



THE INTEGRATED MANAGEMENT OF LAGOON ACTIVITIES
FAO GCP/VIE/029/ITA PROJECT

REPORT ON
FRESHWATER FISH NURSERY PILOT IN
LOC TRI AQUACULTURE FISHERIES ASSOCIATION

By
Dang Nguyen Duy Ngoc

Hue, September 2009



PEOPLE'S COMMITTEE OF THUA THIEN HUE PROVINCE



REPORT ON
FRESHWATER FISH NURSERY PILOT IN
LOC TRI AQUACULTURE FISHERIES ASSOCIATION

Written by
Dang Nguyen Duy Ngoc
IMOLA technical staff

Hue, September 2009

TABLE OF CONTENTS

| | |
|--|----|
| I. INTRODUCTION | 3 |
| II. PILOT SUMMARY | 4 |
| III. PROCEDURE | 6 |
| 1. Technical training | 6 |
| 2. Technical process | 6 |
| a. Pond selection | 6 |
| b. Pond preparation..... | 6 |
| c. Fingerling stocking | 7 |
| d. Care taking:..... | 7 |
| e. Nursery pond management..... | 8 |
| f. Monitoring environmental parameters | 9 |
| 3. Outcomes | 11 |
| IV. EVALUATION OF THE PILOT | 13 |
| V. COMMENTS | 14 |
| 1. Advantages | 14 |
| 2. Disadvantages | 14 |
| 3. Lessons learnt..... | 14 |
| 4. Sustainability of the pilot | 15 |
| VI. CONCLUSION AND PROPOSAL..... | 16 |

I. INTRODUCTION

In Thua Thien Hue province, besides the lagoon area of 22,000 ha of the lagoon, there is also a system of ponds, springs and reservoirs with the estimated area of 10,000 ha.

The freshwater fish culture has been introduced for quite a long time; culture targets and types are diverse (i.e. tanks, small ponds, springs, cages and so on); the investment level is affordable for many households. Most of freshwater fish culture take place springs, lakes, reservoirs and ponds in poor rural areas, mountainous regions or tidal flats where communities are facing varieties of difficulties.

With the aims of improving the livelihoods, hunger alleviation and poverty reduction, agriculture structure alteration in communes in tidal flats, remote and difficult areas, and especially creating the conditions for the application of advanced technologies into production and being active in access to the in-the-spot fingerling source, the initiative of fry to fingerling nursery model has been considered as a good alternative. To help farmers get approach to the techniques of from-fry-to-fingerling nursery, Loc Tri aquaculture FA and IMOLA project collaborated to conduct the pilot namely nursery pilot from fry to fingerlings of grass carp, tilapia and common carp. These species grow fastly, are easily cultured and preferred by local farmers, especially farmers in the remote areas and tidal flats.

*** The necessity of the this nursery pilot includes:**

- Creating the budget for the effective operation of the aquaculture FA;
- Providing the cheap and high quality fish fingerling source for FA and commune members;
- Generating the cohesion between members and the FA Executive Board (via training and conference so that members can share experience and learn from one another);
- Establishing a sustainable income generating activity for the FA;
- Improving the management capacity for the FA Executive Board (EB)

II. PILOT SUMMARY

Table 1.

| | |
|------------------------|---|
| Pilot name: | Nursery pilot from freshwater fries to fingerlings (grass carp, tilapia and common carp) |
| Conducted by: | Loc Tri 1 Aquaculture FA |
| Budget source | <ul style="list-style-type: none"> • IMOLA Project • Contribution from aquaculture FA and farmers |
| IMOLA technical staff: | Dang Nguyen Duy Ngoc |
| Venue: | Loc Tri aquaculture FA |
| Scale: | 4 pilot farmers are members of Loc Tri aquaculture FA |

Table 2. Pilot farmer list

| No. | Full name | Village | Area | Culture target |
|-----|---------------------|-------------|---------------------|-----------------------|
| 1 | Mr. Le Phu Dang | Cao Doi xa | 200m ² | Tilapia + common carp |
| 2 | Mr. Cai Khieu | Hoa Mau | 200m ² | Tilapia + common carp |
| 3 | Mr. Le Xuan Go | Trung Phuoc | 650m ² | Grass carp |
| 4 | Mr. Nguyen Van Sinh | Trung An | 600m ² | Tilapia + common carp |
| | Total | | 1,650m ² | |

* Stocking density, quantity and fry size

- Density: 30 units/m²
- Grass carp: 19,500 units; tilapia: 18,000 units and common carp: 12,000 units
- Fish size: grass carp: 2 cm; common carp: 4-6 cm and tilapia: 4-6 cm

