) epidemic of fishes can take place c) growth of fish can reduce d) expected fish production do not take place e) good quality fish do not produce f) suffer a loss happened in fish culture g) In the end the farmer lose his interest in fish culture.

**6. Possible solution of problems:** a) Excess fry should not stock in the pond b) excess fertilizer more than rules should not be applied c) very careful effort will have to adopt during fish transportation so that fishes cannot get hurt by any means d) weak and sick fries should not release in the pond e) dike of pond and bush and creeper and weeds will have to keep clear always; so that the otter, snake, and mongoose cannot take shelter f) it is better to sundry the bottom of the pond successively after 2-3 years, black and odorous mud should remove if there is any g) dike will have to repair if it is broken, branches of tree lean on pond will have to cut down so that water can get light and air h) it is necessary to take care so that water of pond cannot become too much turbid due to cattle washing and for excessive swimming of children.

### Session – 13 (Old 11)

Day : Fourth	Time : 9.45-10.30	Duration : 45 minutes
--------------	-------------------	-----------------------

**Title: Disease preventive management in fish culture.**

**Target group:** Household fish farmers.

**Goal:** Provide idea to trainees about diseases of fish and about its prevention management, so that they are able to learn about technical process of the mentioned subjects.

**Objective:** At the end of the session trainees will be able to take necessary measurement and will be able to tell about a) disease of fish b) common reason of disease c) symptom of disease and remedy and d) disease prevention management of fish.

**Introduction:** 1. Review on previous session.

2. Describe goal and objective of the current session
3. Focus on current session

**Subject matter:** 1. Different diseases of carp species of fishes, common reason of disease and symptom and remedy (question and answer and participatory discussion through showing hook board picture)

2. Necessary steps to prevent diseases (question and answer and participatory discussion through showing hook board picture).

**Summary:** 1. Review on main subjects (question and answer and hook board picture show)

2. Determine objective of the session (question and answer)
3. Establish connection with the next session.

**Training supportive materials:** Hook board, picture, sick fish, argulas , sumitheon etc.

Session – 13 (Old 11)

**Session method**

---

<b>Disease of fish, symptom of disease and remedy and preventive management (1-2)</b>	<b>Question and answer, participatory discussion through showing hook board picture and practical</b>	<b>Time : 45 minutes</b>
---	---	--------------------------

**Working method:**

- Just in the beginning the facilitator will thank to farmers for listening previous sessions attentively and will invite to take part in this session.
- What type of diseases is found at different type of carp species of fishes? What are the symptoms of these diseases? And what are the prevention managements? Facilitator will know ideas of farmers in this regard through question and answer.
- Afterwards he/she will show pictures of different sick fishes on hook board and will show some sick fishes collected beforehand and will help farmers to identify diseases.
- The facilitator will try to provide in details description about diseases mentioned in hand note.
- After completing discussion on disease prevention management the facilitator will want to know about necessary steps of disease prevention from farmers. He/she will describe necessary steps of disease prevention one by one in participatory process and with reality he/she will make the farmers understand that prevention is better than remedy.
- In the end he/she will review on pictures shown on hook board in participatory process and will make an oral evaluation.

## Handout

---

### Disease prevention management of fish

#### 1. Different diseases of carp species of fishes, symptom and remedy:

**Bacterial disease:** Collumnaris infection -- white spot is found on head, skin, gills and fins of fishes at initial stage. Afterwards these white spots are found to be surrounded by red circle. Usually the inner organs of fishes do not get attacked. Initially this disease affects the external parts of the body of fishes, so external treatment used to become successful in a great extent.

**Remedy:**

- Fish will have to sink into 25 ppm formalin solution for one hour; or
- Will have to sink into 25 ppm copper sulphate solution for 1-2 minutes; or
- Formalin with the dose of 25 ppm can be applied in the pond every alternative day for 3-4 times; or
- Medicine from amoxicillin/erythromycin group with the dose of 2-3 g/kg feed will have to make feed to fishes for 7-10 days, but the mentioned dose can be changed according to age of fish and fatality of disease.

**Dropsy disease of fish:** This disease appear in fishes due to attack of bacteria called *Pseudomonas sp/Aeromonas*, virus called Rhabdo and parasites called Myxosporideans, stomach of fish becomes like a balloon with the collection of liquid. Green or tawny colored liquid gathered in the belly, as a result fishes swim in an imbalanced way and loss of appetite appear.

**Preventive:**

- Medicine from amoxicillin/erythromycin group with the dose of 2-3 g/kg feed will have to make feed to fishes for 7-10 days; or
- Make attacked fishes bath into 5ppm potassium per-manganete solution for 1-2 minutes; or
- Burnt lime with the rate of 500 g/decimal will have to apply in the pond and
- Application of organic fertilizer will have to stop temporarily.

**Parasitic disease:**

Attack of Argulus or lice (Argulosis disease): infection of argulus used to occur due to excess stocking density and for excessive application of organic fertilizer. Usually infection of lice is found more among weak and injured fishes. Severity of this disease is observed more on Rohu and Catla fishes. Anemia appears in the body of fishes suffering from argulosis disease and fishes become very weak within a short time and will die gradually. Severely attacked fish does not have breeding power even if it becomes sound.

**Remedy:**

- Argulex with the dose of 8 ml/decimal for one feet depth will have to apply; or
- 2-3 ml/decimal Sumitheon for one foot depth of water will have to splash all over the pond by mixing with water as per measurement successively after 7 days for 3 times; or

- 12-14 g/decimal of Diptarex powder for one foot depth of water will have to splash all over the pond by mixing with water as per measurement successively after 7 days for 3 times; or
- 0.2 ml/decimal of Sypermevrin for one feet depth of water will have to splash all over the pond by mixing with water, and after seven days the same measurement of solution will have to apply.

Carefulness: Remedy will have to initiate just at the initial stage of aegulas infection otherwise overall harm may happen.

Lernaesis: This disease affects as a result of an external parasites called *Lernaes spp* looks like thin rod. Bleeding of fish occurs and fish lose weight and wound can create by the attack of these parasites so fish moves idly.

Remedy:

- Make fishes bath into 5 ppm potassium per manganate solution; or
- Make fishes bath into 3-5% normal salt solution for 30seconds to 1 minutes or up to the time endurable for fish; or
- Dipterec at the rate of 1 ppm can be applied; or
- Sumitheon with the rate of 3-5 ml /decimal for per foot depth can be applied.

*Dactylogyrus spp*: This disease occurs due to attack of parasite named *Dactylogyrus spp*. *Dactylogyrus spp* is known as gill worm. Usually this type of parasite ruins gill filament of fish by attacking on it; as a result gill of fish becomes big and extra mucus goes out from gill, weight of fish decreases and color of gill becomes pale gradually. Widespread epidemic of fish appears if infection rate is too high.

Remedy:

- Formalin with the rate of 25ppm can be applied in the pond; or
- Make the attacked fishes bath into 25ppm formalin solution; or
- Make the attacked fishes bath into 2-3% sodium chloride solution for 5-10 minutes; or
- Attacked fishes can be made bath into 2-3% potassium permanganate solution for 1-2 minutes.

*Gyrodactylus spp*: This disease occurs due to attack of parasite named *Gyrodactylus spp*. *Gyrodactylus spp* is known as skin worm. Skin of attacked fish becomes pale, bleeding in the skin occurs and scales of fish removes if attack is severe; at this state fish frequents from under the water surface restlessly and gathers at the side of pond.

Remedy:

- Apply potassium permanganate with the rate of 2ppm successively for two times; or
- Make the attacked fish bath into 25ppm formalin solution; or
- Make the attack fish bath into 0.25-0.5ppm dipterec solution.

## Handout

---

### Fungal diseases:

Ulcerative Syndrome: Ulcerative syndrome is a fatal disease occurs due to combined attack of bacteria and fungi. Usually at the beginning of winter and in the winter this disease appears more. In English this disease is called EUS (Epizootic Ulcerative Syndrome). Fishes are attacked by fungi at first and then attack of bacteria is found. But till now the germ is indicated as responsible is *Aphanomyces invadens*.

**Symptom:** Primarily red spot is found on the body of fish if carp species of fish is attacked by this disease and afterwards deep wound is created at the place. Wound or ulcer is found at many places of the body. Fish frequents at the surface level in a weak and imbalanced way. Attacked fish does not take feed and die quickly.

### Remedy:

- 250 g lime and 250 g salt per decimal or 500 g of burnt lime per decimal will have to apply. Afterwards if half of the dose is applied once in a month then good result will be achieved; or
- Make fishes bath into the solution of 5gm potassium permanganate in 10 liters water; or
- As antibacteria, Timsen 2.65g/decimal (for 1 meter or 3 feet depth) can be used. At the same time Oxytetracyclin, as antibiotics, 3-5 g mixed with each kg feed will have to use for 3-5 days.

**2. Overall necessary disease preventive steps:** a) Weak and affected by disease fries should not release in the pond. b) Fries will have to transport very carefully so that they cannot get hurt or injured any way. c) Pond and dikes will have to keep free from bush, creeper and weeds. d) Fishes will have to stock in a proper density. e) Supplementary feed will have to apply regularly and as per measurement, excess feed should not apply. f) It will have to care that there is no excess amount of black mud at the bottom of the pond; it will have to remove in the winter if it is there. g) Measurement will have to take so that snail, oyster and insects cannot grow too much in the pond. h) Net used in the affected pond, should not use in good pond without proper treatment (drying). i) It is necessary to care so that contaminated and filthy water from outside cannot enter into pond particularly flood water. j) It is better to apply lime with the rate of 250-300 g/decimal in the pond before winter.



## Special session

### Practical and farmers activity implementation plan

<b>Day : 4<sup>th</sup></b>	<b>Time : 11.00- 11.30</b>	<b>Duration: 30 minutes</b>
-----------------------------	----------------------------	-----------------------------

### Farmer's activity implementation plan

Session No.	Name of session	Main activities	Time to accomplish		Remarks
			Day	Date	
8 (Old 9&12)	Micronutrients- Vitamin A and Iron	<ol style="list-style-type: none"> <li>1. Know about source of vitamin-A &amp; iron and its function.</li> <li>2. Know about symptoms of vitamin-A &amp; iron deficiency.</li> <li>3. Know about reasons of vitamin-A &amp; iron deficiency</li> <li>4. Make all members of the family known about prevention and remedy to meet vitamin-A &amp; iron deficiency</li> </ol>			
9 (Old 15)	Identification of local small fishes and nutritional value, and maintaining nutritional value	<ol style="list-style-type: none"> <li>1. Identification of local small fishes</li> <li>2. Nutritional value of small fishes</li> <li>3. Maintaining nutritional value</li> </ol>			
10 (Old 7)	Increasing pond productivity after stocking, water exchange and water quality test	<ol style="list-style-type: none"> <li>1. Post- stocking lime and fertilizer application in fish culture</li> <li>2. Considerations for water exchange</li> <li>3. Determine water quality and suitability of water for fish culture according to water color</li> </ol>			
11(Old 8)	Supplementary feeding and dragging chain	<ol style="list-style-type: none"> <li>1. Different type of supplementary feed and its necessity</li> <li>2. Type of commercial feed and test of its durability into water</li> <li>3. Making and application of supplementary feed and chain dragging.</li> </ol>			
12(Old 10)	Sampling, some common problems in fish culture and it probable remedy	<ol style="list-style-type: none"> <li>1. Sampling and documentation</li> <li>2. Find out common problems in fish culture in group, note down and hoisting</li> <li>3. Note down if there is any new problems in fish culture</li> </ol>			
13(Old 11)	Disease prevention	Disease prevention management of fish			



**Module objectives:**

After the end of this training the trainees would-

- ❖ Get the clear concepts on partial harvesting, restocking and complete harvesting and they will be able to explain and implement this
- ❖ Explain and implement fish marketing process in appropriate way
- ❖ Get the clear concept and will be able to explain the cost-benefit analysis of fish culture
- ❖ Will acquire proper knowledge on different kind of small indigenous species and will also be able to explain it
- ❖ Will be able to explain and implement the nutrition and caring of pregnant women, postpartum and lactating mother and
- ❖ Will be able to tell and show the module's dummy activities skillfully to others.
- ❖ Will receive practical idea about importance of dike cropping and vegetation, so that they can say about it and can do it practically by themselves.
- ❖ Will know about fertilizer in Seed bed and additional application and about its importance and will be encouraged to apply that practically.
- ❖ Will know about benefit of use of compost fertilizer and about its making process.
- ❖ Will know about after nursing after plantation of saplings and will be able to demonstrate that.
- ❖ Will attain technical knowledge about diseases of vegetables, making of organic pesticides and about application process and will be able to demonstrate that.
- ❖ Will know about extra food for children and about its necessity.
- ❖ Will attain knowledge on rules of fitful extra food according to age of child will be able to apply that practically.
- ❖ Will be able to say the practical activities of sessions skillfully and will be able to demonstrate that.

**Module title: Post-stocking management and Human nutrition: Fish harvesting, marketing, nutritional value of small fishes, dike cropping management, complementary feeding and caring of women health**

**Training time schedule**

**Facilitator: EF/FS**

**Participants:**

**Date:**

**Venue:**

Day	Time	Discussion item	Training technique
		<b>Module-5:</b> Fish harvesting, marketing, small indigenous fish and its nutrition and nutrition and caring of women	
		<b>Session-14 (Old 13):</b> Partial harvesting& restocking and complete harvesting <ul style="list-style-type: none"> <li>➤ Partial harvesting and restocking</li> <li>➤ Complete harvesting</li> </ul>	Question and answering, hook board picture presentation, real material, participatory discussions and dummy practical
		<b>Session-15 (Old 14):</b> Fish marketing, cost-benefit analysis and yearly calendar on fish culture activities <ul style="list-style-type: none"> <li>➤ Fish marketing</li> <li>➤ Cost benefit analysis of different fish culture systems</li> <li>➤ Yearly calendar for fish culture activities</li> </ul>	Question and answering, hook board picture presentation, real material, participatory discussions, role play, memory game and dummy practical
		Session- 16 (Old 17): Dike cropping, production season, seed bed preparation, fertilizer management in seed bed and compost preparation method <ul style="list-style-type: none"> <li>• Dike cropping, production season and ideal seed bed making for different vegetables</li> <li>• Seed preparation before sowing, sowing and fertilizer management.</li> </ul> Compost making process.	Question and answer, participatory discussion through exhibiting hook board picture, practical materials show and practical
		Session- 17 (Old 21): Culture method of sweet orange potato and nutritional value	
		Session- 18 (Old 18): Crop management, disease protection and crop marketing, preservation for household	Question and answer, participatory discussion through

	<p>consumption, cropping calendar, income and expenditure account.</p> <ul style="list-style-type: none"> <li>• Management after sapling plantation</li> <li>• Pest management of vegetables</li> <li>• Cropping and accounts of income and expenditure of vegetation</li> </ul>	<p>exhibiting hook board picture and practical</p>
	<p>Session- 19 (Old 16): Women nutritional care and Service</p> <ul style="list-style-type: none"> <li>➤ Nutrition and caring of pregnant women</li> <li>➤ Nutrition and caring of postnatal and breastfeeding mother</li> </ul>	<p>Question and answering, hook board picture presentation, participatory discussions and game</p>
	<p>Session- 20 (Old 19):Complementary feeding</p> <ul style="list-style-type: none"> <li>• complementary feeding for children and its necessity</li> </ul> <p>•Rules of suitable complementary feeding according to age of child</p> <p>Everyday food chart for children</p>	<p>Question and answer, participatory discussion through exhibiting hook board picture and group work</p>
	<p>Session 21 (Old 22): Importance of hand wash, steps and use of tippy tap</p> <p>II. Importance of hand wash properly</p> <p>III. Important time for hand wash</p> <p>IV. Making tippy tap and its use</p>	<p>Questions and answers, participatory discussion by presenting poster in hock board and practical</p>
	<p>➤</p>	
	<p><b>Special session:</b> Practical and implementation of farmer's activities planning</p> <ul style="list-style-type: none"> <li>➤ Practical</li> <li>➤ Implementation of Farmer's activities planning</li> </ul>	<p>Direct participation of farmers</p>

**Module title: Post-stocking management and Human nutrition: Fish harvesting, marketing, nutritional value of small fishes, dike cropping management, complementary feeding and caring of women health**

**Training facilitation materials and practical**

**The list of field based using real materials, practical and dummy practical**

Session title	Real materials to use in training		
	Real materials supplied from the Project	Real materials supplied from staffs	Practical and dummy practical
<p><b>Session 14 (Old 13):</b> Partial harvesting, restocking and complete harvesting</p> <p><b>Session 15 (Old 14):</b> Fish marketing, cost-benefit analysis and year calendar of fish culture activities</p> <p>Session- 16 (Old 17): Dike cropping, production season, seed bed preparation, fertilizer management in seed bed and compost preparation method</p> <p>Session- 17 (Old 21): Culture method of sweet orange potato and nutritional value</p> <p>Session- 18 (Old 18): Crop management, disease protection and crop marketing, preservation for household consumption, cropping calendar, income and expenditure account.</p> <p><b>Session 19 (Old 16):</b> Nutrition and caring of pregnant women,</p>	<p>1. Hock board 2. Pictures of hock board 3. Flip chart 4. Separate picture of different fish culture activities (Sticker) 5. Season wise pictures 6. Food card set and 7. VIPP cards</p> <p>8. Measuring tape, 9.Urea, 10. TSP, 11. MoP fertilizer, 12. Copper-sulphate, 13. Borax, 14. Food card.</p>	<p>1. Styrofoam/ stem of water hyacinth 2. Bucket/ dish (Plastic) 3. Playing cards regarding fish culture related expenses</p> <p>4. Bad and good seed/saplings of vegetables, 5. Organic fertilizer, 6. Spade, 4. Water hyacinth/creepers and leaf, 7. Ash, 8. Sample of disease affected vegetables/leaf, 9. Lime, 10. Stanchion/stick 11. Net for making platform, 12. Rice straw or dry hyacinth 13.Yarn, 14. Margosa (Neem) leaf, 15. Bark of neem tree, 16. Water 17. Detergent powder 18. Lime, 19. Sample fence 20. Pot made of plastic or mud 21. Bamboo sticks 22.Pumpkin 23. Savin 24. Bowl (250ml) 25.</p>	<p>1. Partial harvesting and restocking dummy practical activity</p> <p>2. Drama/ role play of fish harvesting and marketing</p> <p>3. Cost-benefit records keeping through memory game</p> <p>4. Showing cost benefit analysis of carp ploy culture in 10 decimal pond</p> <p>5. Women's nutrition and caring related game using VIPP cards</p> <p>6. Characteristics to identify good seed and make known practically, 7. Practical work for making ideal seed bed 8. Seed preparation before sowing, practical of seed sowing/sapling planting process 9. Practical of artificial pollination, 10. Dummy practical for making neem-mixer as organic pesticide 11.</p>

<p>postpartum lactation/lactating mother</p> <p>Session- 20 (Old 19):Complementary feeding</p> <p>Session 21 (Old 22): Importance of hand wash, steps and use of tippy tap</p>		<p>Different type of food ingredients.</p>	<p>Practical of bordey-mixer making 12. Group work through group work 13. Practical about complementary for children (225ml bowl and food smashing process)</p>
<p><b>Special Session:</b> Practical and implementation planning of farmers activities</p>	<p>1. Art line 2. Sign pen 3. Brown paper 4. Scale 5. Hard clip 6. Cord etc.</p>		<p>Through practical and directly farmer's participation</p>

## **Session 14 (old 13)**

**Day : Fifth**

**Time: 9:00-9:30**

**Duration: 30 Minutes**

**Title** : **Partial harvesting & re-stocking and complete harvesting**

**Group** : Household fish farmers

**Goals** : To give the practical knowledge to the farmers on partial harvesting, restocking and complete harvesting, so that they will be able to apply those knowledge efficiently.

**Objectives** : After the end of this session the farmers will be able to explain and apply a) Partial harvesting of fish b) Importance of partial harvesting c) Consideration and precautions of partial harvesting d) Restocking and its importance e) Rules, methods and considerations of restocking f) complete harvesting and g) Methods of complete harvesting

**Introduction** : 1. Greeting and introduction  
2. Review of last session  
3. Participation in farmer's evaluation  
4. Briefly mention the goals and objectives of the current session  
5. Focusing on the current session

**Topics** : 1. Partial harvesting and its importance (Questioning and answering, flip chart, picture presentation using hock board and dummy practical)  
2. The marketable size and weight of fishes during partial harvesting (Hock board picture presentation and dummy practical )  
3. Suitable time for fish partial harvesting and its methods (Questioning and answering and hock board )

4. The consideration during partial harvesting (Questioning and answering and participatory discussions)
5. Precaution for partial harvesting (Questioning and answering and participatory discussions)
6. Restocking and its importance (Questioning and answering, participatory discussions and dummy practical)
7. The considerations for restocking (Questioning and answering and participatory discussions)
8. The objectives and methods of complete harvesting (Questioning and answering and participatory discussions)

- Conclusion** :
1. Review briefly the previous discussions (Questioning and answering and participatory discussions)
  2. Overview the objectives (Questioning and answering and feedback)
  3. Linkage with next sessions

**Training materials:** Hock board, hock board pictures, flip chart, brown paper, bucket/ plastic dishes, Styrofoam/ stem of water hyacinth (3 sizes), art line, sign pen, scale, hard clip, cord etc.

### Session Method

<b>Partial Harvesting</b>	<b>Technique: Questioning and answering, participatory discussion through hock board presentation and dummy practical</b>	<b>Time: 15 minutes</b>
---------------------------	---	-------------------------

#### Working method:

- The facilitator will first thank and welcome everybody. The facilitator will try to know the farmer's present technical knowledge through participatory way and will assess it. He will write down the present situation. That will help to compare after the end of the training.
- **What are partial harvest and the importance of partial harvesting?** The facilitator will try to ask to the farmers first. Then he will show hock board pictures and flip chart and will try to convey the concept of partial harvesting through participatory approach to the farmers.
- After that the facilitator will use 3 plastic dishes. Among them he will put small sized Styrofoam/ water hyacinth stem in one dish, same numbered but medium sized in the 2<sup>nd</sup> dish and biggest sized in the 3<sup>rd</sup> dish. Through this dummy practical the facilitator will try to explain that how biomass is increased due to increasing the size of fishes and consequently space is reducing and different types of problems will arise as density is increasing. Thus the facilitator will try to let them understand the importance of partial harvesting.
- What will be the **marketable size and weight during partial harvesting**? Meaning, what will be the species wise marketable size? The facilitator will ask to the farmers first and later he will explain showing pictures from the hock board.
- **What will be the suitable time and the methods for partial harvesting?** The facilitator will try to know the opinion from the farmers first and later he will explain the process through participatory way and showing the pictures from the hock board.
- **What will be the considerations and precautions during partial harvesting?** First the facilitator will try to know from the farmers and later he will try to let them understand through participatory way and will show the pictures from the hock board.
- At last the facilitator will review and evaluate orally the whole process showing the hock board pictures.

Restocking and complete Harvesting (6-8)	Technique: Questioning and answering, participatory discussion through hock board presentation and dummy practical	Time: 15 minutes
--	--	------------------

**Working method:**

- **What is restocking?** The facilitator will ask first and then he will let the farmers know through participatory approaches.
- **What is the importance of restocking and the considerable things?** The facilitator will ask the farmers first and later he will try to let them understand through participatory way and showing the pictures from the hock board (the facilitator has to show how fish biomass is reduced due to partial harvesting, culture space is increased and he will also has to explain the restocking number as like the same amount of harvesting or 10-15 % more keeping Styrofoam/ water hyacinth into plastic pot).
- **What is the complete harvesting? The objectives of complete harvesting and the methods and suitable time of complete harvesting?** First the facilitator will try to know asking the farmers and later he will try to let them understand through participatory way and showing the pictures from the hock board.
- At last the facilitator will review and assess orally the whole process showing the hock board pictures.

## Handout

### Partial harvesting & restocking and complete harvesting

**1. Partial harvesting and its importance:** Some fishes grow faster and attain marketable size within the 5-6 months after stocking in pond. Such as silver carp, bighead carp, carp, mirror carp, grass carp, thai sarpunti etc. Sometimes to catch the bigger sized fish using big seine net is called partial harvesting. If relatively bigger sized fishes are harvested to eat or sell then the benefits can be achieved:

- ⇒ Remaining small fishes will have the chance to eat well,
- ⇒ Small fishes will have chance to grow faster
- ⇒ The fish mortality risk will be reduced
- ⇒ Less chance for pouching
- ⇒ The loss due to flooding will be reduced
- ⇒ Farmers can get money to buy fertilizer and supplementary feed if they sell partially sometimes. Overall the pond production will be increased.

### 2. The marketable weight during the partial harvesting

Fish Name	Silver carp and catla	Rohu	Mrigel	Common carp/ mirror carp	Grass carp	Thai Puntl	Thai Pangas	Tilapia	Thai koi	Vietnamese koi
Marketable weight	>750 g	>500 g	>350 g	>750 g	>800 g	>150-250 g	>750 g	>150-250 g	>80-100 g	>150-250 g

**3. Partial harvesting time and techniques:** It is better to harvest partially 2-3 times in every season. But in case of commercially tilapia culture and Vietnamese/Thai koi culture partial harvesting is not done. Fish should be harvested during the morning or evening time when temperature is less. Fish should not be harvested during the excess hot and cloudy day.

- **Fish harvesting technique:** For partial harvesting seine net is used for large pond and cast net is used for small pond. Before using the cast net little bit of feed can be used in the target place then maximum catching is possible.

**4. General consideration during the partial harvesting:** The most important things should consider during the partial harvesting are-

- ⇒ **Market price:** It is profitable when the fish price is high in the local market. Such as- during local ceremony, festival, fair and Ramadan period the fish price is higher. During the October

when the marine fish like Ilish is available then the pond fish price becomes lower. That's why partial harvesting is not interesting during that time.

- ⇒ **Size and weight of the fish:** If fish is marketable size then it should be harvested, so that consumer demand will be higher and will get more benefit
- ⇒ **Availability of seed/fry:** If fish is harvested partially then same amount of fish should be restocked. So, partial harvesting should be carried out only when the seed/fry is available to restock.

#### **5. Carefulness during the partial harvesting:**

- ⇒ Fish should be kept in shaded place after harvesting
- ⇒ Fish should not be handled rough and too much
- ⇒ Fish should be washed with clean water and should remove all types of dirty materials including the mud
- ⇒ The harvested fish should not be damaged and the scale should adhere tightly
- ⇒ Fish should be sold immediately after harvesting and if it is possible to sell the fishes live then maximum profit can be achieved.

#### **6. Restocking and its importance:**

- ❖ According to the stocking ratio and density the same amount and same species should be restocked after partial harvesting. If possible then 10-15% fishes should be restocked more. Because some fishes can be died after re-stocking.
- ❖ If 100 silver carp fish is harvested then 100 silver carp must have to restocked, along with 10-15 fingerling should be restocked more, meaning if 100 fish is harvested then 110 or 115 fishes should be restocked.

**Importance of restocking:** To achieve more production and to earn more benefit and to ensure maximum utilization of a pond restocking is essential.

#### **7. The considering things during the restocking:**

- ⇒ Comparatively bigger sized fishes should be restocked (5-6 inches)
- ⇒ The same species should be restocked what will be harvested
- ⇒ Weak and diseased fish should not be restocked

#### **8. The objectives of complete harvesting and its techniques:**

**Complete harvesting:** To harvest fishes fully for eating or for selling is called complete harvesting.

**The objectives:** Normally after the end of culture cycle the fishes are harvested completely to earn money, to exchange the pond water and to renovate the pond dike and to accomplish the pre-stocking activities accurately. It is possible to calculate the cost benefit analysis and it becomes easy to take the next year culture planning through the complete harvesting.

**The techniques of complete harvesting:** To culture fish in profitable way, it is essential to harvest the whole fish at right time maintaining appropriate technique. If complete harvesting is done mainly

from the end of February to April then it will be helpful to accomplish the pre-stocking activities for the next year. For complete harvesting in the household pond the following activities are taken-

- a) Pond drying and b) Using seine net

## Session 15 (Old14)

**Day : Fifth**

**Time: 9:30-10:15**

**Duration: 45 Minutes**

**Title** : Marketing of fish, income and expenditure account and yearly calendar of fish culture activities

**Group** : Household fish farmers

**Goals** : To give the practical knowledge to the farmers on fish marketing, cost-benefit analysis and seasonal calendar of fish culture activities, so that they will be able to apply those knowledge efficiently

**Objectives** : After the end of this session the farmers will be able to explain and apply a) Fish marketing b) Cost- benefit analysis of fish culture c) Data collection and preservation d) Seasonal calendar of fish culture activities

**Introduction** : 1. Review of last session  
2. Brief the goals and objectives of the current session  
3. Focusing on the current session

**Topics** : 1. Fish marketing (Hock board presentation and role play).  
2. Importance and justification to keep the cost benefit records (questioning and answering, remember game and participation)  
3. The items to collect the data and preserve it, the place where to keep the data and cost benefit analysis (questioning and answering and group work)  
4. Cost benefit analysis from a carp polyculture 10 decimal pond (questioning and answering, group work and brown paper writing)  
5. Cost benefit analysis from a Tilapia monosex and carp polyculture 10 decimal pond (questioning and answering, group work and brown paper writing)  
6. Cost benefit analysis from a Pangus and carp polyculture 10 decimal pond (questioning and

answering, group work and brown paper writing

7. Seasonal calendar of different activities from a carp polyculture

- Conclusion** :
1. Review briefly the previous discussions (questioning and answering and participatory discussions)
  2. Overview the objectives (Asking questions and feedback)
  3. Linkage with next sessions

**Training materials:** Hock board, hock board pictures, different types of fish culture activities pictures (Sticker), season wise picture, picture of small indigenous fishes, brown paper, play card of fish culture cost benefit records, bucket/ plastic dishes, Styrofoam/ stem of water hyacinth (3 sizes), art line, sign pen, scale, hard clip, gum cord etc.

### **Session Method**

<b>Fish Marketing (1-2)</b>	<b>Technique: Questioning and answering, participatory discussion through hock board presentation and role play</b>	<b>Time: 15 minutes</b>
-----------------------------	---	-------------------------

#### **Working method:**

- ⇒ Facilitator (EF/FS) will thank to everybody first before starting this session and will request everybody to listen calm and to take participate in the discussion.
- ⇒ In this session facilitator will invite some participants who will play a role on fish marketing
- ⇒ In the fish marketing role play one farmer will collect all the inputs (lime, fertilizer and fish feed) from a input seller and will apply to his pond. After growing the enough natural feed in the pond water, the farmer will stock the necessary fish seed collecting from one fish nursery and will feed his fish collecting fish feed from a feed seller. As a result some fishes will attain marketable size. So the farmer will hire some fishermen and simultaneously will invite the Paiker (fish buyer) to his farm. After harvesting the Paiker will negotiate the fish price to buy. Finally the Paiker will sell fish to the consumer.
- ⇒ After finishing the role play, the facilitator will ask to the participants what the lessons are. The facilitator will take the note accordingly the participant's opinions and will also share the actual idea showing the hook board pictures.
- ⇒ At last the facilitator will review the role play activities and evaluate it using hook board presentation through the active participation.

⇒

<b>Cost-benefit analysis of fish culture (3-7)</b>	<b>Technique: Questioning and answering, remind game and group work participation</b>	<b>Time: 15 minutes</b>
--	---	-------------------------

### **Working method:**

- ⇒ Facilitator (EF/FS) will thank to everybody first before starting this session and will request everybody to listen calm and to take participate in the discussion.
- ⇒ The facilitator will ask the farmers-what are the reasons to keep the records of cost benefit? Data collection and recording, place and time for calculation and what are the cost benefit topics? After this the facilitator will read the different fish culture activities written on the 15-18 VIPP cards, he will ask and write down the probable costs needed for each activity and finally he will keep all the VIPP cards to him. After finishing mentioning the name and cost of every activities the facilitator will ask the activity name and its cost from the 5<sup>th</sup> VIPP card. Again ask what the activity was in the VIPP card no 8 and its cost. Thus the facilitator will ask arbitrarily from different VIPP cards, but the participants won't be able to answer. Then the facilitator will read the activities sequentially and will mention its price as well and will tell the participants if they were written down the activities and cost then they won't forget. Thus the facilitator will inspire them to keep the record and will show the importance of record keeping. At this stage the facilitator will invite the participants to make a cost benefit analysis through work.
- ⇒ Then the facilitator will divide the farmers into 3 groups and will give the name of each group. The group name will be a. pre-stocking and stocking activities group, b. post stocking activities group and c. fish harvesting and marketing activities group. The group wise activities should be fixed before. After this the facilitator will mix up all the pictures and will tell the farmers to collect the pictures according to their activities. The farmers will stick the pictures on the brown paper in order and will put the cost in the cost table in respect of each work and will summarize all the prices.
- ⇒ Then the group leaders from each group will present it.
- ⇒ To finish this session the facilitator will invite one farmer to deduct expense from the income and to calculate the benefit.
- ⇒ The facilitator will present the cost-benefit analysis of premeditated 3 posters on carp polyculture in pond, monosex tilapia-carp polyculture and pangus-carp polyculture from 10 decimal pond.
- ⇒ At last he facilitator will review and evaluate through participation of the farmers.

<b>Seasonal calendar of fish culture activities (8)</b>	<b>Technique: Question and answer, farmers participation to prepare a calendar</b>	<b>Time: 15 minutes</b>
---	--	-------------------------

**Working method:**

- ⇒ The facilitator will ask the farmers what the year calendar of carp fish culture is and how it has to be made. The farmers will answer indiscriminately. The facilitator will listen carefully and will ask everybody to participate to prepare a year round activity calendar of carp fish culture.
- ⇒ The facilitator will ask the farmers how many months comprise a year, and what the seasons are. Then the facilitator will show different picture of different seasons and will ask to the farmers what are those.
- ⇒ Then the facilitator will use a brown paper where he will stick the seasonal pictures with glue. Then each group will stick their activities beside each season's picture. To indicate the time frame the farmers will use the white papers and will stick on the brown paper. The facilitator will use on farmer and he will be careful to finish this work efficiently.
- ⇒ The facilitator will ask another farmer to present this brown paper
- ⇒ Finally the whole process will be reviewed and evaluate through participatory way

## Handout

---

---

Marketing of fish, income and expenditure account and yearly calendar of fish culture activities

**1. Fish marketing:** According to Philip Kotlar, “to earn money ensuring the consumer’s maximum satisfaction is called marketing”. To fulfill the consumer’s necessity and demand the series of activities are taken from fish production to the consumer level and consumption or some activities after the consumption is called fish marketing.

**2. Justification of data collection and cost benefit record keeping:**

- a. For any business the buy and sell records have to keep. From this it is easy to detect the benefit or loss. If we consider the fish culture is a business then we have to keep the production and sell records as well to measure the benefits.
- b. If it is kept the entire buying and selling record then it becomes easy to make plan and manage the fish culture.

**3. The things for data collection and record keeping:**

- ⇒ Pond leasing or hiring cost
- ⇒ Pond preparation/ renovation and maintenance
- ⇒ Fish seed collection/ purchase cost
- ⇒ Fish feed, feed ingredients, lime, fertilizer, medicine, fish catching tools/equipments etc purchase cost, fish harvesting and marketing cost
- ⇒ Transport cost
- ⇒ Daily labour cost
- ⇒ Permanent labour cost
- ⇒ Other machineries and tools purchase cost
- ⇒ Electricity/fuel cost

**Time and place to keep record:** All the entire activity costs from the pond preparation up to the marketing should be recorded along with the date in the record book. After starting to sell the fishes date wise no of fishes sell, its weight, its price, total cost etc should be recorded.

**Cost benefits analysis:** After one year all the sells value should be added together. Then if the total cost is deducted from the total sell then the net benefits will be found.

**For marketing four points should be considered, such as-**

- ⇒ Product
- ⇒ Price
- ⇒ Place
- ⇒ Promotion

**4. The cost-benefit analysis of carp polyculture (Culture period: 8-9 months)**

SI No	Items	Amount (Kg)	Price (Tk)	Total Taka
<b>A</b>	<b>Pond preparation</b>			
1	Pond excavation and renovation (Farmer and 1 labour)	1	300	300
2	Liming (1 kg/dec)	10	18	180
3	Urea (150 g/dec)	1.5	20	30
4	TSP (75 g/dec)	0.75	26	20
5	Cowdung (6 kg/dec)	60	1.5	90
<b>B</b>	<b>Fry stocking (Example 2)</b>			
6	Fry cost (66 pc/dec)	660	3	1,980
<b>C</b>	<b>Post stocking management</b>			
7	Liming (0.3 kg/dec -2 times)	6	18	108
8	urea (150 g/dec/wk)	18	20	360
9	TSP (75 g/dec/wk)	9	26	234
10	Cowdung (1 kg/dec/wk)	240	1.5	360
<b>D</b>	<b>Supplementary feeding (4% of body weight)</b>			
11	Rice bran (30%)	54	8	432
12	Master oil cake (40%)	72	30	2,160
13	Fish meal/trash fish (10%)	18	35	630
14	Wheat bran (20%)	36	26	936
15	Sinking pellet feed	75	32	2,400
<b>E</b>	<b>Other</b>			
16	Harvesting cost (partial)	2	250	500
17	Pond hiring (farmer's own pond)	0	0	0
18	Marketing	1	300	300
19	Labour (Own)	0	0	0
<b>F</b>	<b>Total cost</b>			<b>11,020</b>
<b>G</b>	<b>Carp production (14 kg/dec)</b>	140	150	<b>21,000</b>
<b>H</b>	<b>Net profit (G-F)</b>			<b>9,980</b>

**5. The cost-benefit analysis of Tilapia-carp polyculture from 10 decimal pond (Culture period: 4-5 months)**

Sl No	Items	Amount (Kg)	Price (Tk)	Total Taka
<b>A</b>	<b>Pond preparation</b>			
1	Pond excavation and renovation (Farmer and 1 labour)	1	300	300
2	Liming (1 kg/dec)	10	18	180
3	Urea (150 g/dec)	1.5	20	30
4	TSP (75 g/dec)	0.75	26	20
5	Cowdung (6 kg/dec)	60	1.5	90
<b>B</b>	<b>Fry stocking (Example 3)</b>			
6	Monosex Tilapia (80 pc/dec)	660	2	1,600
7	Silver, Catla and Mrigel (10 pc/dec)		3	300
<b>C</b>	<b>Post stocking management</b>			
8	Liming (0.3 kg/dec -2 times)	6	18	54
9	urea (150 g/dec/wk)	18	20	420
10	TSP (75 g/dec/wk)	9	26	273
11	Cowdung (1 kg/dec/wk)	240	1.5	240
<b>D</b>	<b>Supplementary feeding (4% of body weight)</b>			
12	Rice bran (30%)	54	8	432
13	Master oil cake (40%)	72	30	2,160
14	Fish meal/trash fish (10%)	18	35	630
15	Wheat bran (20%)	36	26	936
16	Floating pellet feed	75	40	2,000
<b>E</b>	<b>Other</b>			
17	Feeding and buying		1	300
18	Pond hiring (farmer's own pond)	0	0	0
19	Harvesting cost (partial)	2	1	300
20	Labour (Own)	0	0	0
<b>F</b>	<b>Total cost</b>			<b>10,265</b>
21	Monosex tilapia production (16 kg/dec)	160	100	16,000
22	White fish production (3 kg/dec)	30	150	4,500
<b>H</b>	<b>Net profit</b>			<b>10,235</b>

**6. The cost-benefit analysis of Pangas-carp polyculture from 10 decimal pond (Culture period: 4-5 months)**

Sl No	Items	Amount (Kg)	Price (Tk)	Total Taka
<b>A</b>	<b>Pond preparation</b>			
1	Pond excavation and renovation (Farmer and 1 labour)	1	300	300
2	Liming (1 kg/dec)	10	18	180
3	Urea (150 g/dec)	1.5	20	30
4	TSP (75 g/dec)	0.75	26	20
5	Cowdung (6 kg/dec)	60	1.5	90
<b>B</b>	<b>Fry stocking (Example 3)</b>			
6	Pangas (25 pc/dec)	660	6	1,500
7	Whitefish (25 pc/dec)		3	750
<b>C</b>	<b>Post stocking management</b>			
8	Liming (0.3 kg/dec -2 times)	6	18	54
9	urea (150 g/dec/wk)	18	20	420
10	TSP (75 g/dec/wk)	9	26	273
<b>D</b>	<b>Supplementary feeding (4% of body weight)</b>			
12	Rice bran (30%)	54	8	480
13	Master oil cake (40%)	72	30	2,460
14	Fish meal/trash fish (10%)	18	35	700
15	Wheat bran (20%)	36	26	1,040
16	Floating pellet feed	75	40	3,000
<b>E</b>	<b>Other</b>			
17	Feeding and buying		500	500
18	Pond hiring (farmer's own pond)	0	0	0
19	Harvesting cost (partial)	2	300	300
20	Labour (Own)	0	0	0
<b>F</b>	<b>Total cost</b>			<b>12,037</b>
21	Pangas production (15 kg/dec)	150	100	15,000
22	White fish production (8 kg/dec)	80	100	8,000
<b>H</b>	<b>Net profit</b>			<b>10,963</b>

## Session 15

<b>Day : Sixth</b>	<b>Time: 9.00-9.40</b>	<b>Duration: 40 minutes</b>
--------------------	------------------------	-----------------------------

**Title:** Dike cropping, production season, making seed bed, fertilizer management in seed bed and compost making method

**Target group:** Household fish farmers

**Goal:** Provide knowledge to trainees about dike cropping, production season, making seed bed, fertilizer management in seed bed and compost making method; so that they become able to know technologies about the mentioned subjects.