Table 3.

| No. | Full name | Village | Species | Quantity (unit) | Price (VND) |
|-----|---------------------|-------------|-------------------------|-----------------|-------------|
| 1 | Mr. Le Phu Dang | Cao Doi Xa | Tilapia and common carp | 3,600 2,400 | 110 150 |
| 2 | Mr. Cai Khieu | Hoa Mau | Tilapia and common carp | 3,600 2,400 | 110 150 |
| 3 | Mr. Le Xuan Go | Trung An | Grass carp | 19,500 | 100 |
| 4 | Mr. Nguyen Van Sinh | Trung Phuoc | Tilapia and common carp | 10,800 7,200 | 110 150 |
| | Total | | | 49,500 | |

Table 4. Time frame

| | |
|------------|---|
| 21/04/2009 | Fish fingerling nursery technique training + pond selection |
| 28/04/2009 | Pond preparation |
| 13/05/2009 | Fingerling stocking |
| 15/06/2009 | Premilinary workshop and fingerling introduction to members |
| 18/6/2009 | Initial harvest |

*** Objectives:**

- Enable members to get approach to the fingerling nursery techniques
- Generate the income for FA operation
- Provide the fingerling source with high quality and cheap price to FA members
- Duplicate the pilot in the whole FA

III. PROCEDURE

1. Technical training

The training on the freshwater fingerling nursery was conducted at the CPC meeting hall before the pilot came into practice. The training focused on pond preparation, fingerling selection and bathing, lime stocking methods, feeding techniques, pond cleaning and management for 4 pilot farmers and other 14 farmers in the commune. Before stocking fingerlings, we selected the pond of Mr. Cai Khieu for on-site training, i.e. pond preparation, pond bottom dredging, clearance, lime stocking, pond bed drying, dung and green fertilizer stocking, water intaking, net installation and so on. The other three households were also at the place.

2. Technical process

a. Pond selection

The pond to be selected shall:

- be accessible to the good water source and have a fine drainage system
- have the area of more than 200 m², 1.0-1.5 m deep
- receive a lot of sunlight and be not shadowed
- have a solid dyke with no risk of leakage and 0.3-0.5 m higher than the highest water level

b. Pond preparation

- Dry the pond, collect all trash fish, and eradicate predators
- Mend the pond dyke, build the canals, clear weeds on the pond dyke and seal up holes
- Eradicate the predators in the pond by using rackets and releasing ducks into the pond; add water at one pond end and discharge water at the other end to let the mud flow out.
- Dredge the mud at the pond bottom and leave only a layer of 10 cm
- Lime stocking: Distribute the lime powder over the pond with an amount of 10 kg/100 m²; stir it with the pond mud. Dry the pond bed in 3-4 days. Lime stocking is aimed at getting rid of acidity, aluminium and parasites; in addition, making the pond bed fertile and creating the aeration and activating the protein and phosphorus metabolism micro-organisms. In case the nursery pond is near lagoons, lakes and rice fields, net has to be set around the dyke to avoid the invasion of predators.

* Base fertilizing is aimed at enhancing the nutrients for the pond, and producing available natural feed. Base fertilizing should be applied 5-7 days before the fingerling stocking; avoid too early or too late fertilizing.

- Stock the compost dung with 40 kg/100 m²
- Stock green fertilizers (*lá cộng sản*) with 30 kg/100 m²

* Water supply: Add water into the pond 2-3 days before stocking; set the net or bamboo screen at the sewage to prevent the invasion of predators

* Eradication of backswimmers before the fingerling stocking:

Make a bamboo or Neohouzeaua (núa) frame of around 2 m² and let it float on the water surface; set a light at the frame side or in the middle, 1 metre from the pond surface; pour 8 ml/2m² of gasoline on the frame. Backswimmers like swimming towards shining source and sometimes they swim up to the pond surface so they will face the risk of suffocation. This frame can be positioned at various pond corners to kill more backswimmers.

c. Fingerling stocking

- Fingerlings were purchased at the Provincial Centre for freshwater fingerlings level 1 to ensure the quality and quantity (Mr. Thuyen, the FA head and Ms. Nhan came directly to Cu Chanh hatchery to buy fingerlings)
- Stocking time: May, 13th, 2009. The stocking quantity was 49,500 units (grass carp, common carp, and tilapia)
- After stocking, we saw no fish death; fishes were active and hunted for preys well

d. Care taking:

Feed was periodically provided by the Project. The quality and quantity of fine feed was sufficiently provided to be in line with the fish feeding features.