**Objectives:** At the end of the session trainees will be able to say in details about (a) dike cropping and its importance (b) summer and winter vegetables (c) way to identify good seed (d) making seed bed (e) Fertilizer application process in seed bed and (f) compost making method and will be able to demonstrate.

**Introduction:** 1. Exchange of greetings

2. Review on previous session

3. Describe goal and objectives of the current session

4. Participation at farmer's evaluation session

5. Focus on the current session.

**Subject matter:** 1. Dike cropping and its importance (Question and answer and participatory discussion through exhibiting hook board picture).

2. Production season of vegetable and identification of variety and way to identify good seed (question and answer, practical material show, participatory discussion and practical)

3. Making of ideal seed bed for different vegetables and production technique (participatory discussion and practical)

4. Seed preparation before sowing and seed sowing/sapling planting process (question and answer, practical material show, participatory discussion and practical)

5. Fertilizer management before sowing seed in seed bed (Question and answer, practical materials and participatory discussion through exhibiting hook board picture).

6. Compost making method (Question and answer, participatory discussion through exhibiting hook board picture)

**Summary:** 1. Review on main subjects (Question and answer and hook board picture show)

2. Determine objective of the session (question and answer)

3. Establish link with the next session.

**Training supportive materials:** Hook board, hook board picture, different seeds and saplings cultivable on the dike, measuring tape, spade, urea, TSP, MPO, creeper and leaf/water hyacinth, ash, cow dung fertilizer/compost, hard clip, brown paper, marker etc.

**Session method**

<b>Dike cropping and its importance (1)</b>	<b>Technique: Question and answer, participatory discussion through exhibiting hook board picture</b>	<b>Time: 5 minutes</b>
---	---	------------------------

**Working Method:**

- In the beginning the facilitator will thank farmers and will ask about their well-being. The facilitator will ask questions to farmers—what is dike cropping? What vegetables can be cultivated on dike? What is the importance of dike cropping?
- The facilitator will listen to the answers of the farmers attentively and will discuss in a participatory process about how to cultivate vegetables on dike through exhibiting hook board pictures.
- The facilitator will explain the importance of vegetation through question and answer and participatory discussion.
- In the end he/she will review the pictures shown on the hook board in a participatory process and will make an oral evaluation.

<b>Season of vegetable cultivation, introduction of varieties, way to identify good seed, making of ideal seed bed and production technique (2-3)</b>	<b>Technique: Question and answer, participatory discussion through exhibiting hook board picture, participatory practical work and practical materials show.</b>	<b>Time: 15 minutes</b>
---	---	-------------------------

**Working method:**

- The facilitator will question farmers—what are the seasons of vegetation, what are the varieties of vegetables cultivable on dike, what is the way to identify good seed, and will listen to their answers attentively.
- Then the facilitator will explain the subjects in an understandable way in a participatory discussion through showing hook board pictures.
- Supplying good and bad seed to the farmers, the facilitator will want to know the characteristics of good and bad seed and will make it practical for the farmers to identify good and bad seed.
- Then the facilitator will want to know in a beautiful composing way—how to make ideal seed beds for different vegetables, what can be the cultivation techniques of different vegetables. Then the facilitator will discuss in a participatory process more definitively about making and measurement process of ideal seed bed for water gourd, pumpkin, country bean, cucumber, bitter melon, snake/tube gourd through showing hook board pictures.
- The facilitator will show the making process of an ideal seed bed measuring by measurement tape or by hand and using a spade and will make ideal seed bed with the farmers.

Session-16 (Old 17)

**Session method**

Preparation before sowing seed, sowing and sapling planting process (4)	Technique: Question and answer, participatory discussion, practical materials show and practical	Time—5 minutes
---	--	----------------

**Working method:**

- At first the facilitator will thanks to farmers for listening to previous discussion with patience and will invite them to participate actively in this session.
- Then the facilitator will want to know from farmers-- how to take preparation before sowing seed? What will be the process of sowing seed/planting sapling?
- Facilitator will listen to farmer’s answers attentively and will discuss in a participatory process.
- He/she will show seed prepared beforehand for showing how to prepare seed before sowing and will make them understood practically.
- He/she will show practically how to sow prepared seed by sowing seed in seed bed made in the training. If the seed is sown through training then it will have to preserve to show all activities from sapling to fruit bearing in that seed bed and will have to bestow the responsibility of taking care upon the relevant farmer.
- In the end he/she will review on the subject and will make oral evaluation in a participatory process.

Fertilizer management in seed bed before sowing seed and compost making method (5-6)	Question and answer, hook board picture show and participatory discussion through using practical materials	Time: 15 minutes
--	---	------------------

**Working method:**

- The facilitator will question to farmers—what is fertilizer management in seed bed before sowing seed? And will ask some more relevant question, such as—what fertilizers will have to apply? How to apply? What will be the amount? Etc. Facilitator will listen to answers from farmers attentively and discuss on it in a participatory way through showing different pictures of fertilizer on hook board.
- Afterwards the facilitator will ask—what is compost? How to make compost? What is the usefulness of compost using? Etc. Facilitator will listen to answers attentively and will show pictures of different ingredients of making compost on hook board and will make them informed in details on those subjects through participatory discussion.
- The facilitator will discuss on the subject of fertilizer application in participatory process.
- Then he/she will show sample of each of the fertilizer (Urea, TSP) to make them known different fertilizer practically and will make them learn to identify good and impure fertilizer with active participation of farmers. And will encourage farmers so that they do not buy impure fertilizer.
- In the end he/she will review on pictures exhibited on hook board in participatory process and will make an oral evaluation.

## Handout

### Dike cropping, growing season, making seed bed and fertilizer management in seed bed

**1. Dike cropping:** To tell dike cropping means vegetation on the bank or slope of pond. Generally there is no harm of fish due to vegetation on dike; in preference extra income is possible from vegetable production on dike or slop of the bank of pond.

**Importance of dike cropping:**

- Extra income is received
- Proper use of fallen land take place if there is dike cropping
- It possible to reduce economical loss a bit through another crop if one crop is affected for any reason.
- Vegetable provides a lot of vitamin-A
- Young leaves of vegetable can be used as fish feed and the surplus can be used in compost making.
- Risk of stealing fish reduces for making stage surrounding the pond.

**2. Vegetable cultivation season and introduction of varieties:** Vegetable cultivation seasons can divide into two parts; such as –

**a) Summer season:** This season is from 2<sup>nd</sup> Chaitra (Bangle calendar) or 16<sup>th</sup> March to 30<sup>th</sup> Kartic or 15<sup>th</sup> October. This season is also known as Kharif season. Summer vegetables—Bitter guard, tube guard, thatch roof guard, snake guard, Besella Alba, data potherb, cucumber, egg plant, ladies finger, yard long bean etc.

**b) Winter season:** Extension of this season is from 1<sup>st</sup> Augrahasan or 16 October to 1<sup>st</sup> Chaitra or 15<sup>th</sup> March. This season is also called as Rabi season. Winter vegetables are—Water guard, country bean, radish, spinach, cauliflower, cabbage, turnip etc.

Name of vegetable	Time of sowing seed	High-breed	High yielding
Water guard	Mainly winter vegetable Summer: Sravana-kartic Winter: Paus- Magh	Martina, High-green	BARI Lau-1, BARI Lau-2, Te Lau
Bean	Summer: Asadr-Kartic Winter: Baishakha- Bhadra		BARI Sim, Epsa-1, Epsa-2, Mayabi gadda
Bitter guard	Summer: Falgun-Jaistha	Tia, green arrow	BARI Korola-1, gaj korola
Tube guard	Summer: Falgun-Jaistha	Surma	Dhaka-Green, Tista
Cucumber	Summer: Magh-Chaitra	Alvi, Dynasty	Baramashi, Seela
Ladies finger	Summer: Falgun-Bhadra	Sylvia-5, Lucky-7	BARI Dheras-1, Arka Anamika.OK-285,Choice, Green finger
Pumpkin	Summer: Sravana-Kartica	Sweetie	Baramashi, Ausha
Thatch guard	Winter: Pous-Magh Summer: Falgun-Jaistha	Jupiter-1,Polester, Thai Express, Green gold	BARI Chal kumra-1, Duranta, Durbar
Red potherb	Mainly winter but cultivable for round the year		BARI Lal shak-1, Altapeti-20, Lolita, Raktaronga, Pinky queen, Raktalal
Bessela Alba	Summer: Falgun-Jaistha		Madhuri, Monisha
Egg Plant	Mainly winter but cultivable for round the year	Laboni, Sravani, Banani	Uttra, Islampuri, Singnath-666, Eva, Kajla, khatkhatia.

## Handout

---

**Way to identify good seed:** Seed is an important ingredient for crop production. One of the main reasons for fewer crops is use of low quality seed. Production can be increased up to 10-15% only by using good seed.

Good seed means quality seed. Good seed is—

- Free from mixing with other seed and clear
- Will not be worm-eaten and will be free from disease
- The grain will be big, nourished and of same size.
- Will be bright and glittering.
- Pure
- There will be a hard sound while gripping with the teeth.
- And overall the germination power will be more than 70-80 %.
- Will be from reputed company or from known farmer.
- Packet is done properly.

### 3. Making of ideal seed bed for different vegetables and growing technique:

**Growing technique of Water guard and Country bean:** Growing water guard, thatch guard and country bean on the dike as winter vegetable is more profitable. 1 hand long 1 hand wide and 1 fisted hand deep seed bed successively after 4 hands will have to make for thatch guard and water guard on the dike. For country bean 1 fisted hand long, wide and depth seed bed will have to make successively after 2 hands.

**Growing technique of Bitter guard, Tube guard, Cucumber, Ladies finger and Pumpkin:** Bitter guard and tube guard are cultivated as summer vegetable. 1 hand long 1 hand wide and 1 fisted hand deep seed bed will have to make on the dike successively 3 hands. Else, Pumpkin can be cultivated at any season of the year, i.e. both in kharip and in rabi season. Seed bed for pumpkin will be same as water guard and seed bed for cucumber and ladies finger will be the same as country bean.

Mentionable that, 3-4 sound and strong seeds will have to sow in each seed bed . And after germination no more than 2 saplings should keep in each seed bed.

### Considerable subjects for making ideal vegetable seed bed:

- Seed bed should be made in such a place where there is sunlight and flow of wind.
- The height of the seed bed will have to make at last 1 hand high from the surface so that water cannot collect at the bottom of tree during rainy season.
- The soil of seed bed will have to make at surface level in the winter. Seed bed will have to make one week before sowing seed.

**4. Preparation before sowing seed:** Seeds will have to dry under sun for 2-3 hours after opening the packet. Then after make it cool for 2-3 hours seeds will have to wet into water up to 12-14 hours according to variety of seed. Then seeds will have to make dry by placing in a shadowy place so that there is no water on the seeds.

### Techniques of sowing seed/planting sapling:

- Embryo of seed (usually the thin end) always will have to keep downward.
- Seed will have to sow twice depth of the size of seed.
- Sapling grown in poly-bag will have to plant by tearing up the poly-bag.
- Irrigation will have to arrange through considering watery state of soil after sowing seed/planting tree.

## Handout

### 5. Fertilizer management in seed bed before sowing seed

Fertilizer management at each seed bed of water guard and pumpkin

Name of fertilizer	Organic fertilizer	TSP	MPO	Boron/Borax	Gypsum	Zinc
Amount of fertilizer	5-10 kg	100gm or 2 fist full	50gm or 1 fist full	15gm or 3-4 pinch	15gm or 2-3 pinch	15gm or 2-3 pinch

Mentionable that, half of the mentioned amount of fertilizer will have to apply for the management of country bean, ladies finger, cucumber, bitter guard and tube guard seed bed.

### 6. Compost making method:

- Compost can make by digging hole or as a heap
- A hole of 6 feet long, 4 feet width and 3 feet deep will have to dig by selecting a semi shadow high place close to the house.
- It is better to cover the bottom and walls by a polythene paper; or will have to make a coating of cow dung.
- A layer of more than one foot of water hyacinth/ leftover of vegetable cutting into small pieces will have to spread at the bottom of the hole and one fist full of urea and one fist full of TSP will have to scatter on it. Then the first layer will have to be done by adding 1 inch of ash and 1 inch of cow dung on it. A few layers will have to place one after another up to fulfill the hole.
- It is better to add a mixer of half a foot of good quality loose soil and cow dung at the top most layers.
- When decoration of layers is complete then the face of the hole will have to cover up by placing soil on it (for rainy season)
- The heap of the compost will have to cover by a shade so that it can be saved from rain water.
- A stick will have to push into the middle of the heap after 12-14 days. If it is felt hot enough then it will have to understand that the compost making process have been going on properly.
- Afterwards ingredients of the heap will have to make upside down once a week.
- Within 3-4 weeks compost will be made like fertile black soil.
- Compost can be made with heap method by decorating layers as the same way.

### Benefit of use of compost:

- It increases quality of soil and increases its fertility power.
- Increase water keeping capacity of soil.
- Increase frequency of air in the soil which observe supportive role to increase the activities of beneficial bacterium.
- Helps to lessen soil suitability created due to use of excessive chemical fertilizer and pesticide.
- No harm of soil is done even if excessive compost is used.

### Session-17 (old 21)

Day: 7<sup>th</sup>

Time: 10:00-10:30 am

Duration: 30 min

**Title: culture method of orange sweet potato and nutrition value**

**Target group:** household fish farmers

**Aims:** to provide proper knowledge on culture method of orange sweet potato and nutrition value; so that they can be able to know technical method of that matters.

**Objectives:** at the end of the session trainee can know and speak details about (i) culture method of orange sweet potato and (ii) nutrition value of orange sweet potato

**Introduction:**

1. Re-discussion of previous session.
2. Participate in the session of farmers' assessment.
3. Describes aims and objectives of current session.
4. Discussion on current session.

**Subjects:**

1. culture method of orange sweet potato (questions and answers, participatory discussion and dummy practical).
2. Nutrition value of orange sweet potato (questions and answer, and participatory discussion).

**Summary:**

1. Re-discussion on main topics (questions and answers, and picture presentation in hock board).
2. Get connected with next session.

**Training assistance materials:** hock board, pictures of hock board, cow dung, Urea, TSP, orange sweet potato etc.

**Session – 17 (Old 21)**

**Session procedure**

**Culture method of orange sweet potato; (1) Technique: questions and answer, participatory discussion and dummy practical; Time: 20 min**

**Working method:**

- At the beginning of discussion, facilitator (EF/FS) will give thanks for listening previous session patiently and invites to participate in this session.
- Facilitator will ask question to farmers- what is the method of orange sweet potato culture? Why do culture orange sweet potato? etc. Facilitator will listen answers carefully after that will do discussion by participatory method about mentioned matter.
- After that, facilitator will discuss by participatory method with farmers what benefits can get for family if do orange sweet potato culture.
- After that, facilitator will show hands-on how to planted cuttings by using dummy practical with farmers participation.
- At the end, do re-discussion in participatory methods and verbal evaluation.



(D) Distance between one row to another is 2 feet and one cutting to another is 1 feet and watering after 1-2 days of planted cutting.

(E) Have to apply 300-350 gm urea, 300-375 gm MOP fertilizer after 30-35 days of cutting planted.

**Vegetables, sweet potato and cutting collecting:**

- Until potato harvesting and after 70-80 days of stem plantation till February-March, leaf can collect and eat.
- Potato can harvest within 120-130 days (March-April) of stem/plantation.
- Have to do cutting of stems before harvesting for next crop's stem production.

**Production:** yield 120-140 kg/decimal based on soil type and management.

**2. Nutrition value of orange sweet potato:** there are deficiency of micronutrients of youth, postpartum lactation/lactating mother in our country; besides, more than 60% people not getting enough vitamin A and iron in their daily food. So if orange sweet potato keeps in daily food menu, can fulfill most of the demand of micronutrients.

There are lots of vitamin A, C and minerals in orange sweet potato, which help to prevent from night blindness and have significant impact for keeping good eyesight. Should keep proper amount of orange sweet potato in daily meal for children, youth, pregnant, and postnatal women.

- The leaf of this potato is source of vitamin A, B and C.
- As its containing vitamin A, C and other nutrition values, it helps to keep vital and bright skin.
- 125 gm of orange sweet potato can fulfill the daily vitamin A requirement of a child.
- Help from decay of bone and teeth and keep strong.
- Orange sweet potato control diabetes, prevent heart disease and reduce the risk of cancer.
- Help to produce hemoglobin in blood.

## Session—18 (old 18)

Day : sixth	Time: 9.40- 10.30	Duration: 50 minutes
-------------	-------------------	----------------------

**Title:** Management after planting sapling, pest management and harvesting

**Target group:** household fish farmers

**Goal:** Provide idea to trainees about different activities after planting sapling, pest management and cropping ; so that they become able to attain practical technical knowledge about the subjects mentioned above.

**Objectives:** At the end of the session trainees will be able to say about (a) fencing surround the seed bed, install leaning stick and supplementary fertilizer application in seed bed (b) Weed management, cutting, loosening soil (c) making stage, mulching or covering seed bed and pollinating (d) disease, making of organic pesticide and application process (e) pest management of water guard, pumpkin, cucumber, bitter guard, tube guard and country bean and (f) cropping and about the picture of income and expenditure and will be able to do it.

**Introduction:** 1. Review on previous session.

2. Participation in farmer's evaluation part
3. Describe goal and objective of the current session.
4. Focus on current session.

**Subject matter:** 1. fencing surrounds the seed bed, set leaning stick for sapling and supplementary fertilizer application after germination (question and answer and participatory discussion through exhibiting hook board picture).

2. Weed management, cutting, loosening soil (question and answer and participatory discussion through exhibiting hook board picture).

3. Making stage, mulching or covering seed bed and pollinating (question and answer and participatory discussion through exhibiting hook board picture).

4. Disease, making and application process of organic pesticide (question and answer, participatory discussion, and practical).

5. Pesticide management of vegetables (question and answer and participatory discussion).

6. Cropping and income and expenditure picture (question and answer, participatory discussion through exhibiting hook board picture and information presentation prepared beforehand).

**Summary:** 1. Review on main subjects (question and answer and hook board picture show).

2. Determine objective of the session (question and answer).

3. Establish link with the next session.

**Training assistive materials:** Hook board, picture, sample of insects, diseased vegetables, fruit and leaf, hoe, sample fence, stick, net for making stage, thread, rice straw or dry water hyacinth, cooking pot, neem leaf, bark of neem tree, water, detergent/ soap powder, pumpkin, copper-sulphate, lime, borax, plastic or mud made pot, bamboo sticks, brown paper, marker, hard clip, rope etc.

Session—18 (Old 18)

**Session method**

<b>Fencing surround the seed bed, setting leaning stick, supplementary fertilizer application in seed bed, weed management, cutting and loosening soil (1-2)</b>	<b>Technique: Question and answer and participatory discussion through exhibiting hook board picture.</b>	<b>Time: 10 minutes</b>
--	---	-------------------------

**Working method:**

- At first the facilitator will thank to farmers for listening to the previous session attentively and will invite to attend in this session.
- Facilitator will question to farmers—how and using what materials a fence surrounding the seed bed can be made, why fence is essential? How to set leaning stick for climbing of sapling is to do and what is supplementary fertilizer application, weed management, cutting and loosening soil and why these are necessary? Facilitator will listen to the answers attentively and will make them understood by showing hook board picture and through participatory discussion.
- At this stage facilitator will practically show fence, leaner of saplings, weed management, cutting and soil loosening etc at a seed bed practically made and will let them known its necessity.
- Always the facilitator will give emphasis on practical and will decorate and present practical subjects by using his/her own intelligence.
- In the end he/she will review on pictures exhibited on hook board in a participatory process and will make an oral evaluation.

<b>Making stage, mulching and pollinating (3)</b>	<b>Technique: Question and answer, participatory discussion through exhibiting hook board picture and practical</b>	<b>Time: 10 minutes</b>
---	---	-------------------------

**Working method:**

- Facilitator will question to farmers—how to make stage for vegetation on the bank of pond? What is mulching or covering seed bed? What benefit will be achieved if these two thing is done? Facilitator will listen to answers of participants attentively. Then by thanking farmers he/she will discuss in participatory process by showing pictures of stage and mulching making process on hook board.
- Afterwards facilitator will ask what is pollinating in the case of vegetation and how to do artificial pollinating and will explain the subject through using hook board picture in a participatory process.
- Facilitator will demonstrate a practical on how to do artificial pollinating in vegetation. He/she will show how to do pollinate a female flower with a male flower by flowers collected beforehand and will make it practiced by the farmers. Along with it he/she will discuss importance of the subject.
- In the end he/she will review on pictures showed on hook board in a participatory process and will make an oral evaluation.

Session—18 (Old 18)

**Session method**

<b>Disease, making of chemical pesticide and pest management of vegetable (4-5)</b>	<b>Technique: Question and answer, participatory discussion through using hook board picture and practical materials and practical</b>	<b>Time: 20 minutes</b>
---	--	-------------------------

**Working method:**

- Facilitator will question to farmers – what it means to tell disease and organic pesticide and why it is necessary to learn?
- Facilitator will listen to answers of farmers attentively and will take support of practical materials before discussing each of the subjects. Such as—weed, diseased vegetable and pest/insects, collecting these three items, he/she will explain the subjects in a participatory process.
- Afterwards he/she will want to know from participants about making and application process of organic pesticide. After receiving opinions from farmers he/she will take 8 practical items together for making organic pesticide and will make organic pesticide (neem mixer, bordo mixer and poison trap) with the support of farmers to explain in this regard and will show dummy practical of how to apply it.
- Now he/she will want to know from the participants about pest management. During discussion on the subject facilitator will make the participants understood by explaining about pest management in a participatory process through showing hook board picture.
- In the end he/she will review on pictures showed on hook board in participatory process and will make an oral evaluation.

<b>Cropping and income-expenditure picture (6)</b>	<b>Technique: Question and answer, hook board picture and brown paper show and participatory discussion</b>	<b>Time: 10 minutes</b>
--	---	-------------------------

**Working method:**

- Facilitator will question about picture of income and expenditure and will listen to answers with patience and will note down them.
- Then facilitator will make them understood by participatory discussion on cropping through using hook board picture and then he/she will repeat the remembering game.
- Afterwards the facilitator will make the participant understood by explaining the picture of income and expenditure in participatory process through brown paper prepared beforehand.
- In the end he/she will review on pictures exhibited on hook board in participatory process and will make an oral evaluation.

## Handout

### Management after planting sapling, pest management and cropping

#### Activities after sowing seed/planting sapling

**1. Fencing surrounds the seed bed:** Fence will have to make surrounding the seed bed by using slip of bamboo or by net so that duck, chicken or cattle cannot destroy seed/ sapling just after sowing/ planting.

**Noticeable:** Necessary watering will have to be done successively after 2-3 days after planting sapling by shower/bucket/mug and rest of the saplings will have to remove after two weeks by keeping two sound and strong saplings. Else, borde mixer will have to use if bottom rotten disease appears and the seed bed will have to cover by polythene during rainy season so that rain water don't fall upon saplings.

**Setting leaning stick:** Saplings will have to bind softly with set-sticks as climbing tool to lift them on stage within two weeks of germination.

**Supplementary fertilizer application in seed bed after germination:** Use of fertilizer in seed bed after plant sapling (Water guard, thatch guard and pumpkin) and time of application—

Name of fertilizer	Of germinating/of planting			
	1 <sup>st</sup> supplementary dose after 15-20 days	2 <sup>nd</sup> supplementary dose after 40-50 days	3 <sup>rd</sup> supplementary dose after 60-65 days	4 <sup>th</sup> supplementary dose after 75-80 days
MPO	25 gm or half fistful	25 gm or half fistful	-	-
Urea	25 gm or half fistful			

Mentionable that half of the mentioned dose will have to apply for fertilizer management of each seed bed of bean, cucumber, ladies finger, bitter guard and for tube guard.

**2. Weed management:** Weeds collect fertilizer applied for plant and makes the plants weak and don't allow plants to grow properly.

**Cutting:** Old and excess branches of vegetables (water guard, thatch guard, pumpkin, bitter guard, tube guard, cucumber etc) from the bottom is to cut down it is cutting. The bottom becomes clear, shelter for disease and insects destroys, to do other becomes easier and expected size of fruit can be collected if sprout is removed from the bottom.

**Soil loosening:** Soil gets congealed after watering or after rain, it will have to break by using hoe. Then flow of wind in soil will increase, as a result growth of plant and root will be better.

**3. Making stage:** Stage will have to make by using wood, bamboo, branches of tree and GI wire on plant after two to three weeks of germination of creeper type of crop like water guard, bitter guard, tube guard and cucumber etc. Light and wind can flow properly when stage is set. Disease attacks less and more production is achieved.

**Mulching or covering seed bed:** If seed bed is covered by dry water hyacinth or straw to keep moisture of seed bed during dry season then wetness of soil is kept.

**Pollination:** Female flower and male flower of pumpkin varieties blooms separately so usually their pollinating accomplish by insects. Sometimes pollination cannot occur due to the lack of expected insects, so production gets reduces. Artificial pollinating is necessary in this case. 30-35 % more production is possible to achieve through artificial or hand- pollinating.

## Handout

**Rules of artificial pollination:** Petals of a blooming male flower are to remove by plucking it. Stamen of male flower is to touch slowly on the pistil of female flower. It is possible to pollinate 4-5 female flowers by one male flower.

**Way to identify female and male flower:** There is no shape of fruit at the stalk of male flower but there is the shape of fruit at the stalk of female flower.

**Time of pollinating:** For bitter guard, thatch guard and for pumpkin it is better to pollinate from before dawn to within 9.00 am in the morning and for water guard the better time is after 5.00 pm to just before sunset.

#### 4. Calamity and organic pesticide:

**Calamity:** Because of the presence of unexpected objects for which production reduces or plants die before time those objects are called calamity. Crops become mostly affected by the presence of these three objects mentioned below so these are essential to manage –

➤ Weeds \* Disease \* Insects

**Organic pesticide:** Pesticide produced from living creature is organic pesticide. Organic pesticide is made by different ways. Ingredients and making process of organic pesticide is given below —

1. Neem leaf --- 500 g	4. Soap powder ---- 50 g
2. Bark of neem tree --- 250 g	5. Copper sulphate – 10 g
3. Water --- 5 liters	6. Borax ----- 05 g

**Making method:** 500 g of neem leaf and 250 g of bark of neem tree will have to wet into 5 liters of water in a pot. Then the water will have to boil for 40-50 minutes after adding 50 g soap powder, 05 g borax and 10 g copper sulphate in it. Then the solution will have to collect by filtering it when it is cold.

**Application process:** It is better not to apply pesticide on vegetable on dike of commercial fish culture pond. It can be rather a big harm if pesticide is diluted into pond water, i.e. fishes can die. But if there is special need then another stage made by polythene can set under the main stage so that pesticide cannot fall into water when it will be sprayed. The made solution can be used highest for one day. This solution can be sprayed twice in a day on the same plant, but it is necessary to care so that the plant does not get wet fully. Fungal disease like foot rot disease, dust disease can remove by spraying this solution.

#### Bordo mixer:

**Making method:** Both 100 g of delicately powdered lime and copper-sulphate will have to take. Water will have to take in two separate pots, 5 liters in each pot. Lime powder and copper sulphate powder will have to mix in those pots separately and will have to keep for 8-10 hours. Then by shaking both mixer together bordo mixer is to made. Color of the prepared mixer will be deep blue. It is better to use the made mixer within 3 hours. For application the mixer the above mentioned process will have to follow.

**Poison trap:** Good result is achieved if poison trap is used to manage fly-insects and other insects of fruit.

#### 5. Pest management of vegetable: See appendix-3.

**6. Cropping:** Vegetables are to collect according to demand of market, availability of laborer and transport. It is necessary to take care so that attraction and other qualities of fruits cannot get ruined. The stalk will have to cut by sharp knife so that no harm of plant or stem occurs. It is better to collect crop in the morning or in the afternoon.

Session—18 (Old 18)

Handout

**Income-expenditure picture:** Making of income and expenditure account (accounts for vegetation in one decimal of land)

Description of expense	Amount	Unit price	Total price	Remarks
Expense			1342.00	
Income			2300.00	
From water guard	200 kg	10.00	2000.00	
From potherb	20 kg	15.00	300.00	
Net income			958.00	

Appendix—03

**Pest management of pumpkin variety of vegetable and bean**

Application in seed bed	Type of harm	Remedy
Fly insect	<ul style="list-style-type: none"> <li>➤ Sign of attack appears on the body due to laying eggs into young fruit</li> <li>➤ Worm from egg grow up by eating pulp</li> <li>➤ Attacked living fruits become deformed</li> </ul>	<ul style="list-style-type: none"> <li>* Attacked plant with the worm will have to burry under soil</li> <li>* Leaves with egg will have to burn and poison trap will have to use</li> <li>* 1 sex-pheromone/decimal will have to use.</li> </ul>
Epilakna beetle	<ul style="list-style-type: none"> <li>* Caterpillar and grow up, both stage of this insects are harmful for crop, they make the leaves as clear as net by eating greet portion.</li> <li>* This type of attacked leaf drops down gradually and the plant becomes leafless.</li> </ul>	<ul style="list-style-type: none"> <li>* Heap of eggs, caterpillar and worm will have to destroy collecting from attacked plant.</li> <li>* Seed bed will have to clear always.</li> <li>* It can manage by using ash.</li> <li>*Using neem leaf juice it can be managed too.</li> </ul>
Jab insects of bean	<ul style="list-style-type: none"> <li>* The grown up and adolescent Jab insects suck juice of growing sprout of bitter guard/bean group wise.</li> <li>* Leaves become deformed, growth become hindered and often found curved downwards.</li> </ul>	<ul style="list-style-type: none"> <li>* Neem seed solution can use (2 spoons full of soap powder mixing with 1 kg half crushed neem seed wetted for 12 hours into 10 liters water can spray)</li> </ul>
Red beetle of pumpkin	<ul style="list-style-type: none"> <li>* Caterpillar of this beetle makes the plant weak by eating its root.</li> <li>*Grown up beetle makes round hole by eating leaves of plant. Ruins the total green portion of leaf by eating veins of old plant, Attacks flower and young fruit.</li> </ul>	<ul style="list-style-type: none"> <li>* Grown up insects will have to kill catching by hand if sapling is attacked.</li> <li>*The vegetable field will have to keep clear always and ash can use.</li> </ul>
Bore making worm of bean	<ul style="list-style-type: none"> <li>* Attacked flower becomes wan and destroyed. Reproduction portion of flower is affected. Buds fall down and production of globule of fruit decreases. Small hole on the body of globule and caterpillar is found inside it. Leaf and globule remains jointed together in the net made by worm and eaten sign is found on the upper side. Caterpillar of moth or different species of butterfly eats by getting inside of flower and fruit. Caterpillar of worm ruins seed and carnal by eating it.</li> </ul>	<ul style="list-style-type: none"> <li>* Neem leaf juice can use.</li> <li>* Attacked flower and fruits will have to burry one hand deep of earth collecting by hand every alternative day. Cultivating in a clean and clear way, destroy drop down flower and fruits by collecting it. Suggestion from agriculture office will have to take if rate of attack is too high.</li> </ul>

## Session 19 (Old16)

Formatted: Centered

**Day : Fifth**

**Time:10:35-11:00**

**Duration: 45 Minutes**

- Title** : Nutrition and caring of pregnant women, postpartum lactation/lactating mother
- Group** : Household fish farmers
- Goals** : To give the practical knowledge to the farmers on small indigenous fishes, its nutrition and measures to restrain its nutrition, so that they will be able to apply those knowledge efficiently
- Objectives** : After the end of this session the farmers will be able to know and explain a) Malnutrition and malnutrition cycle b) Nutrition and caring of pregnant women c) Nutrition and caring of postpartum lactation/lactating mother
- Introduction** : 1. Review of last session  
2. Brief the goals and objectives of the current session  
3. Focusing on the current session
- Topics** : 1. Malnutrition and malnutrition cycle (Hock board presentation, participatory discussion and group work).  
2. Nutrition and caring of pregnant women (questioning and answering, participation and group work)  
3. Nutrition and caring of postpartum lactation/lactating mother (questioning and answering, participation and group work)
- Conclusion** : 1. Review briefly the previous discussions (Questioning and answering, hock board presentation and participatory discussions)  
2. Overview the objectives (Asking questions and feedback)  
3. Linkage with next sessions

**Training materials:** Hock board, Different types of hock board pictures, food card, brown paper and hard clip etc.



### Session Method

<b>Malnutrition and malnutrition cycle (1)</b>	<b>Technique: Question and answer, participatory discussion through hock board presentation</b>	<b>Time: 10 minutes</b>
--	---	-------------------------

**Working method:**

- ❖ Facilitator will thank to everybody first to listen the previous session carefully and will request everybody to listen calm and to take participate in the discussion.
- ❖ The facilitator will ask- **malnutrition and malnutrition cycle?** The facilitator will listen the answer carefully and later he will explain showing the hock board pictures and also participatory discussion
- ❖ Then the facilitator will ask to the farmers- if we want to bring out the children from the malnutrition cycle or to break down the malnutrition cycle, how can we do this?
- ❖ Then the facilitator will discuss the process to break down the malnutrition cycle and to bring out the children from this cycle through the participatory discussion
- ❖ At last the facilitator will review and evaluate showing the hook board pictures

<b>Nutrient and caring of pregnant women, postpartum lactation/lactating mother (2-3)</b>	<b>Technique: Questioning and answering ,participation and group work</b>	<b>Time: 15 minutes</b>
---	---	-------------------------

**Working method:**

- ❖ In this session the facilitator will ask to the farmers about the pregnancy condition, postpartum lactation/lactating mother's nutrition and caring (The necessity of nutrition for pregnant women and postpartum lactation/lactating mother and why is it needed extra diet to them?)
- ❖ To know those things the facilitator will divide the whole group into two groups. Like: group1: will work on nutrition and caring of pregnant women and group 2: will work on nutrition and caring of postpartum lactation/lactating mother (if any member won't be able to write then one member of that group will write down for her)
- ❖ At last the facilitator will review and evaluate showing the hook board pictures

## Intergenerational Cycle of Malnutrition

### ➤ **Purpose:**

- To introduce the concept of the intergenerational malnutrition cycle and ways to break the cycle
- To introduce the concept of the Critical Window of Opportunity (“1000 days”)

### 🕒 **Time: 1 hour**

### ✍ **Materials:**

- 2 copies of skit scripts (see annex)
- Flip Chart paper
- Marker pens
- Intergenerational Malnutrition Cycle on Flipchart
- Blue tack

### **Action**

Preparation – Day before activity or during the break time

Ask for two volunteers (male or female) from the group to play two women in a short scripted skit (volunteers can be chosen before the lunch break). They should receive the scripts during lunch time or the previous day so that they can be familiar with the scripts they have to read.

Formatted: No underline

### **Day of Activity**

Part – I: Skit (30 minutes)

1. Divide the participants into 4 groups.
2. In front of all the participants, ask the two volunteers to read the scripts of the story out loud, taking turns reading their parts. (10 minutes)

Formatted: No underline



3. When the skit is finished, show the participants the two questions related to the story. Encourage the participants to answer the questions in groups and write down their answers on flip chart paper. Ask the groups to present their discussions. (20 min)

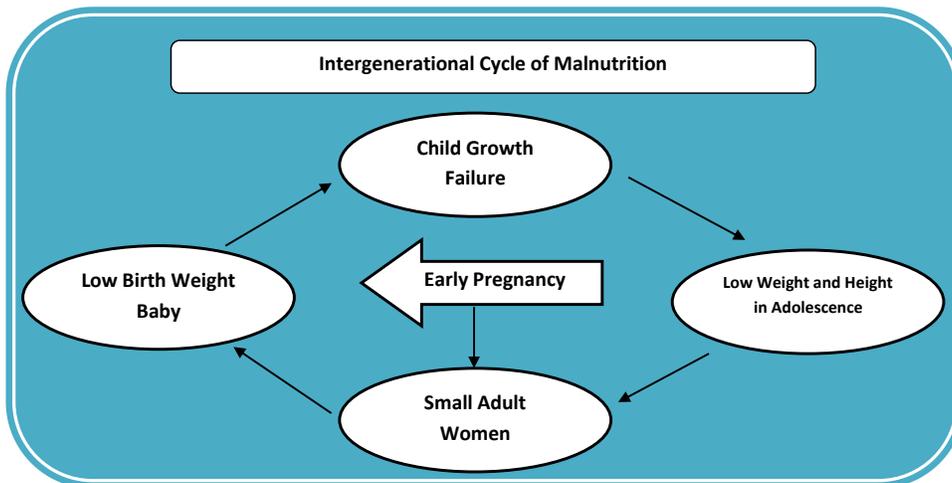
### Questions

1. What are the differences between the lives of Cho Cho and Po Po?
2. What do you think are the reasons behind those differences?

### Part – II: Intergenerational Cycle of Malnutrition (30 minutes)

Formatted: No underline

1. Ask the participants what they understand about the Intergenerational Malnutrition Cycle, which will be drawn on the flipchart.



2. Provide additional explanations about the cycle. After looking at the Intergenerational Cycle, ask participants who they think are the important groups of people in their community that they need to focus on to improve nutrition.

Additional Information (for the facilitator): Malnutrition continues from one generation to the next. A woman who does not receive proper nutrition will be more likely to give birth to a baby with low birth weight. A baby with low birth weight will be more likely to become malnourished during childhood and have developmental difficulties. This child will be at risk for being an undernourished teenager and grow up to be a short (stunted) adult. Stunted adults are more likely to give birth to babies with low birth weight. Early pregnancy during adolescence can also lead to higher risk of a baby being born with low birth weight. And an undernourished woman who becomes pregnant is also more likely to become even more undernourished and put her baby at risk. The cycle can continue like this from generation to generation

3. Brainstorm about the possible ways to break this cycle. Write down participants' comments on the flip chart.

#### **Note to Facilitator:** Some possible ways to break the cycle

- Reproductive health education to women, especially young women and adolescence girls
- Family planning
- Proper Antenatal Care
- Proper Infant and Young Child Feeding Practices
- Immunization
- Encourage education and more schooling
- Eating diverse and balanced diets throughout the whole life, especially during vulnerable periods in the life cycle

4. Summarize by highlighting the importance of the critical period between conception and a child's 2<sup>nd</sup> birthday. Explain that good nutrition during this critical window has lasting positive effects for the rest of the person's life and that malnutrition during this time can have irreversible negative consequences on the person.