*** Feed for grass carp:**

- Fine feed equivalent to 2-5% of fish weight; combine with green feed in accordance with fish consumption ability
- At this stage, grass carp loves eating chopped green feed (duckweed, vegetables, young grass, cassava leaf, etc.)
- Green and fine feed are put in the frame set float on the water surface; monitor feed consumption daily to have an appropriate increase or decrease to avoid the deficiency or surplus of feed
- Feed is given twice per day in the morning at 7-8 AM and 4-5 PM

*** Feed for tilapia:**

Fry (21 days) to fingerling stage:

- Use feed of soft powder such as fish powder, rice bran, soya bean powder and so on; feed should consist of 30 % of protein. The feed amount should be 0.2-0.3 kg/ten thousand of fingerlings/day.
- Feed twice per day in the morning from 7-8 AM and 4-5 PM. Besides the above feed, we also use Vitamin C of 3-5 g/kg of feed to mix into the feed to increase the resistance to fishes;

Fry to fingerling stage:

- Use powder feed to combine with floating pelleted feed with high percentage of protein (22 %) and 3-7 % of the fingerling weight. Besides the above mentioned feed, we use also vitamin C 3-5 g/kg of feed (once feeding per week) fixed with feed to increase the resistance capacity for fish.

*** Feed for common carp**

- We also feed fingerlings with powder that has a high proportion of protein (>25 %). After one month, when fingerlings convert to eat zoo-plankton, we feed them with compost dung. Some farmers collected ant eggs and ốc bưu vàng (a kind of shellfish) as feed to increase the protein for fishes. Periodically stock dung to the common carp pond with 20 kg/100 m²/pond. Feeding is provided twice at 7 AM and 4-5 PM.

e. Nursery pond management

- Do routine checking of pond conditions, collect frog eggs in the pond, do the clearance and monitor the pond embankment and gates
- Collect all surplus feed in the pond and add new feed
- Monitor behavior of cultured stocks: if they heads towards the water surface, add water or change the pond water
- Constantly check pond dykes and the supply and drainage sewages especially in heavily rainy days
- Supply water 3-4 times per month, increase 20-30 cm of water in the pond (simultaneously add and release water) to create the good ecological condition for fish growth and improve the natural feed composition; maintain pH at 6.5-8. If pH <6.5, dissolve lime with water (2kg/100 m² of pond area) to distribute over the pond
- Stock dung of 20 kg/100 m² every week into the common carp and tilapia pond
- Add green fertilizer (lá cộng sản-an indeginious herb) to the pond with 15 kg/100 m² every 10-15 days (bundle by bundle set at 4 pond corners and middle). When green leaf is disintegrated, remove the blades out of the pond. Constantly monitor the water color; green or brown are regarded as the signal for good pond conditions
- Regularly monitor fingerling behaviors in the morning to have good measures

f. Monitoring environmental parameters

Table 6. Survival rate of fingerlings

| Number of culture days | Survival rate of common carp (%) | Survival rate of tilapia (%) | Survival rate of grass carp (%) |
|-------------------------------|---|-------------------------------------|--|
| 1 day | 99.8 | 99.9 | 99 |
| 7 days | 97 | 98 | 97 |
| 14 days | 95 | 96 | 94 |
| 21 days | 94 | 93 | 90.5 |
| 28 days | 92 | 91 | 88 |
| 35 days | 90 | 87.5 | 84 |
| 42 days | 88 | 85 | 82 |
| 49 days | 80 | 83 | 80.2 |
| 56 days | 75 | 80 | 78 |
| 63 days | 72 | 77 | 75.5 |
| 70 days | 70 | 75 | 73 |
| 77 days | 65 | 73.3 | 71.8 |

As shown in table 1, the survival rate of tilapia and grass carp is higher than in common carp. This is because after 30 culture days, common carp started to change its eating habit, from a middle layer feeder to bottom feeder (feed includes shells, clams, Oligochaeta, and organic humus). In most nursery ponds, the pond bottom was alum illusive and the zoo-plankton was unavailable so a lot of fishes were lost.