Annex:

**SCRIPT**

**Po Po:** Mingalabar! My name is Po Po. I am a primary school teacher and I live in Ywar Thar Yar village. I would like to tell you how I have grown up in my life.

**Cho Cho:** Mingalabar! My name is Cho Cho and I am Po Po's neighbor. We have been friends since childhood and I would also like to share with you how I have grown up in my life.

**Po Po:** Before I start talking about my life, I think I should tell you about my parents first. My parents are also friends with Cho Cho's parents. They got married and gave birth to us almost at the same time.

**Cho Cho:** Actually, I am about 1 month older than Po Po. Our birth weights did not differ very much but we both seemed smaller than other children of the same age.

**Po Po:** The midwife from the health center of a nearby village visited our homes right after our mothers gave birth to us. Both of our mothers received valuable information on not only how to eat while breastfeeding, but also on child feeding practices. Both of our mothers shared child caring information they received from the midwife with their family members.

**Cho Cho:** My father and my grandmother did not agree with the new messages from the midwife about child caring practices. My mother had to avoid all kind of beans, legumes, vegetables, fruits, eggs and meats because she and her mother believed that those foods could be harmful for the health of the mother and child.

**Po Po:** My father appreciated the advice given by the midwife even though my grandmother had some objections. My mother received a balanced diet while she was breastfeeding me. She included diverse foods in her daily diet.

**Cho Cho:** My mother introduced semisolid foods when I was 2 months old and stopped breastfeeding when I was 23 months old as she thought that I was getting enough nutrients from eating rice porridge (rice only) three times a day.

**Po Po:** At 6 months of age, my mother introduced semisolid foods to me including vegetables, eggs, meat, fish and beans in addition to rice. She continued breastfeeding me till I was 2 years and 2 months old.

**Cho Cho:** When we turned 5 years old, we went to the same school in the village. Po Po obviously received better scores at school while I was facing many learning difficulties. Then, I left school before I finished G4.

Formatted: No underline

Po Po: For me, I continued my education well. I moved to school in town to study high school education and after that, I went to a university in the capital city. I graduated after 5 years of university and returned to my own village as a primary school teacher.

Cho Cho: During the same time, I wasted several years because of repeated illnesses and could never restart my studies again. Then I married a young boy in the same village who was 2 years older than me. At that time I was only 15 years old. Although I was not in good health the only way I could earn some income in the village was through physical labor. I became pregnant for the first time at the age of 17 but the pregnancy ended in premature still birth. Now, my health is worsening and my family's economic situation is also getting worse. I am very unhappy in my life.

Po Po: Now I was very happy to return to my family and lovely village. After a year, I married a handsome man who is also a male teacher in the same school. We met each other while we both were at the university. I got pregnant for the first time 6 months into our marriage. During my pregnancy I ate balanced diets everyday and I didn't have any particular difficulty when I gave birth to my first daughter. She is so healthy and strong and is now 3 months old. I made a commitment to my daughter that I will breastfeed her exclusively. Don't worry, Cho Cho, My friend. Please don't feel frustrated. I am now here to help you. Although you lost your first baby, I am confident that you will have a healthy child if you follow my suggestions.

#### **KEY MESSAGES FOR MATERNAL NUTRITION**

##### **During adolescence and before pregnancy**

- Increase food intake to accommodate the adolescent "growth spurt" and to establish energy reserves for pregnancy and lactation
- Delay the first pregnancy to help ensure full growth and nutrient stores

##### **During pregnancy**

- Eat a variety of foods, particularly animal products (meat, milk, eggs, etc.), plus fruits and vegetables (ripe papaya and mango, sweet potatoes, carrot & pumpkin are especially good)
- Increase food intake to permit adequate weight gain to support fetal growth and future lactation
- Take iron /folic acid tablets daily
- Eat iron-rich foods such as red meat, fish, eggs and beans to prevent iron deficiency and anemia
- Use iodized salt
- Drink water regularly

##### **During lactation**

- Eat the equivalent of an additional, nutritionally balanced meal per day
- Minimize heavy work and reduce work hours to help save the extra energy needed to breastfeed
- Breastfeeding provides health benefits to the mother as well as to the infant, including decreased risk of hemorrhage after delivery
- Maternal deficiencies of some micronutrients can affect the quality of breast milk. These deficiencies should be avoided by improving the diet or providing supplements to the mother

**Poor maternal nutrition may be linked to several leading causes of infant mortality, such as preterm birth and fetal growth restriction. Focusing on maternal nutrition will improve the long-term health of both the woman and her children.**

Key messages adapted from: Academy for Educational Development LINKAGES Project (2004). *Breastfeeding and Maternal Nutrition Frequently Asked Questions*.

Formatted: Highlight

Formatted: Font: Bold  
Formatted: Font: Bold

### 1. Malnutrition and malnutrition cycle:

**Malnutrition:** Malnutrition refers in wide sense as either undernourished or overnourished. When the body doesn't get right amount of required food (protein, carbohydrate, vitamins, and minerals) then food deficiency is occurred and regular nutrition deficiency creates malnutrition. On the other hand, due to intake of insufficient food, too much or unbalanced food the situation can be called as malnutrition.

**Malnutrition cycle:** From the research it was found that womb baby's health is depended on the pregnant mother's health and nutrition. When one woman suffers from malnutrition then there is a chance to get malnutrition of her next generation and gives birth a low birth weight baby. If this low birth weight baby becomes a girl then it turns into a low weight dwarf sized girl infant. Later this infant turns into low weight child and some child becomes pregnant before mature and then they give birth again same low weighted baby. If those children were getting married early then they become malnutrition women who will also gives birth same low weight baby. The below picture shows the malnutrition cycle:

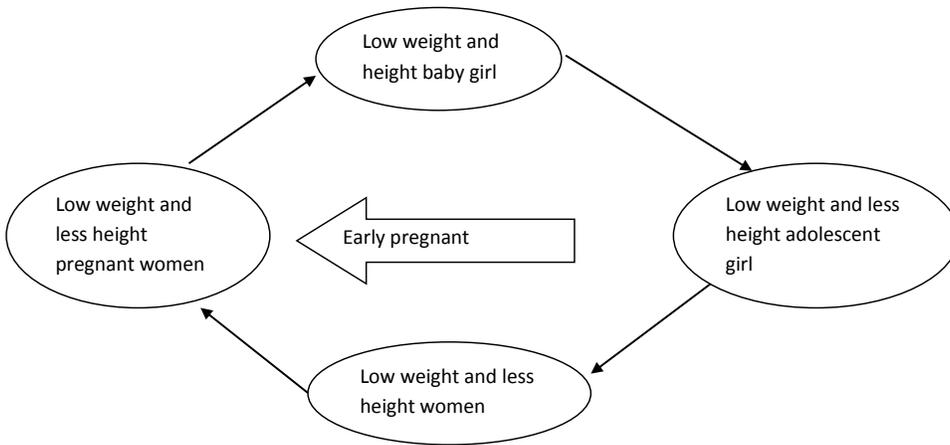


Fig: Malnutrition cycle

## 2. Pregnant women's nutrition and caring:

To bring out a child from the above mentioned malnutrition cycle or to break down the malnutrition cycle it is essential to ensure nutrition and special caring of pregnant women and postpartum lactation/lactating mother. It is possible the below mentioned ways to break down this malnutrition cycle-

**a) Nutrition of pregnant women:** The food and nutrition of pregnant women should be different from other women. Because, due to the growth of placenta food for pregnant women should be increased. But nutritional balanced food should eat instead of too much eat of other foods. Everyday 3000 calorie has to intake more than the daily requirement. The source of this calorie can be milk, fish, meat, lentils etc. This time the most essential foods are fishes (small and big sized), eggs, milk, nut, meat, beans, tomato, vegetables, lentils, amla, guava, hog plum fruit (*Spondias mombin*) etc. To recover from anemia some foods are essential like taro, green vegetables, dry fruits, jaggery, liver, red amaranth, sour fruits etc. To get folic acid green leafy vegetables, ladies fingers, snake guard, long bean, liver, eggs, lettuce leaves etc are essential. Without that-

- ⇒ During pregnancy one handful more food than the normal consumption has to add with every 3 meals of a day.
- ⇒ Fish especially mola, darkina, meat, egg, milk, liver, concentrated lentils, colorful vegetables and seasonal fruits must have to eat
- ⇒ Iodized salt has to ingest
- ⇒ Vitamin C high food have to intake
- ⇒ As iron supplementary from 4<sup>th</sup> month of pregnancy, one iron tablet have to take in each night after dinner
- ⇒ After 3<sup>rd</sup> month of pregnancy 2 calcium tables have to take in each day (Morning and noon) during full stomach which should be continued up to the 6<sup>th</sup> month of delivery

### b) Caring of pregnant women:

- Prevention and treatment of transmitted disease-
- To accomplish 5 dosages of tetanus vaccines (2<sup>nd</sup> vaccine should take after 28 days of 1<sup>st</sup> vaccine, 3<sup>rd</sup> vaccine should take after 6 months of 2<sup>nd</sup> vaccine, 4<sup>th</sup> dose should take after 1 year of 3<sup>rd</sup> dose and last 5<sup>th</sup> dose should take after 41 year of 4<sup>th</sup> vaccine)
- During the pregnancy 4 times maternal check up should take
- Ensuring safe delivery (a. delivery in hospital b. to use experienced delivery nurse)
- It should inform and aware everybody of the family about the pregnancy, delivery and 5 danger points of women after delivery
- Mental health and physical health condition should be improved during pregnancy
- Tough and heavy works (tube well pressing, lift up heavy objects, excess/ heavy cloth washing etc) should avoid for pregnant women
- Pregnant women should take enough rest (for 2 hours after having lunch and 8 hours at night)

### **3. Nutrition and caring of postpartum lactation/lactating mother:**

**a) Mother's diet during delivery:** It should be ensured that the mother will get proper feeding after giving birth. Because, this time mother has to depend on proteinous food for her breast milk. Mother has to drink enough water that helps breast milk production and flow. After delivery of baby black spots can be found on the face of some mothers that are occurred due to the deficiency of calcium and iron. So that calcium, iron and protein has to add with daily diet. Carrot, cauliflower soup, chicken soup, legume, milk, coriander leaf, mint, master oil seed leaf, spring onion, different types of small fishes (mola, darkina etc), orange sweet potato etc.

Without those one vitamin capsule has to supply to lactating mother after 42 days of delivery.

#### **b) Nutrition of lactating mother:**

- ⇒ Lactating mother has to eat 2 feasted foods more in each meal. This excess food will help to produce breast milk for baby and it will help to rebuild mother's health deficiency.
- ⇒ Lactating mother has to eat nutrient balanced food; like- eggs, milk, fish, meat, lentils and sweet orange potato leaf, colored vegetables and fruits etc
- ⇒ Within the 14 days of delivery lactating mother has to intake vitamin A capsule (200000 IU)
- ⇒ Mother also has to intake one iron table per day from the delivery day to three months.

#### **c) Care of Postpartum lactating/lactating mother:**

- ⇒ After the delivery mother's health should be checked at least 4 times by experienced and trained health worker
- ⇒ Mother has to wear loose and comfortable clothes and should keep clean
- ⇒ Pregnant women, postpartum lactation/lactating mothers should not work hard and it has to inspire them to take rest enough
- ⇒ It has to increase the participation of husband and mother in law with the daily work of pregnant woman, postpartum lactation/lactating mother and special care should take for them as well
- ⇒ Besides those it has to ensure the help of other family member.

#### **Nutrition and care of pregnant women, postpartum lactation/lactating mother:**

The health and weight of womb babies depends on the health condition of pregnant women. In this time insufficient and imbalanced food can be dangerous for womb baby. Malnutrition affected mothers give birth those babies who become low weight during birth, hampers brain development and poor health condition.

### Care of pregnant women (Excess information):

During pregnancy time

- 
- ⇒ Ith has to be checked at least 4 times (to know pregnant women's weight, anemia, blood pressure and the position of babies in womb).  
1<sup>st</sup> checking= within 16<sup>th</sup> week (4 months). 2<sup>nd</sup> checking=24-28 weeks (6-7 months), 3<sup>rd</sup> checking=32 weeks (8 months), 4<sup>th</sup> checking=36 weeks (9 months)
  - ⇒ Ensuring safe delivery (delivery in the hospital, using trained and experienced delivery nurse)
  - ⇒ It should inform and aware everybody of the family about the pregnancy, delivery and 5 danger discomforts of women after delivery. The five danger points are-
    1. Extreme headache and blurry vision
    2. Delivery cramping, swelling/backache
    3. Too much bleeding
    4. Long time delivery pain/ delay delivery (More than 12 hours)
    5. Malposition of vertex

### Nutritional care for postpartum lactation/lactating mother:

Postnatal or postpartum period is the most essential and crucial phase for the health of mother and babies. This postpartum period is the period beginning immediately after the birth of a child and extending for about six weeks. This time mother needs special caring. Breast milk contains all the nutrients need to growth of baby. So that to keep the mother healthy all types of nutrient contained balanced diet and extra caring are essential.

### Caring of lactating mother:

After delivery the mother should be monitored the postnatal condition at least 4 times by trained health worker. 1<sup>st</sup> check up- within 24 hours, 2<sup>nd</sup> check up- within 2-3 days after delivery, 3<sup>rd</sup> check up- within 4-7 days after delivery, 4<sup>th</sup> check up- within 42-45 days after delivery

**Nutrition and caring of adolescent girl:** Normally 10-19 years old child is called adolescent. This time physical and mental development occurs. So, nutritional requirement is higher. If the nutritional requirement is not fulfilled then the body building and development is not occurred appropriately and different nutritional deficiency related diseases will begin. Period of menstruation starts in this child stage. In this stage if proper nutritional demand is not supplied then iron deficiency can be happened.

### Bellow the points should be considered to fulfill the nutritional demand of adolescent girl:

- To grow up accurately in adolescent stage proper balanced diet should intake demand wise
- Fulfill iron, vitamin A and iodine deficiency
- Control of contaminated diseases and treatment
  - Tetanus vaccine 5 dosages
- ⇒ To learn about Sexual disease like HIV and AIDS contamination and its control

- ⇒ Protection of child marriage and pregnant in the mature stage
- ⇒ To inspire the parents so that they let their children educated

### **Extra Handout for facilitator**

Food list for pregnant women, postpartum lactation/lactating mother in bellow:

Sl No	Food name	Amount		
		Pregnant women	Postnatal	Breastfeeding mother
1	Bread	3 pc	2 pc	2 pc
2	Egg	1 pc	1pc	1 pc
3	Vegetables (Bean/ pumpkin)	2.5 cup	2.5 cup	2.5 cup
4	Fruit (hog plum, Orange, Guava)	1 pc	1 pc	1 pc/ 1 cup
5	Dairy food	1 cup	1 cup	-
6	Rice	5 cup	6 cup	3.5 cup
7	Lentils	2 cup	3 cup	2 cup
8	Leafy vegetables (red amaranth, OSP)	½ cup	½ cup	½ cup
9	Fish/meat	2-3 cup	2-3 pc	2-3 pc
10	Biscuit	2 pc	2 pc	2 pc
11	Banana/ ripe mango	1 pc	1 pc	-
12	Milk	1 glass	1 glass	1 glass
13	Cocking oil	5 tea spoon	5 tea spoon	5 tea spoon
14	Cake/ singara	-	-	1pc

Source: Food composition table and database for Bangladesh with special reference to selected unique foods, AINFS, DU







# Module Title

Module—03

## Session—20 (Old 19)

Day: Sixth	Time: 10.30-11.00	Duration: 30 minutes
------------	-------------------	----------------------

**Title :** Complementary feeding

**Target group:** Household fish farmers.

**Goal :** To provide idea to trainees about complementary for children, its necessity and rules of complementary according to age; so that they become able to take necessary steps by using this knowledge.

**Objectives:** In the end of the session participants will be able to tell about (a) complementary feeding for children and its necessity (b) rules of suitable complementary feeding according to age and about (c) List of daily food for children, and will be able to show it practically.

**Introduction:** 1. Review on previous session.

2. Describe goal and objective of the current session.
3. Focus on current session.

**Subject matter:** 1. Complementary feed for children and its necessity (question and answer and participatory discussion)

2. Rules of feeding according to age (question and answer, participatory discussion and practical)
3. Daily food list for children (question and answer, participatory discussion and group work through food card).

**Summary:** 1. Review on main subjects (question and answer and hook board picture show)

2. Determine objective of the session.
3. Establish link with next session.

**Training supportive materials:** Hook board, pictures for hook board, food card, brown paper, hard clip, bowl (250 ml), different kind of food etc.



## Complementary Feeding

➤ **Purpose:**

- To understand the importance of continued breastfeeding after 6 months
- To introduce the participants to recommended complementary feeding practice and its importance

🕒 **Time:** 35 minutes

✍ **Materials:**

- Flipchart paper & markers
  - Blue tack
  - 3 glasses of water: completely full,  $\frac{1}{2}$  and  $\frac{1}{3}$  filled
- 

### Action

Continued Breastfeeding – 10 minutes

1. Ask participants: How much energy is provided by breast milk for an infant/young child:
  - From 0 up to 6 months
  - From 6 up to 12 months
  - From 12 up to 24 months
2. Demonstrate the same information using 3 glasses: completely full, half ( $\frac{1}{2}$ ) and one third ( $\frac{1}{3}$ ) filled respectively - pour water into the glasses (the first to overflowing) to show the energy supplied by breast milk at various ages
3. Write on flipchart: breast milk supplies ALL of the 'energy needs' of a child from 0 up to 6 months, more than half of 'energy needs' of a child from 6 up to 12 months (60%) and a little less than half of 'energy needs' of a child from 12 up to 24 months (40%); leave posted throughout the training.

Introduction to Complementary Feeding – 25 minutes

1. Explain that we will now talk about complementary feeding – the foods a baby needs in addition to breast milk.
2. Brainstorm with participants in plenary: (10 min)  
Ask: In your area, at what age do families usually start to give foods to the infant – other than breast milk?  
What are the reasons you hear as to why families start complementary foods when they do?

Notes to the facilitator:

Possible answers may include:

- Families may decide a young child is ready for complementary foods because they notice certain developmental signs such as reaching for food when others are eating or starting to get teeth.
- Families may decide the baby needs additional foods because the baby is showing what they believe to be signs of hunger. Signs such as the baby putting his/her hands to the mouth may be normal development not signs of hunger.
- Sometimes a family may decide to start complementary feeding because they believe that the baby will breastfeed less and the mother will be able to be away from the baby more.
- Complementary foods may be started because the baby is not gaining weight adequately.
- A family may be influenced by what other people say to them about starting complementary foods. They may listen to a neighbor, their mother, a health worker or even advertisements for baby food products.

Knowing why families start complementary foods helps you to decide how to assist them. Once you understand her reason, you can give her appropriate information.

3. Explain: Complementary feeding should be started when the baby can no longer get enough energy and nutrients from breast milk alone, which is at 6 months of age.
4. Continue to brainstorm with participants with the following questions, writing answers on a flipchart and using the facilitator's notes as a guide: (10 min)

- What happens if complementary foods are started too soon (younger than 6 months)?

**Adding foods too soon may:**

Take the place of breast milk  
Result in a low nutrient diet  
Increase risk of illness  
Less protective factors  
Other foods not as clean  
Difficult to digest foods  
Increase mother's risk of pregnancy

- What happens if complementary foods are started too late (older than 6 months)?

**Adding foods too late:**

Child does not received the nutrients needed  
Growth and development slows down or stops  
Risk of deficiencies and malnutrition

Sources: UNICEF (2012), "The Community IYCF Counselling Package: Facilitator's Guide"; WHO (2004), "Complementary Feeding Counseling: A training course"; FAO & Government of Namibia (2004), "Food and Nutrition: Handbook for Namibian Volunteer Leaders."

### Session method

complementary feeding for children and its necessity (1)	Technique: Question and answer and participatory discussion	Time: 10 minutes
--	---	------------------

**Working method:**

- Just at the beginning to discuss this part of the session the facilitator will thanks to the farmers and will invite them to listen to attentively and to take part in this session.

- Facilitator will question to farmers—what is the complementary feeding for children and what is its necessity? He/she will listen to answers attentively and after receiving opinion from farmers, will discuss in a participatory process to explain the subject.
- In the end he/she will review on the subject in participatory process and will make an oral evaluation.

<b>Rules of complementary feeding for children according to age and daily food list (2-3)</b>	<b>Technique: Question and answer, participatory discussion, group work through food card and practical</b>	<b>Time: 20 minutes</b>
---	---	-------------------------

**Working method:**

- Facilitator will question to farmers what can be the rules of suitable complementary feeding children according to age and what harms can occur if these are not followed, he/she will want to know all these things through participatory discussion one by one.
- In this discussion facilitator will provide idea about stomach of children through fingers of hand and will make the farmers understood by explaining about rules of suitable complementary feeding for children of different age through participatory discussion.
- Afterwards facilitator will want to know from participants about what kind of foods can be there in the daily food list of children.
- Facilitator will listen to all answers attentively in a beautiful way and will let them know in details about daily food list through participatory discussion.
- At the end of main discussion, for group work, facilitator will ask participants to make a one day food plan for children according to different age through food card by divided into two groups, and will make each group to show their list at the end of group work and will make a proper food plan for one day through participatory discussion and will provide idea about proper food list by comparing with food list prepared beforehand on brown paper.
- In the end he/she will review in participatory process and will make an oral evaluation.

## Handout

---

**1. Complementary feeding for children:** For the first six months only breast milk of mother is the best food for a child. There are all necessary nutrients for healthy growth of child remains in it and disease preventive ingredients to protect the child from illness are also in it. Food that is given to children after completion of six months of age along with breast milk is called “**Complementary feeding**”. After six months of age just only mother’s milk is not sufficient for a child to grow up properly so then it is necessary to give extra food (the list is on the next page) to child along with breast milk. This is why **Complementary feeding** will have to start to feed every day from after completion of six months of age beside breast milk.

**Necessity to start complementary feeding in proper time:** The energy/nutrition which is necessary along with physical development of child from birth to six months of age, that can get only from mother’s milk. On the other hand children reduce to eat mother’s milk if **Complementary feed** is given before completion of 6 months; as a result children become deprived from proper nutrition.

- **Complementary** feed to children is to start after 6 months of age along with mother’s breast milk, because of only mother’s milk is not sufficient for children after 6 months of age. **Complementary** feed is necessary for children, firstly for physical development and secondly for mental development. Else—
- Children learn to eat, chew and to swallow food easily after completing 6 months of age and can digest the food. This is why it is the perfect age to start giving extra food.
- If **Complementary** feeding is not practiced at the very moment after completing 6 months of age then children will not learn how to eat, his/her proper demand will not fulfill; as a result children can lose weight, development can hindered according to age etc and at a certain stage child can suffer from severe malnutrition.

### **Benefit of Complementary feed:**

- Necessary nutrition is ensured if **Complementary** feed is started along with mother’s milk.
- Physical and mental development becomes quick and intelligence becomes well.
- Children suffer less from diseases and quickly recovered from illness.

**2. Rules of suitable Complementary feeding for children according to age:** Stomach of child is small (Idea of child stomach is given by making a small shape with tip of thumb and the index finger together) and cannot contain much food at a time. So, small amount of food will have to feed them frequently. Along with their growth their stomachs also have been developed; as a result they can eat much food at one sitting. Children must have to eat frequently for proper growth and development. How much food is essential for a child of 6-24 months of age can be shown on brown paper through the chart given below.

**Handout**

**Complementary feeding**

Age of child	Recommended daily food (main food and repast)	Complementary feeding
6-8 months (full)	2-3 times	½ bowl of soft and thick/semi hard food 2 times daily
9-11 months (do)	3-4 times	½ bowl of hard/semi hard food 3 times daily and 1-2 times nutritious repast
12-24 months	3-4 times	½ bowl of hard/semi hard food 3 times daily and 1-2 times nutritious repast

➤ Measurement of bowl 250 ml

**3. Daily list of different type of extra food for children according to age (sample):**

**One day’s food list for child of 6-8 months of age:**

- Extra food prepared with rice, small fish (mola, darkina)/meet/egg/pulse, orange sweet potato/green, deep colorful vegetables etc cooked with oil every day.
- Soft and thick food ½ bowl (25 ml), twice daily.
- Use iodized salt in extra food.

**One day’s food list for child of 9-11 months of age:**

- Extra food prepared everyday with rice, small fish (mola, darkina)/meet/egg/pulse, orange sweet potato/green, deep colorful vegetables etc cooked with oil.
- ½ bowl (250 ml) of thick and half hard food 3-4 times daily.
- 1-2 times nutritious repast, such as orange sweet potato and chips made of it, vegetable chop, rice grain, vermicelli, frumenty, banana cake, noodles etc homemade food.

**One day’s food list for child of 12-24 months of age:**

- Extra food prepared everyday with rice, small fish (mola, darkina)/meet/egg/pulse, orange sweet potato/green, deep colorful vegetables etc cooked with oil.
- One bowl of normal food 3-4 times daily and nutritious repasts 1-2 times.
- Ripe papaya, carrot, ripe mango, ripe jackfruit, ripe guava etc and different seasonal food, iodized salt will have to use with extra food.

### Session-21 (Old 22)

**Day:** 7<sup>th</sup>

**Time:** 10:30-11:00 am

**Duration:** 30 min

**Title:** Importance of hand washing properly, steps and use of tippy tap

**Target group:** household fish farmers

**Aims:** to provide proper knowledge on importance of hand wash properly, steps and use of tippy tap; so that they can be able to know technical method of that matters.

**Objectives:** at the end of the session trainee can know and speak details about (i) importance of hand wash properly, (ii) important time of hand wash and (ii) tippy tap making and hand wash properly.

**Introduction:**

1. Re-discussion of previous session.
2. Participate in the session of farmers' assessment.
3. Describes aims and objectives of current session.
4. Discussion on current session.

**Subjects:**

1. Importance of hand washing properly (questions and answers, and participatory discussion).
2. Important time of hand wash (questions and answer, and participatory discussion).
3. Tippy tap making and hand wash properly (questions and answer, participatory discussion, and practical).

**Summary:**

1. Re-discussion on main topics (participatory discussion using picture presentation in hock board).
2. Get connected with next session.

**Training assistance materials:** hock board, pictures of hock board, empty water bottle, metal nails, candle, sharp knife, soap, safe water, mug, bucket, rope, net bag, lighter etc.

**Session – 22**

**Session procedure**

**Importance of hand washing properly, and important time; (1-2)**

**Technique: questions and answer, and participatory discussion;**

**Time: 10 min**

**Working method:**

- At the beginning of discussion, facilitator will give thanks for listening previous session patiently and invites to participate in this session.
- Facilitator will ask question to farmers- what is the importance of hand wash properly? Will do some associate question to farmers; such as, what are the important times for hand wash? What should do before wash hand properly? Facilitator will listen answers carefully after that will do discussion about mentioned matter by participatory method.
- After that, facilitator will discuss by participatory method with farmers what benefits can get for family if hand wash properly.
- At the end, do re-discussion in participatory methods and verbal evaluation.

**Tippy tap making and hand wash properly; (3)**

**Technique: questions and answer, participatory discussion by presenting picture in hock board, and practical;**

**Time: 20 min**

**Working method:**

- At the beginning of discussion of this part, facilitator will invite farmers to take part actively.
- After that, facilitator will ask farmers about tippy tap making and steps of hand wash; will note down if someone has any idea.

- Facilitator will listen answers of questions carefully and at this part of this session facilitator will show tippy tap making to farmers and discuss details about steps of hand wash properly by presenting pictures in hock board.
- After that, facilitator will make tippy tap with farmers participation using empty water bottle which is collected earlier.
- After that, facilitator will show steps of hand wash properly using his own hand. Then will show hand wash practically by a farmer using tippy tap.
- At the end, do re-discussion on presented pictures in hock board by participatory method and verbal evaluation.

## Hand out

### 1. Importance of hand wash properly, important times and tippy tap making and hand wash

**2. Importance of hand wash properly:** proper hand wash protect from food and water infection, protect entering germs inside mouth, protect infection from diarrhea, protect hookworm infection, and most of the time get rid from skin disease infection.

**Important times for hand wash:** it looks like that our hand is clean but often it's not real clean. Mandatory hand wash before and after of following works:

Before these works	After these works
Before eating	After use of toilet/faeces
Before feed child	After clean/faeces of child
Before food preparation/cooking and presentation	After catch domestic animals/clean faeces

**Apart from that, should wash hand during these works:** wash babysitter/child hand after clean baby nasal dirt, babysitter/child hand after sneezing, before and after touch raw fish and meat, before and after see patients, and work with dirt or after playing.

**3. Tippy tap making and hand wash properly:** tippy tap method is important because this method will save water that collected from difficulties, easily ensure running water, and overall it will help to protect everyone in family especially children from different disease.

**Tippy tap making materials:** to make tippy tap need a clean empty water bottle (as big as possible), knife/metal nails, candle, rope, net bag, lighter and soap.

**Tippy tap making procedure:** at first heat the knife/metal nail on fire. After that, make a hole around two fingers up from bottom of empty water bottle by keeping open bottle cap. After making hole, make full the bottle by water and close the cap well and keep in high place or hang it with a bamboo by rope. Hang soap in net bag near the water filled bottle so that can get easily while hand wash. That way easily can make tippy tap.

**Steps of hand wash:** can wash hand properly by following these steps below:

1. Wet hand using running water and soap

2. Rub hand palm with palm
3. Rub under nail
4. Rub palm by finger tips
5. Rub back side of palm
6. Rub finger node and tips with palm
7. Rub hand elbow
8. Wash hand well by running water
9. Wipe hand by clean cloth after hand wash

**Using procedure of tippy tap:** running water will flow if open bottle cap during hand wash, and easily can wash hand well with little water. Water falling will stop if close the bottle cap after hand wash. Fill the bottle once water is finished.

### Extra hand note for facilitator

---

**Recommendations for feeding extra food:** World Health Organization has composed some recommendations on feeding extra food to fulfill the nutrition demand of children. Mentionable recommendations are—

**1. Different type of food:** Extra food for child will have to prepare from different type of household food. Food enriched with iron and vitamin-a will have to feed to fulfill deficiency. Daily food for child will have to prepare by taking at least 4 different foods from the food list given below and at least one food will have to be from animal source —

- a) Corn type of food: Rice, bread, pressed-rice, potato, rice-grain etc.
- b) Different pulse type of foods and nut.
- c) Milk and milk product.
- d) Animal food: Fish, mola/ darkina fishes, meat, chicken liver, egg etc.
- e) Deep green and red potherb, else, vegetables and fruits of yellow and orange in color; such as pumpkin, orange sweet potato, carrot, ripe mango, ripe papaya etc.
- f) Other vegetables and fruits; such as water guard, snake guard, cauliflower, banana, guava etc.
- h) It is better to use oil or ghee in food for children, energy remains more in it.
- i) It is better to use sugarcane molasses instead of sugar, because of sugar cane molasses is a good source of iron.

**2. Amount of food:** Children used to grow up quickly after 6 months of age. So amount of food will have to increase accordingly.

**3. Density of food:** Density of food will have to increase according to demand along with development ratio of child; so that proper nutrition of the child is ensured. The more proper the density rate of extra food is the more nutrition value is there. The smashed food will be such a one, which will not fall down easily when picked by hand or by spoon.

**4. Times of giving food:** Since amount of food will increase along with growth of child; so that amount of food will have to serve the child frequently with the proper rules.

**5. Responsive feeding:** Have to feed child by understanding his/her mood. Young children will have to feed by giving food into the mouth, support will have to provide to elder ones to eat by themselves; what they will eat, how they will eat, how much they will eat, it will have to teach them; nutritious food will have to serve them as per their wish and like. Children will have to feed gradually by encouraging them, they should not feed forcefully.

**6. Making of proper/healthy food and preservation:** Extra food will have to prepare in a healthy way and have to preserve. Clean utensils will have to use during making food and feeding. Hands will have to wash properly with soap before feeding the child and the food will have to feed soon after making.

**7. Feeding during illness and after illness:** Breastfeeding will have to increase during illness of child and extra supplementary food will have to give after illness. If children are fed properly during and after illness then children quickly recover from illness, get saved from malnutrition and suffer from less disease afterwards.

\* Serving hard food should not reduce during illness of child, child will have to breastfeed frequently so that he/she gets more milk and different extra food of his/her wish and will have to give frequently in a small amount.

\* At least up to two weeks (14 days) extra supplementary food will have to serve until the child recovers his/her previous weight.

**Extra hand note for facilitator**

**A few superstitions/idea about feeding child:**

- To stop feeding child while he/she is sick.
- Stop eating vegetables by mother (breastfeeding mother) if child is suffers from diarrhea.
- The notion that stop giving normal/extra food to child while suffering from diarrhea.
- Upbringing the idea that there is more nutrition in costly food.
- Reasons of why children don't want to eat and solution:
- The notion that it is better to give extra food to child before 6 months of age.

**Reasons of why children don't want to eat and solution:**

Reason	Solution
Mother want to feed children quickly and forcefully	Force should not apply for feeding child quickly, it is necessary to wait patiently until the child finishes the food already in the mouth
Mother does not encourage child while feeding	The child will have to encourage while feeding, the food will have to praise that the food is very tasty.
While food is given to child after full six months, he/she push out the food from mouth.	In the beginning children can do it, it is simple. This is why children will have to feed patiently by taking time for the first few months.
Children cannot chew or swallow the food if it is hard.	This is why smashed and soft food will have to serve to children in the beginning.
Sometimes children do not like the taste of food and don't want to eat while sick	It is necessary to notice which of the food the child likes to eat amusingly, food will have to make as per liking of the child.
Children do not want to eat while they are tired and feel sleepy	The child should not feed at that time; it will have to wait until the child wake up.
Fill up the stomach by eating liquid food	This is why liquefied food should not make for children. Food with proper density according to age or smashed food will have to serve to children.
Children do not want to eat homemade food for eating unnecessary food	Stomach of children should not fill up with unnecessary food from outside. It is better to keep a 2 hours gap in between food and repast.
Children do not want to eat for mixing many food at a time	Not to mix various food all together: such as—sweet food with salty food and green vegetables with fish or egg is better not to mix together.
When children is not allowed to eat alone while he/she wants	Children will have to allow eat alone while he/she wants to and his/her hands will have to wash properly with soap before eating.
Children do not want to eat while busy with toy or friends	Children should not make busy by giving toy while eating or they should not feed while playing with friends.
Children do not want to eat if the food is not tasty	Before feeding the child mother will have to taste the food if it is tasty or not.
Children do not want to eat same food every day	Food with different taste, different color and with different density will also have to serve to children as like as elder.

**Special session**

**Practical and farmers activity implementation plan**

<b>Day: sixth</b>	<b>Time: 11.00-11.30</b>	<b>Duration : 30 minutes</b>
-------------------	--------------------------	------------------------------

**Practical and farmers activity implementation plan**

Session No.	Name of session	Main activities	Completion time		Remarks
			Day	date	
14 (Old 13)	Partial harvesting & restocking and complete harvesting	1. partial harvesting and restocking 2. Complete harvesting			
15 (Old 14)	Marketing of fish, income and expenditure account and yearly calendar of fish culture activities	1. Fish marketing 2. Cost-benefit analysis 3. Year calendar on fish culture activities			
16 (Old 17)	Dike cropping, production season, seed bed preparation, fertilizer management in seed bed and compost preparation method	1. Vegetation on dike 2. making of ideal seed bed and production technique 3. Preparation before sowing seed and sowing process, fertilizer management before sowing seed. 4. Making of compost			
17 (Old 21)	Culture method of sweet orange potato and nutritional value				
18 (Old 18)	Crop management, disease protection and crop marketing, preservation for household consumption, cropping calendar, income and expenditure account.	1. Fencing surrounds the seed bed. 2. Pollinating 3. Making of organic pesticide and application 4. Cropping 5. Income and expenditure of vegetables.			
19 (Old 16)	Women nutritional care and Service	1. To discuss with the neighborhood about the malnutrition 2. to discuss with the family members about the nutrition and caring of women			
20 (Old 19)	Complementary feeding	1. Discuss with neighbor about necessity of extra food for children 2. Discuss with neighbor about rules of suitable extra food according to age of child. 3. Making daily food list for children			
21 (Old)	Importance of hand wash,				

22)	steps and use of tippy tap				
-----	----------------------------	--	--	--	--

**NB:** Number of work in main activities column can be more or less as per current state/work and decision of farmers. Activities mentioned here are written only for example.

Special suggestion regarding gender:

Women's participation has to be ensured in every step mentioned earlier in this module. Without that, it has to be inspired and participated women in every step especially in the cost benefit analysis to let them feeling the freedom and empowerment in their family.

Attention: According to the opinion of the farmers and depending upon the group main work activity can be different. Here in the table only few work activities are given as example.

Special instructions for gender:

Women's participation has to be ensured in every step mentioned earlier in this module. Without that, it has to be inspired and participated women in every step especially in the cost benefit analysis to let them feeling the freedom and empowerment in their family.

#### **Module-0 4**

##### **Module title**

, **Disaster management in fish culture, recap of aquaculture and nutrition**

**Day: 7<sup>th</sup>**

**Time: 9:00-11:30 am**

**Duration: 2:30 hour**

##### **Overall aims of the module:**

Provide knowledge, skills and positive behavioral change to trainee about gender, disaster management in fish culture, culture method of orange sweet potato and hand wash; so that they can be able to do appropriate activities using that knowledge.

##### **Overall objectives of the module:**

At the end of this training participants-

- a. Can speak about gender, gender equality and equity, and class of men and women works.
- b. Can identify women role and participation fields in fish culture.
- c. Can take pre-preparation before facing natural disaster and can speak about things to do after disaster.
- d. Will know about culture method of orange sweet potato, and nutrition value and able to practice in real.
- e. Will know about hand wash technique and able to practice in real.
- f. Will be able to speak practical works of session with skill and can do.

**Module-04**

**Module title: Disaster management in fish culture, recap of aquaculture and nutrition**

**Training time-table**

**Facilitator: EF/FS**

**Participants: household fish farmers**

**Date:**

**Venue:**

Day	Time	Discussion subjects	Training methods
7 <sup>th</sup>	2:30 hr	<b>Module-4: , Disaster management in fish culture, recap of aquaculture and nutrition</b>	
		<b>Session-22 (Old 20):</b> preparation for disaster in fish culture <ul style="list-style-type: none"><li>➤</li><li>➤ Disaster and types of disaster</li><li>➤ Pre-preparation before disaster obligation and after disaster</li></ul>	Questions and answers, participatory discussion by presenting poster in hock board, team work and role-play
		➤	
		1.	
	11:00-11:30	<b>Special session:</b> practical and planning for implementation of famer’s activities <ul style="list-style-type: none"><li>➤ Practical</li><li>➤ Planning for implementation of famer’s activities</li></ul>	Hands-on and direct participation of farmers

**Module-4**

**Module title:** Disaster management in fish culture, recap of aquaculture and nutrition

**List of training materials used in the field level, practical and for dummy practical work:**

Training materials			
Title of sessions	Materials provided by project	Materials provided by staffs	Practical and dummy practical
<b>Session-22 (Old 20):</b> preparation for disaster in fish culture	1. Hock board, 2. Pictures of hock board, 8. Flip chart	1. Necessary materials for role-play,	2. Short drama/role-play related to responsibility for women during disaster,
<b>Special session:</b> practical and planning for implementation of famer's activities	1. Brown paper, 2. Art line, 3. Scale 4. Marker, 5. Hard clip, 6. Sign pen, 7. Rope etc		Hands-on and direct participation of farmers

**Module- 04**

**Session-22 (Old 20)**

**Day:** 7<sup>th</sup>

**Time:** 9:00-10:00 am

**Duration:** 60 min

**Title:** Disaster management in fish culture

**Target group:** household fish farmers

**Aims:** to provide idea on gender, role of women in fish culture, huge participation technique and preparation of disaster; so that they can be able to do proper activities using that knowledge.