Table 7. Water parameters in the pond

| Number of culture days | Water color | | | | Depth (m) | | | | pH | | | |
|------------------------|-------------------|--------------------|-----------------|-------------------|-----------|--------|--------|--------|--------|--------|--------|--------|
| | Mr. Dang (pond 1) | Mr. Khieu (pond 2) | Mr. Go (pond 3) | Mr. Sinh (pond 4) | Pond 1 | Pond 2 | Pond 3 | Pond 4 | Pond 1 | Pond 2 | Pond 3 | Pond 4 |
| 1 day | Brown | Green | Green | Brown | 1.2 | 1.2 | 1.3 | 1.3 | 7.6 | 7.8 | 8.0 | 7.7 |
| 7 days | Dark green | Dark green | Green | Brown | 1.1 | 1.0 | 1.1 | 1.05 | 7.5 | 7.1 | 7.6 | 7.0 |
| 14 days | Dark green | Light green | Light green | Brown | 1.1 | 1.0 | 1.05 | 1.0 | 7.6 | 7.0 | 7.5 | 7.1 |
| 21 ngày | Dark green | Green | Light green | Brown | 1.1 | 1.0 | 1.1 | 1.0 | 7.0 | 6.5 | 7.0 | 6.5 |
| 28 days | Dark green | Green | Light green | Brown | 1.0 | 1.0 | 1.05 | 1.1 | 7.5 | 7.2 | 7.8 | 7.6 |
| 35 days | Dark green | Light green | Light yellow | Light green | 1.1 | 1.0 | 1.05 | 1.0 | 7.2 | 7.0 | 7.0 | 7.0 |
| 42 days | Dark green | Dark green | Green | Brown | 0.95 | 1.0 | 1.1 | 1.0 | 7.0 | 7.2 | 7.2 | 6.9 |
| 49 days | Dark green | Dark green | Green | Brown | 0.9 | 1.0 | 1.1 | 1.0 | 7.8 | 7.6 | 7.5 | 7.1 |
| 56 days | Dark green | Dark green | Light green | Brown | 0.9 | 1.05 | 1.05 | 1.0 | 7.5 | 7.0 | 7.6 | 7.2 |
| 63 days | Green | Light green | Light yellow | Dark brown | 0.9 | 1.0 | 1.1 | 1.0 | 7.0 | 7.2 | 7.5 | 7.1 |
| 70days | Dark green | Dark green | Green | brown | 0.9 | 1.1 | 1.05 | 1.0 | 7.8 | 7.6 | 7.5 | 7.1 |
| 77 days | Dark green | Dark green | Green | brown | 0.95 | 1.0 | 1.1 | 1.0 | 7.0 | 7.2 | 7.2 | 6.9 |

Over 2.5 culture months, environmental parameters of 4 ponds were relatively stable and suitable for fish growth and development. However, the water source in one pond was alum affected so the farmer stocked lime weekly (1.5kg/100 m²) to wash away the alum and stabilize the water parameters with the aim of ensuring the good growth and development of fingerlings.

3. Outcomes

* Estimated expenses:

Table 8. Pilot budget table (after 3 culture months)

| No. | Content | Unit | Quantity | Unit price (VND1,000) | Total (VND1,000) |
|--------------|--|-------------|----------|--------------------------|---------------------|
| 1 | Pond preparation | | | | 973 |
| | Net surrounding (depreciation 2 crops/year x 3 years) | m | 315 | 2 | 630/6 = 105 |
| | Preparation | Working day | 14 | 50 | 700 |
| | Lime for stocking | Kg | 210 | 0.8 | 168 |
| 2 | Fries | | | | 5,730 |
| | Grass carp: Density of 30units/m ² x 650m ² x VND100/unit. | unit | 19,500 | 0.1 | 1,950 |
| | Tilapia: Density of 30units/m ² x 1000m ² x 60% X VND200/unit | unit | 18,000 | 0.11 | 1,980 |
| | Common carp: density of 30 units/m ² x 1000m ² x 40% X VND200/unit | unit | 12,000 | 0.15 | 1,800 |
| 3 | Feed | | | | 4,236 |
| | Industrial feed | Kg | 415 | 9.2 | 3,818 |
| | Green feed | kg | 418 | 1 | 418 |
| 4 | Labor (1.75 month x 4 households x VND500,000/month) | Month | 7 | 500 | 3,500 |
| Total | | | | | 14,439 |

* Estimated income:

After two culture months, fingerlings developed well and showed no disease.

- Average weight: grass carp: 4-10 cm/ unit; tilapia: 4-5 cm/unit; common carp: 4-5 cm/unit
- Survival rate: common carp: 65 %, tilapia: 73.3 % and grass carp: 71.8%

Table 9. Estimated harvest (after three culture months)

| No. | Criteria | Common carp | Tilapia | Grass carp |
|-----|-------------------|----------------|---------------|---------------|
| 1 | Survival rate | 65% | 73.3% | 71.8% |
| 2 | Harvest size | 4 – 6 cm | 5-7cm | 6 – 8cm |
| 3 | Fish quantity | 7,800 units | 13,194 units | 14,001 units |
| 4 | Sales price | VND 350/unit | VND 350/unit | VND 500/unit |
| 5 | Total expenditure | VND 2,730,000 | VND 4,617,900 | VND 7,000,500 |
| | Total | VND 14,348,400 | | |