**Objectives:** at the end of the session trainee can know and take effective steps about (vii) disaster and types of disaster and (viii) know about pre-preparation of disaster and take effective steps

- Introduction:**
1. Exchange greetings.
  2. Re-discussion of previous session.
  3. Describes aims and objectives of current session.
  4. Participate in the session of farmers' assessment.

5. Discussion on current session.

**Subjects:**

5. Disaster, types of disaster, disaster pre-preparation (questions and answers, participatory discussion by presenting poster in hock board).

6. Things to do after disaster (questions and answers, and participatory discussion by flip chart presentation)

**Summary:** 1. Re-discussion on main topics (questions and answers, and picture presentation in hock board).

2. Objective evaluation of session (questions and answers)

3. Get connected with next session.

**Training assistance materials:** hock board, pictures of hock board, flip chart, and essential materials for role-play.

**Session – 22 (Old 20)**

**Session procedure**

**(1) Technique: questions and answer, participatory discussion by presenting pictures in hock board; Time: 10 min**

**Working method:**



**Disaster, types of disaster, disaster preparation and management; (5)**

**Technique: questions and answers, participatory discussion by presenting pictures in hock board; Time: 15 min**

**Working method:**



In this part of this session, facilitator will welcome farmers and invite all for participate in this discussion.



Facilitator will ask farmers- what is disaster? What type of disaster you seen? And what kind of disaster

preparation and management steps can be taken in case of fish culture? Facilitator will know from farmers by questions and answers. Explain definition of disaster and will inform details about disaster by presenting pictures in hock board. After that, facilitator will discuss details about types of natural disaster in fish culture using example of previous session's acting and things to do for preparation, and will give exact idea on this topics by participatory discussion.

- At the end, do re-discussion on pictures presented in hock board by participatory methods and do verbal evaluation.

**Things to do after disaster; (6)**

**Technique: questions and answers, flip chart, and participatory discussion; Time: 5 min**

**Working method:**

- In this part of the session, facilitator will ask questions to participant- what can be mandatory things after disaster? What are your ideas about it? Facilitator will know from farmers by questions and answers, listen carefully their answers, and note down. After that, facilitator will give clear idea about this topics using flip chart by participatory discussion.
- At the end, do re-discussion in participatory methods and verbal evaluation.

**Session-22 (Old 20)**

**5. Disaster:** disaster is an unexpected occurrence that might be created by nature or human being. This disaster occurs suddenly or slow motion, as a result affected people can't get back their normal life with their own power. Rather most of the time needs assistance from outside for that.

**Types of disaster:** generally disaster is two types, such as, natural and human made.

- Natural disaster: cyclone and wind storm, flood, drought, earthquake, landslides and river slides, and tornadoes-sidr etc.
- Human made disaster: river pollution, fire, deforestation, climate change etc.

**Climate of Bangladesh:** Four climate seasons in Bangladesh are-

Season	Time	Weather related occurrence	Rainfall
Summer (prior to rainy season)	March-May	Kalboishaki, tornado, hailstorm, heavy storm, cyclone, storm, fire, drought, sudden flood	370 mm (17%)
Rainy season	June-September	Torrential rain, flood, river slides,	1625 mm (72.5%)
Autumn (subsequent of rainy season)	October-November	Cyclone, tornado, heavy storm	208 mm (9%)
Winter	December-February	Abnormal humidity, cold, very cold air	33 mm (1.5%)

Climate has been changing due to different natural and human made reasons. Greenhouse gas (such as, carbon dioxide, methane, nitrous oxide etc) has been increasing in atmosphere due to smoke from industry, engine fuel, air conditioner, refrigerator, chemical fertilizer and pesticides, and deforestation etc). Earth temperature is increasing due to greenhouse gas absorbs heat from the sun. That is called global warming.

**Pre-preparation of natural disaster:**

- Have to catch big fish from possible affected pond/gher every year prior to cyclone/rainy season starts.
- Have to repair pond dike strongly and make high. If possible make fence using net.
- Have to identify safe permanent place with proper security to keep fish culture materials, feed etc.
- Have to contact with local officers from Water Development Board for management and take care of respective area's dike and sluice gate so that saline water can't enter due to heavy ocean storm.
- Have to ensure proper management and caring of sluice gates.
- Have to apply enough feed in pond before disaster and make shelter using dry tree and bamboo branches.
- Have to receive training about how to face cyclone and preparation.
- Have to aware about recent information on disaster.

**6. Things to do after disaster:**

- A. Have to make a committee by volunteers just after disaster, which committee will work with disaster affected ponds.
- B. Note down details of affected ponds and submit these to respected office.
- C. Have to remove big tree branches and leafs immediately from pond.
- D. Have to clean inlet-outlet of pond
- E. Have to remove predatory and non-cultured fish
- F. Have to use lime after remove trees and leafs
- G. Have to visit pond/gher quickly to find out amount of damage fish property and if need have to get advice from field officer, fishery technologist, Upozila Fishery Officer.
- H. Have to take action to restock in pond if advised.

## Module-04

Session 23 : Recap on post-stocking management on Aquaculture

Session 24 : Recap on Human nutrition **Session – 25 A (Old 23)**

### Session procedure

**Food and nutrition; (1)  
participatory discussion and games;**

**Technique: questions and answer,  
Time: 10 min**

#### Working method:

- At this stage of training, facilitator greets and gives thanks to farmers and invites to participate in this session.
- Facilitator will ask farmers about food and nutrition; they will note answers according to their previous ideas.
- Facilitator will call participant to attend a game. By this game, participants will know about the source of food. Tell participant to stand as circle. Give paper to everyone hand where different components of food are written (such as protein, carbohydrate, fat, vitamin and minerals).

Let them understand the game: tell a name of food, for example mola or orange sweet potato or vegetable and take one of them. Participant will decide that food under which class of food classification. Everyone of that group will interchange place with each other from same group. For example if that food is “mola”, then it’s food classification will be protein and participants who are under protein, all will interchange place each other. Mention that, if you say “nutritious food” then everyone has to changes the place. Continue the game until everyone changes the place few times.

Now do question: which group changed place more? Why? Why we eat those foods more?

- At the end, do re-discussion in participatory methods and do verbal evaluation.

**Essential micronutrient iron and vitamin-A; (2-3)  
participatory discussion and games;**

**Technique: questions and answers,  
Time: 10min**

**Working method:**

- At the beginning of discussion of this part of the session, facilitator will invite farmers to attend.
- At this part of session, facilitator will ask farmers about essential micronutrient iron and vitamin-A.
- Now facilitator will request a volunteer to help. Facilitator will tell him to close his eyes or tie his eyes by clothes for a while. Request other participants for not talking and only focus on you. Take little bit salt and two glass of water, mix salt one of the glass. Tell volunteer to open eyes and analyze water in two glass.  
Do question: does water look different in appearance in two glasses? Different in smell? Tell him/her to drink little water from two glasses. Are they in different taste? How it happens? Tell other participants to discuss how much salt you put in glass (only little bit). Explain that a little bit salt makes so different in taste. Mention that, the importance of micronutrients components in human body is like a little bit salt. We need every micronutrients component as little amount, but these are so important, if someone can't take specific micronutrient components in sufficient amount then can be sick or physically or mentally disable. After that, tell them that we will re-discuss important information about iron and vitamin-A which discussed in earlier days-  
Team work:  
Do question: what can we do to avoid the symptoms of iron and vitamin-A deficiency?  
Answers can be: take proper foods or eat iron and vitamin-A contained foods. Once we want to eat iron and vitamin-A contained foods, we must know their source. Now request participants to make two different small teams and sit, give one set food card to each team. After that, tell one of the teams to find out the foods from food card where someone can get lots of iron and tell another team to find out vitamin-A contained foods. Give five minutes time to each team and request them to discuss in a big team after finish their team work.
- At the end, do re-discussion in participatory methods and do verbal evaluation.

Session-25 A (Old 23)

**Hand out**

**Food and nutrition and essential micronutrient iron and vitamin-A**

**1. Food and nutrition:** details discussion (module-02, session-06: food, nutrition, food components and classification of food according to function) see page number 47.

**Importance of eating more carbohydrate, protein and fat contained food:** to keep body active, to produce body heat and energy regularly, to fulfill the body that decay regularly, for cell and body growth, and to store extra energy we need to eat more amount of mentioned above three foods.

**Micronutrient components:** essential micronutrient iron and vitamin-A.

**2. Essential micronutrient iron:** details discussion (module-03, session-09: iron and its source, function, deficiency symptoms, prevention and cure) see page number 67-68.

**3. Essential micronutrient iron and vitamin-A:** details discussion (module- 04, session-12: vitamin-A and its source, function, deficiency symptoms, prevention and cure) see page number 88-89.

Module-04

**Session-25 B (Old 24)**

**Day: 8<sup>th</sup>**

**Time: 9:30-10:00am**

**Duration: 30 min**

**Title** : Nutrition and caring of lactating mother

Target group : household fish farmers

**Aims** : to provide proper knowledge on women nutrition and caring to trainee, supplement food for children and about hand wash; so that they can be able to know about mentioned above matters.

**Objectives:** at the end of the session trainee can know and explain details about (i) malnutrition cycle (ii) women nutrition and caring (iii) supplement food for children and (iv) importance of hand wash properly.

**Introduction** :

1. Re-discussion of previous session.
2. Describes aims and objectives of current session
3. Participate in the session of farmers assessment
4. Discussion on current session

**Subjects** :

1. Malnutrition cycle (questions and answers, participatory discussion by presenting pictures in hock board).
2. Nutrition and caring of pregnant women (questions and answers, VIIP card game and participatory discussion).
3. Nutrition and caring of lactating mother (questions and answers, VIIP card game and participatory discussion).
4. Children supplementary food and its importance (questions and answers, storytelling and participatory discussion).
5. Guidelines of suitable supplementary food for children according to age (questions and answers, and participatory discussion).
6. List of children's daily foods (questions and answers, participatory discussion by presenting pictures in hock board, and team work).
7. Importance of hand washes properly (questions and answers, participatory discussion, and practical).
8. Important time of had wash (questions and answers, participatory discussion).

**Summary:** 1. Re-discussion on main topics (questions and answers, and picture presentation in hock board).

2. Get connected with next session.

**Training assistance materials:** hock board, picture of hock board, orange sweet potato, mola, brown paper, 250ml bowl-1 etc.

Session- 25 B (Old 24)

### Session procedure

**Malnutrition cycle, nutrition and caring of pregnant, lactating mother; (1-3)      Technique: questions and answer, participatory discussion by presenting pictures in hock board, and team work;**  
**Time: 10 min**

#### Working method:

- At the beginning of this session discussion, facilitator will give thanks for listening previous session patiently and invites to participate in this session.
- At this part of session, facilitator will ask farmers what is malnutrition cycle, nutrition and caring of pregnant women, and why need to know about nutrition and caring of lactating mother.
- Facilitator will listen answers of mentioned above matters carefully and note down. After that, facilitator will present pictures in the hock board for farmers about malnutrition cycle, nutrition and caring of pregnant, lactating mother.
- After that, participants divide into four teams and requested to do team work according to following instructions- to know about the requirement of nutrition and caring of lactating mother. Team number-1: caring of pregnant women, (B) team number-2: nutrition of pregnant women, (C) team number-3: lactating mother, (D) team number-4: tell to do team work for fulfill the nutrition requirement of lactating mother. Farmer requests to team members to spread the VIIP cards (more than necessary) which was prepared earlier and request to put in the poster paper by masking tape. After that, tell every team to present their own team works.
- At the end, do re-discussion in participatory methods and verbal evaluation on presented picture in hock board and on poster paper's items.

**Supplement food for children; (4-5, 6?)      Technique: questions and answer, and participatory discussion by presenting pictures in the hock board;      Time: 10 min**

**Working method:**

- Facilitator will question to farmers- what are the supplement foods for children and their importance? What can be the guidelines of suitable supplementary food for children in different ages and what kind of impairment can be if they don't follow etc. Ask about these matters one by one.
- After that, facilitator will know from participant about what kind of food can be in the daily food list for children and listen answers carefully. Do participatory discussions with farmers about daily food list for 6-24 months old children that were prepared in brown paper earlier.
- Now facilitator will present five characteristics of supplement foods in the hock board that was written in VIIP card and read at the same time. What amount of food is mandatory daily for a child of 6-24 months old show in a chart that was prepared in brown paper earlier. After that, request everyone to raise one hand and explain five characteristics of supplement food using five fingers.
- After that, explain a food preparation guideline as a story with participants and tell them to listen carefully.

Story: Rehana will cook today supplement food for her daughter Rumi. Rumi is nine months old. At first, Rehana washed her hands, cooking ingredients, rice and dal (lentils) by clean safe water. After that, she puts pot in the cooker and then put suitable amount of oil, rice, dal and water. She added some spices for good smell. Once dal and rice is about to boil then she added mola head paste and half of orange sweet potato which was prepared before. Suddenly she remembers that there is leaf of orange sweet potato in her garden then she ran away and took some leaf then washed by safe water and added. Then she added proper amount of salt. Now she took out the food and made it cool then she squeeze little lemon on it and she made it soft. Now tell participants to compare 'five characteristics of supplement food' which is hanged in the hock board in card.

- a). Did that food increase energy and nutrition?
- b). Are components easily available?

- c). Was cooking technique clean and safe?
- d). Is it suitable for child?
- e). Is that food delicious?

Mention that everyday any of the protein contains food (any types of fish, meat, egg, liver) include with three types of food such as: (1) fish/mola/meat/egg, dal; (2) bright colored vegetables, yellow fruits and (3) rice have to feed to child.

- At the end, do re-discussion in participatory methods and do verbal evaluation.

**Hand wash; (7-8)                      Technique: questions and answers, games participatory discussion and practical;                      Time: 10 min**

**Working method:**

- Facilitator will ask questions to farmers- importance of hand wash properly? Will do some associate questions to farmers; for example, why need to hand wash properly? What are the steps before hand wash properly? What is the importance of keep clean hand for cleanliness and healthy? etc
- Facilitators will listen answers of farmers carefully and what kind of benefits can get for family members if hands wash properly by participatory discussion.
- Tell every participant to follow you by standing as a circle. Raise right hand then keep in stomach and rub it as circular shape. Wait till all participants touch their hand for few times. Then tell them to stop. Raise left hand and draw a positive sign (+) in the air. Draw some more till all participants draw some positive sign by their left hand, now tell them to do both works at the same time; draw positive sign with left hand and right hand move as circle. Observe for a while and see what happen, most of the people can't do easily two different works with two hands. Mention that, now we will discuss one work which we can do by both hands. Ask participants when should wash hands. Write down the answers in brown paper and ask them why those times are important. If

following times are not discussed then include. In discussion, give priority for hand wash especially before prepare foods and before feed children. Germs can enter directly into children mouth, for that do re-discussion of suitable time tables for hand wash. Practice hand wash properly using tippy tap.

Do question: how do we wash hand to clean properly? Request any of the volunteer to show the technique of hand wash, after that explain the steps of proper hand wash and explain that it is very important to wash hand properly so that children can learn it from their parents.

➤ At the end, do re-discussion in participatory methods and do verbal evaluation.

## Session-25 B (Old 24) Hand out

### Women nutrition and caring, supplement food for children and hand wash

#### Topics number 1-3

**Women nutrition and caring:** details discussion (module-05, session-16: nutrition and caring of pregnant, lactating mother) see page number 114-115.

#### Topics number 4-6

**Supplement food for children:** details discussion (module-06, session-19: supplement food for children, its importance and guidelines of foods according to age) see page number 136-137.

Characteristics of children supplement foods:

- (i). contains with energy and nutrition components (as children eat less amount so nutrition contained foods are so important).
- (ii). Clean and safe (plates must be clean, foods have to be fresh and recently prepared and must wash hand with soap who prepare foods and feed child).
- (iii). Available and affordable (most of the foods can come from home garden or farmed fish from home).
- (iv). Soft and easily edible for children (food should be soft, but not liquid).
- (v). delicious and enjoyable (food will be thrown from mouth if child doesn't like the taste of food).

#### Topic number 7-8

**Hand wash:** details discussion (module-07, session-22: important of hand wash properly, steps and use of tippy tap). See page number 158.

#### Some important information related to food and nutrition:

- (i). there are many nutrition components in food. In different foods contain different types of nutrition and in different amounts. We need to eat every nutrient contains food every day in proper amount to maintain good and sounds health.
- (ii). Fish, meat, egg, liver or dal, peanut, seed contained food eat every day (protein contained food have to select in terms of family ability) which help for physical growth and fulfill the damage.
- (iii). Bright green vegetables, colored and yellow colored fruits (such as, spinach, colocassia, green vegetables, orange sweet potato leaf, sweet pumpkin, carrot, and ripen mango, ripen jackfruits, ripen papaya, lime, guava, pomelo, aonla, hog plum etc), must eat one of the vegetables and fruits everyday among them, because we can get different types of vitamin from those foods, which prevent our body from sickness.

- (iv). Have to eat iron contained food every day and if possible have to eat one iron contained food from animal source every day (in terms of family ability).
- (v). have to eat vitamin-C contained foods every day for well-functioning of iron related foods in body, for example, lime, or any sour type fruits, green chili, guava etc.
- (vi). Vitamin-A is important to increase immune system of the body by fighting against germs and protect from sickness. So need to eat vitamin-A contained foods every day.
- (vii). Have to cook by vitamin-A contained oil so that body can get vitamin-A easily from foods.
- (viii). after six months of children age, have to give vitamin-A capsule minimum twice in a year. Can get this capsule for free of cost at health center and in national vaccine day.
- (ix). Have to eat little more food with regular three times food during pregnancy.
- (x). have to take one iron table after dinner during pregnancy.
- (xi). Have to be free from heavy works (such as, use tube-well, pull heavy things, more/heavy clothes wash) and avoid difficult works.
- (xii). after three months of pregnancy, have to take two calcium table every day (morning and afternoon) in full stomach.
- (xiii). Minimum four times have to check health during pregnancy.
- (xiv). Have to eat little more food in every meal for lactating mother, extra foods helps to increase breast milk for child and fulfill mother's body requirement.
- (xv). Have to give all kind of nutritious foods to pregnant and lactating mother, for example, egg, milk, fish, small fish, Mola, meat, dal, and green, yellow and orange colored vegetables and fruits.
- (xvi). everybody in family have to help pregnant and lactating mother's daily activities.
- (xvii). Pregnant and lactating mother need enough rest.
- (xviii). Have to take a high power vitamin-A capsule (2,00,000 IU, 1 capsule) within fourteen days of delivery.
- (xix). Have to take one iron tablet every day after baby birth to till three months of breast feeding.
- (xx). after baby born, minimum four times need to check up by trained health care provider.
- (xxi). everybody in family have to eat iodine contained salt.

\*IU= International Unit

\*1 ml= 3,333 IU

#### **Module 4**

### Session-25 C (Old 25)

**Day:** 8<sup>th</sup>

**Time:** 10:00-11:00 am

**Duration:** 60 min

**Title** : nutrition value of orange sweet potato and mola, recipe and preservation methods

**Target group** : household fish farmers

**Aims** : to provide proper knowledge on nutrition value of orange sweet potato and mola, recipe and preservation methods to trainee; so that they can be able to know technical methods of mentioned above matters.

**Objectives:** at the end of the session trainee can know, explain details and can do in real about (i) nutrition value of orange sweet potato (ii) nutrition value of mola (iii) cooking orange sweet potato and mola maintaining nutrition value and (iv) preservation methods of orange sweet potato and mola and procedure of pickle making of mola.