Economic accounting:

- Profit = total income – total expenditure = VND14,348,400 – VND14,439,000
= - VND 90,600
- Loss: VND 90,600 (in words: ninety thousand six hundred dongs)

The above price was only at 55-60 % of the market price. If the price had been equal to the market price, the profit would have been VND7,751,100 (in words: seven million, seven hundred and fifty one thousand, one hundred dongs)

Table 10. Comparison

| Fingerling quantity (unit) | Sales price compared to market price | In money (VND) | Beneficiary member (VND) |
|---------------------------------------|---|---------------------------|-------------------------------------|
| 34,995 | 50-60% | 14,348,900 | 7,751,100 |
| 34,995 | 80% | 17,950,000 | 4,150,000 |
| 34,995 | 100% | 22,100,000 | 0 |

IV. EVALUATION OF THE PILOT

1. General evaluation

After two culture months, the fingerlings of grass carp, tilapia (21 days) and common carp developed well. The pilot was according to the schedule. Beneficiary farmers followed the technical instructions given by the technical staff.

2. Evaluation of progress

The pilot went on as planned.

3. Evaluation of the environment

Over two culture months, the environmental parameters were stable with little variation; fingerlings developed and no diseases occurred. However, the water was alum illusive and thus farmers had to add lime to remove the alum and stabilize the water quality for fish good growth and development.

4. Evaluation on the growth rate

- Fingerlings developed well after two culture months
- For the first month (fry stage), fingerlings grew in length; from the second month (fingerling stage), they developed strongly in weight; besides, the environmental parameters were relatively stable so fish growth was good

5. Evaluation on the socio-economic significance

- The pilot enabled farmers to understand well technical procedures for fingerling nursery and apply them into practice and bring about high economic efficiency. The generated fingerlings were provided to FA and commune members as well as to neighboring communes.
- The pilot helped make use of the pond for fish nursery, reduce the product price to improve the economic value in one area, and generate job opportunities for the poverty reduction and hunger alleviation
- It also helped improve the management capacity for the FA's Executive Board and create the budget source for the FA operation

V. COMMENTS

1. Advantages

- The nursery farmers have gradually approached the technical procedures of fry to fingerling nursery; techniques of fingerling care taking, fish training by harvest time, fish storage and transport (most farmers were engaged in this nursery pilot just for the first time)
- FA members have an opportunity to purchase cheap fingerlings with the high quality and with high adaptability to the local environment. Over the past time, farmers have to purchase fingerlings from Hue with high price, long distance transport and high risk of fingerling death
- IMOLA project supports the budget for buying the fingerlings and feed, particularly the weekly monitoring provided by the project technical staff, who has delivered instruction related to fingerling stocking, feeding, water coloring, measurement of water parameters and predator eradication
- At harvest time, fingerlings will be sold to FA members (the nursery will be continued in 2009)

2. Disadvantages

- Farmers still lack experience and fingerling nursery techniques
- The price was cheaper than expected by the EB (only at 55-60 %, but as planned at 80 % of the market price)
- The pilot came into operation behind the seasonal calendar so there was a lower demand for fingerlings at harvest time
- Some people misunderstood that the pilot would give them fingerlings with free of charge

3. Lessons learnt

- The pond should have the depth of more than 1.0 m
- The position should be appropriate with the available water source; fingerlings should be of high quality; feed should be sufficiently provided
- Periodically feed leaves for disease prevention such as purslane, Chinese leaf, false daisy (cỏ mỳc), Vitamin C, and antibiotics
- The nursery and fingerlings should be selected to be appropriate
- Predators shall be eradicated before stocking and thus can avoid fish loss during nursery

4. Sustainability of the pilot

- Though farmers did not get much profit from this pilot, they were pleased as fingerling survival rate was high; no diseases occurred during the nursery period and committed to continue the next cycle.
- The pilot provided fingerlings of cheap price and high quality for FA members.

VI. CONCLUSION AND PROPOSAL

1. Conclusion

- The fingerling nursery pilot has shown its practical and effective significance; thanks to this kind of venture, farmers will be able to reduce the input cost during the grown-out fish culture, active in finding and supplying fingerlings to FA members
- Before, some projects and farmers stocked fingerlings but they had not achieved success; the reason was due to the bad pond preparation; additionally, snakehead carp and predators entered the pond and the poor management has led to fish loss.

2. Proposal:

The project should provide fingerlings, feed and give technical assistance to nursery farmers so that they can continue the venture in the next crop.