**Introduction** :

1. Re-discussion of previous session
2. Describes aims and objectives of current session
3. Participate in the session of farmers assessment
4. Discussion on current session

**Subjects** :

1. nutrition value of orange sweet potato (questions and answers, participatory discussion).
2. nutrition value of mola (questions and answers, and participatory discussion).
3. cooking orange sweet potato and mola maintaining nutrition value (questions and answers, participatory discussion and practical).
4. preservation methods of orange sweet potato and mola and procedure of pickle making of mola.( questions and answers, participatory discussion and practical).

**Summary:**

1. Re-discussion on main topics (questions and answers, and picture presentation in hock board).
2. Get connected with next session.

**Training assistance materials:** hock board, picture of hock board, orange sweet potato, mola, brown paper, necessary ingredients for cooking such as knife, bowl, chili, salt, onion, garlic etc.

**Session- 25 C (Old 25)**

### Session procedure

**Nutrition value of orange sweet potato and mola; (1-2)  
answer, and participatory discussion;**

**Technique: questions and  
Time: 15 min**

#### Working method:

- At the beginning of this session discussion, facilitator gives thanks for listening previous session patiently and invites to participate in this session.
- Facilitator will ask farmers about nutrition value of orange sweet potato and mola; will note down if someone has any idea.
- After that in this part of the session, facilitator will inform in details about nutrition value of orange sweet potato and mola by participatory discussion.
- At the end, will do re-discussion by participatory method and verbal evaluation.

**Nutritious recipe of orange sweet potato and mola; (3)  
participatory discussion and practical;**

**Technique: questions and answer,  
Time: 30 min**

#### Working method:

- At this part of session, facilitator will ask farmers about nutritious recipe of orange sweet potato and mola and note down if someone has any idea. Later, will tell in details about that matter by participatory discussion. If possible can show farmers how to cook orange sweet potato and mola and treat them.
- At this part of session, facilitator will show hands-on technique of orange sweet potato and mola cooking maintaining nutritious value with farmers participation.
- At the end, do re-discussion in participatory methods and verbal evaluation.

**Preservation methods of orange sweet potato and mola and procedure of pickle making of mola;  
(4)**

**Technique: questions and answer, participatory discussion and practical;**

**Time: 15 min**

**Working method:**

- Facilitator will ask question to farmers- why necessary to preserve orange sweet potato and mola? What are the ways of orange sweet potato and mola preservation? And note down the answers of farmers. After that, facilitator will discuss in details about importance of orange sweet potato and mola preservation and different methods of preservation with farmers.
- At this part of session, facilitators will ask farmers about making pickles of mola. Note down if someone has any idea. After that, will tell details how to make pickle from mola and if possible make pickle of mola and show to farmers.
- At the end, do re-discussion in participatory methods and verbal evaluation.

## Session-25 C (Old 25)

### Hand out

#### Nutrition value of orange sweet potato and mola, recipe and preservation methods

**1. Nutrition value of orange sweet potato:** orange sweet potato is very familiar to many people in our country but very few people know as a big source of vitamin-A. Nutritious value of orange sweet potato are given below:

- There are lots of vitamin-A, C and minerals in orange sweet potato which help to prevent from night blindness and have significant impact for keeping good eyesight. Should keep proper amount of orange sweet potato in daily meal for children, adolescent boys and girls, pregnant, and postnatal women.
- The leaf of this potato is source of vitamin-A, B and C.
- As its containing vitamin-A, C and other nutrition values, it helps to keep vital and bright skin.
- 125 gm of orange sweet potato can fulfill the daily vitamin-A requirement of a child.
- Help from decay of bone and teeth and keep strong.
- Orange sweet potato control diabetes, prevent heart disease and reduce the risk of cancer.
- Help to produce hemoglobin in blood.

**2. Nutrition value of mola:** Mola contains protein and easily digestible. Mola contains lots of protein, vitamin-A, calcium, iron and other components of nutrient. Those components increase the power of disease prevention of human body. Mola has important contribution to prevent night blindness and anemia as it's contains of vitamin-A and iron. Calcium of mola can compare with milk. Oil of mola reduces the risk of having stone in kidney.

**3. Cooking orange sweet potato maintaining nutrition value:** after 70-80 days of plantation of branch till harvest of potato, without taking of main branch and take suitable amount of branch from nearby and collect leaf then can eat. In that case, sweet potato, young branch, and leaf have to wash thoroughly by clean water and then cut and cook.

#### **Orange sweet potato and leaf can eat in different ways of cooking-**

- i). **in raw condition:** potato can eat as raw after wash thoroughly using clean water.
- ii). **Boiling:** can eat after boiling in water and peel out.

**iii). Burn:** after finish cooking for family, potato can keep in hot cooker for a while and can eat.

**iv). Making mash:** first boil potato in water then mix salt, oil, green chili, and onion then can easily make delicious mash and eat.

**v). Halwa:** orange sweet potato can eat making halwa as well. That kind of halwa is favorite and delicious to small kids.

**vi). vegetable curry:** leaf of orange sweet potato can cook with small fish and eat. But its more delicious if cook with dry fish or prawn.

**Noticeable:** small fish should not cook for long time. Most of the cooking should finish within maximum 10-15 minutes. If other cooking ingredients take long time to boil/cook then small fish should add 10-15 min before finishing cooking.

#### **4. Preservation methods of orange sweet potato and mola and procedure of pickle making**

**of mola:** after harvesting, have to collect adult/healthy sweet potato and keep two days under shadow, then preserve potato as pile in bamboo cage. When keep in bamboo cage then keep 1-2 feet distance from each pile. In that case, it's better to use tobacco grain or grain of neem leaf between two piles to protect from harmful insects. Orange sweet potato can store up to few months in that method. Apart from that method, can preserve in sand hole, dry condition and cold storage.

#### **Mola preservation:**

**i). easy fish preservation method using ice:** fish and ice can keep as pile in small bamboo cage. Need to use a thick white plastic cover surrounding inside the bamboo cage after wash it using clean water. After that, have to fill small bamboo cage/wood box with one part fish and another part with ice. After making full of cage/box then give some ice and sew with small part of sack then close the cage. Fish can preserve 7-10 days if do proper care, use ice and fish proper ratio and proper storage box. In case of preservation, in winter, fish: ice ratio would be 2:1 and in summer, 1:1.

**ii). preservation by drying in sun:** Mola can preserve by drying in the sun as well, dry fish contains up to 60-70% protein. In that case, well dry fish can preserve in container.

**Pickle making of mola:** To make pickle of mola, the fish has to sort out and remove the gut and then has to wash using clean water gently and then has to fry 3-4 min in vegetable oil. After that, all ingredients such as salt, chili powder, cumin powder, garlic, olive paste, etc has to mix well with lightly fried fish and then preserve in glass container with full of oil or vinegar. Pickle can be preserved up to 6 months by keeping in room temperature. But if it is stored in normal fridge then it can be preserved more than one year. It is better if the container is kept under sun at least once in a month.

### **Extra hand note for facilitator**

**Recipe:** chop of mola (duration: 40 min)

**Necessary ingredients for making mola chop:** Mola- 250 g, orange sweet potato/potato- 100 g, onion- 50 g, green chili- 1-2 pcs, ginger paste-1 spoon, cumin powder- 1 spoon, iodine salt- as per taste, soybean oil- 2 spoons, coriander leaf- suitable amount.

### **Making procedure:**

- Remove intestine and tail of mola and wash thoroughly. Pay attention during washing time that fish head and other parts are not washed away and not wash for long time.
- Wash orange sweet potato and boil using safe water. Peel out boiled potato and mash by hand.
- Wash green chili and cut as round shape and wash coriander leaf using safe water and cut into very small pieces.
- Peel out onion, wash then cut into small pieces.
- Wash grinder using safe water and grind washed fishes.
- After that, mix all thoroughly ingredients with mashed orange sweet potato except oil and make round and then chop shape.
- Put oil in pan and wait till oil become hot, fry chop in hot oil like brown color.

### **Main message:**

**Can get from ingredients:** carbohydrate and vitamin-A from orange sweet potato, energy from oil, and help to absorb vitamin-A, iron from coriander leaf, vitamin-A and vitamin-C, vitamin-C from green chili, and get vitamin and minerals from used spices for cooking.

### **Things to do:**

- Have to wash hand thoroughly by safe water and soap before start cooking.
- Have to wash every cooking ingredients using safe water.
- Have to cook with medium heat for short time.
- Cooked food has to cover and keep in clean and dry place.
- Have to wash hand properly by safe water before eating.
- Must use iodine salt during cooking.
- Never should cook small fish for long time. Most of the cooking has to finish within 10-15min.

**Note:** Mola chop is suitable and delicious for all family members besides children, for example, for pregnant and lactating mother as well. Apart from this, other recipes such as halwa of orange sweet potato, dry curry of mola, mola-vine spinach/cooking of orange sweet potato leaf, cooking fish kedgerree, mash of mola head etc prepared in next part also suitable for children, pregnant and lactating mother.

**Recipe:** halwa of orange sweet potato (duration: 50 min)

**Ingredients:** orange sweet potato (boiled and mashed)- 250 g, suger-125 g, soybean oil- 4 spoon, milk-250 g, cardamom, 2-3 pcs, cinnamon, 1-2 pcs, bay leaf, 1-2 pcs.

**Making procedure:**

- Wash sweet potato and boil using safe water. Peel out boiled orange sweet potato and mash by hand or it's good if boiled sweet potato can mash in grinding stone after wash grinding stone by safe water.
- Put oil in pan and wait till become hot. After that, put cardamom, cinnamon and bay leaf in hot oil then fry little bit and put pasted orange sweet potato and stir slowly.
- After that, put milk in it and stir frequently so that not sticks in the pan.
- Once mixer become thick then put sugar and stirs frequently.
- Once mixer become very thick and come out from pan then take it from cooker.

**Main message:**

**Things get from ingredients:** carbohydrate and vitamin-A from orange sweet potato, energy from oil, and help to absorb vitamin-A, protein from milk, carbohydrate from sugar, and get vitamin and minerals from used spices for cooking.

**Things to do:** See from mola chop cooking 'things to do' from main message (page number-177).

**Dry curry of mola (40 minute)**

**Ingredients:** Mola- 250 g, sweet pumpkin- 100 g, tomato- 1 pcs, onion- 50 g, green chili- 1-2 pcs, turmeric powder- ½ spoon, coriander powder- ½ spoon, iodine salt- as per taste, soybean oil- 2 spoon, coriander leaf- suitable amount.

**Making procedure:**

- Remove intestine and tail of mola then wash thoroughly. Pay attention during washing time that fish head and other parts are not washed away and not wash for long time.
- Peel out sweet pumpkin and wash by safe water then cut into big pieces.
- Wash tomato by safe water and cut into four pieces.
- Wash green chili and cut into two pieces from middle.
- Wash coriander leaf by safe water and cut into small pieces.
- Peel out onion, wash and cut finely.
- All ingredients mix together except green chili and coriander leaf and put in pan and with closed lid.
- After 10 min take out the lid and stir little bit then put green chili and coriander leaf and cover it back.

**Note:** grind fish, fish head and fish bone by hand before feed children or feed with rice after grinding in grinding stone.

**Main message:**

**Things get from ingredients:** vitamin-A from sweet pumpkin, energy from oil, and help to absorb vitamin-A, iron from coriander leaf, vitamin-A and vitamin-C, vitamin-C from green chili and tomato, and get vitamin and minerals from used spices for cooking.

**Things to do:** vegetable have to cut into big pieces to maintain nutrition value, must use oil for cooking. See remaining part from mola chop cooking 'things to do' from main message (page number-177).

### **Mola-vine spinach/orange sweet potato leaf curry cooking (40 min)**

**Ingredients:** Mola- 250 g, vine spinach/sweet potato leaf/any vegetable- 100 g, onion- 50 g, green chili- 1-2 pcs, turmeric powder- ½ spoon, coriander powder- ½ spoon, iodine salt- as per taste, soybean oil- 2 spoon, coriander leaf- suitable amount.

#### **Making procedure:**

- Remove intestine and tail of mola then wash thoroughly. Pay attention during washing time that fish head and other parts are not washed away and not wash for long time.
- vine spinach/sweet potato leaf/any vegetable have to wash using safe water and cut into big pieces.
- Wash green chili and cut into two pieces from middle.
- Wash coriander leaf using safe water and cut into finer pieces.
- Peel out onion, wash and cut into finer pieces.
- Heat oil in pan. Put finer pieces of onion, ginger paste, turmeric powder and little water in hot oil then make it gravy.
- After mix all spices thoroughly then put mola and vine spinach/sweet potato leaf/any vegetable then put little water for boil and cover it.
- After 10 min take out the cover, put salt as per taste and stir little bit then put green chili and coriander leaf and cover it back and have to take out after 2 min.

**Note:** grind fish, fish head and fish bone by hand before feed children or feed with rice after grinding in grinding stone.

#### **Main message:**

**Things get from ingredients:** micronutrient iron and vitamin-A from vine spinach/sweet potato leaf/any vegetables, energy from oil, and help to absorb vitamin-A, iron from coriander leaf, vitamin-A and vitamin-C, vitamin-C from green chili, and get vitamin and minerals from used spices for cooking.

**Things to do:** See from mola chop cooking ‘things to do’ from main message (page number-177).

#### **Fish kedgerree cooking exhibition:**

**Ingredients:** rice-500 g, dal (lentil/moong dal/peas/any dal)-200 g, fish (mola/rohu/tilapia)- 250 g, vegetable (sweet pumpkin, orange sweet potato, bean/carrot, cauliflower)- 150 g, green vegetable (vine spinach/leaf of orange sweet potato/spinach)- 100 g, tomato- 2 pcs, soybean oil- 4 spoon, bay leaf- 3-4 pcs, mix spices- ½ spoon, onion-50g, ginger paste- 1 spoon, garlic paste- 1 spoon, iodine salt- as per taste, green chili- 3-4 pcs, coriander leaf- according to taste, turmeric powder- 1 spoon, coriander powder- 1 spoon, cumin powder-1 spoon, and water- appropriate amount.

**Making procedure:**

- Rice and dal have to clean very well then wash and keep it aside for absorb the water.
- Green vegetables (vine spinach/spinach/orange sweet potato leaf) have to clean very well then wash and cut it into big pieces and wash vegetables (sweet pumpkin, orange sweet potato, bean/carrot, cauliflower) then cut into medium pieces.
- Tomato has to cut into four pieces.
- Remove intestine and tail of mola then wash thoroughly. Pay attention during washing time that fish head and other parts are not washed away and not wash for long time.
- Wash grinding stone using safe water and mash washed fish in grinding stone and keep in clean pot.
- In case of big fish, fishes have to boil in little water and remove bones, and use boiled fish water for cooking.
- Peel out onion, wash and cut into fine pieces. Wash coriander leaf and cut into fine pieces.
- Cut green chili into two pieces from middle.
- Put suitable amount of oil in a big pot or pan then put in cooker and fry onion pieces for 2 min. Once onion become little reddish color then put ginger paste, garlic paste, bay leaf, mixed spices, turmeric, coriander and cumin powder and stir it and put little water and make it gravy.
- After that, put rice and dal in that spices and make gravy for 2 min.
- Put suitable amount of water and cover it then cook it for 15-20 min so that rice, dal boil and water become thick.

- After that, open the lid and put vegetable and pasted/sorted fish and stir little bit. Once vegetable is boiled then reduce heat and cover it back after that put salt and stir.
- Before take out put green chili and coriander leaf then take out from cooker.

**Main message:**

**Things get from ingredients:** vine spinach/spinach/orange sweet potato and colored vegetables; such as sweet pumpkin, orange sweet potato, bean/carrot, cauliflower etc can get vitamin-A, iron, calcium and folic acid from them, energy from oil and rice, protein from dal, protein-iron and vitamin-A from fish; iron, vitamin-A and vitamin-C from coriander leaf, vitamin-C from tomato and green chili, and get vitamins and minerals from used spices for cooking.

**Things to do:** all kind of vegetables have to wash using safe water before cut; don't keep vegetables in water after cut, vegetables leaf and other vegetables have to cut into big pieces. See remaining part from mola chop cooking 'things to do' from main message (page number-177).

**Mola head mash:**

**Ingredients:** Mola-250 g, turmeric powder 1/4 spoon, onion 1-2 pcs, garlic 1-2 pcs, green chili 1-2 pcs, iodine salt-as per taste, soybean oil 1 spoon, and mustard oil 1 spoon.

**Making procedure:**

- Beheaded mola and wash head thoroughly. During wash have to be careful that not wash for long time.
- Peel out onion and garlic then wash and cut into fine pieces and wash green chili.
- Put soybean oil in pan and wait till become hot.
- After that, washed fish head mix with little turmeric powder and suitable amount of salt then stir in oil.
- Once head stirring is done then put onion, garlic pieces, and green chili and then stir it again for a while.
- After that, add other ingredients with pasted fish head then mix with fish head.
- At the end, mix mustard oil with pasted fish head and make mash.

**Main message:**

**Things get from ingredients/(Nutrient availability from that recipe):**

Micronutrients like iron and vitamin A are found from spinach/OSP leaves, energy is found from oil and that oil helps to dissolve vitamin A, iron, vitamin A and vitamin C can be found from coriander leaves, vitamin c can be found from Chile and vitamin and minerals can be found from different types of spices that are used.

**Things to do:** See from mola chop cooking ‘things to do’ from main message (page number-177).

**Nutritional value of orange sweet potato and mola:**

The amount of nutrition components of orange sweet potato and young branch per 100 g are mentioned below:

Nutritional components	Amount	
	Pulp	Young branch
Water	70 g	87 g
Carbohydrate	20 g	6 g
Protein	2 g	4 g
Fiber	3.3 g	2 g
Sugar	4 g	–
Calcium	34 mg	37 mg
Phosphorus	54 mg	94 mg
Iron	0.5 mg	1 mg
Zinc	0.2 mg	0.3 mg
Potassium	298 mg	518 mg

Sodium	36 mg	9 mg
Vitamin-A	719 µg	308 µg

Nutritional components of mola per 100 g are mentioned below:

Nutritional components	Amount
Energy	108 kcal
Protein	17.1 g
Fat	4.4 g
Vitamin-A	2680 µg
Calcium	767 mg
Iron	3.8 mg
Zinc	3.19 mg

### Measurements

#### General measurement:

##### Solid material:

1 metric ton = 1000 kg = 26.8 mon

1 quintal = 100 kg = 2.68 mon

1 mon = 37.32 kg = 0.37 quintal

1 kg = 1.07 ser = 2.02 pounds

1 ser = 0.93 kg = 0.933 pounds

##### Liquid:

1 gallon = 8.36 pounds = 4.5 liter = 3800 cc  
1 cubic foot = 7.5 gallon = 62.4 pounds = 28354.3 g

**Dimension:**

1 decimal = 435.6 square feet = 40.48 square meter  
1 bigha = 0.33 acre = 33 decimal  
1 acre = 100 decimal = 0.405 hectare  
1 hectare = 2.47 acre = 10,000 meter  
1 kilometer = 0.62 mile  
1 meter = 3.28 feet = 1.094 gauge  
1 cubic meter = 1.30 cubic gauge = 35.31 cubic feet  
1 cubic feet = 0.028 cubic meter = 27 liter  
1 square meter = 10.76 square feet

**General amount:**

1% salt = 10 g/liter  
1 : 10,000 = 1 milliliter/10 liter  
1 : 40,000 = 1 milliliter/40 liter  
1 decimal = 40.48 square meter  
33 decimal = 1336.03 square meter = 0.33 acre = 0.133603 hectare  
100 decimal = 4048.58 square meter = 1 acre = 0.4048 hectare  
247 decimal = 1000 square meter = 2.47 acre = 1 hectare

1 meter depth 1 hectare area pond contains 10,000 cubic meter water  
1 cubic meter water = 1000 liter and weight is 1 metric ton = 1000 kg = 1 million g

1 meter = 100 centimeter = 39.37 inch = 3.2808 feet  
2.54 centimeter = 1 inch  
1 feet = 30.48 centimeter  
1 cubic meter = 35.3434 cubic feet  
1 ppt = parts per thousand  
1 ppm = parts per million

