

Article

Problems and prospects of fish nursery operators in Jessore district of Bangladesh

Md. Abdul Halim¹, Syed Ariful Haque^{2*}, Md. Ariful Islam³, Mst. Sonia Sharmin¹ and Abu Rayhan³

¹Department of Aquaculture, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

²Department of Fisheries Technology, Sheikh Fazilatunnesa Mujib Fisheries College, Melandah, Jamalpur, Bangladesh

³Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

*Corresponding author: Syed Ariful Haque, Department of Fisheries Technology, Sheikh Fazilatunnesa Mujib Fisheries College, Melandah, Jamalpur, Bangladesh. E-mail: ariful_bau@yahoo.com

Received: 24 October 2016/Accepted: 21 November 2016/ Published: 28 December 2016

Abstract: A study was conducted to know the problems and prospects fish nursery operators in Jessore district. A total of 50 nursery operators (Jessore sadar, Jikhorgasha and Avynagor) were interviewed using a structured questionnaire during March-May 2016. The objective of the survey was to study different aspects on pond area, fingerling rearing status, nursery layer, number of employees, sources of fingerlings, survival rate, fingerlings prices, market system, capital sources, fingerling production, prospects and problems for nursery operators. In survey areas, most of the nursery operators were continued their business in two to five ponds with an average area of 1.25 ± 0.04 ha. In the present study, it was found that 4.5 ± 3.25 persons were associated in each nursery but the permanent manpower was minimal. The total fingerlings production in the selected nurseries were 1685 laks of where silver carp 23.74%, Rohu 20.77%, Catla 19%, Mrigal 14.84%, Common carp 10.68%, Koi 2.97%, Thai Puti 5.93%, Grass Carp 1.19% and Pungus 0.89%. The survival rate were 70-80%. Average price of Indian major carps- were Tk. 350 to 500, Chinese carp were Tk. 200 to 400, Thai sharpunti were 350-400 and Pungus were Tk. 400-500 fingerlings/ kg. In the study area, nursery operators were faced various problems such as lack of capital (21.25%), diseases problem (19.75%), high lease value (15.00%), shortage of water (5.00%), high price of production inputs (11.00%), flooding (3.00%), terrorism (11.00%), high temperature (3.00%), intense market competition (6.00%) and the lack of policy support (5.00%). Government should take proper care for nursery operators and fish associated communities for the enhancement of fishery production.

Keywords: nursery operators; fish fingerlings trader; problems and prospects

1. Introduction

Fish hatcheries and nurseries were not established in symmetry in all region of Bangladesh. Jessore district is the centre point for fry and hatchling production as it is a potential and profitable business avenue in this region. Approximately 45,000 kg (21% of the total hatchling production of the country) is produced per year in Jessore (DoF, 2002). Hence, the survivability of the hatchlings, socio-economic impact on fish farmers and the economic analysis of the hatchery operation has not been quantified.

In past, the rivers of Bangladesh were the major natural source of carp seed production. Millions of eggs and spawn were collected from the rivers during monsoon (May-August). In 1984 the spawn production in Bangladesh was 93.86% (23657 kg), 3.55% (895kg) and 2.59% (625 kg), respectively from Padma-Brahmaputra river system, from Halda river and from all hatcheries respectively (Tasi and Ali, 1997). Due to the destruction of natural habitats and also increased demand, the natural availability of carp seed has largely declined and the aquaculture venture are gradually replaced by the hatchery produced fry since early 80's when artificial fish breeding techniques and low cost hatchery designs have been successfully adapted in Bangladesh (Islam, 1989).

In recent years, there has been a phenomenal growth in the number of hatcheries, especially in the private sector. In 1982 there were only 3 private hatcheries in Bangladesh. The number has increased 40 in 1985 and 214 in 1987 (Islam, 1989) and reached to 756 in 2004. Their production of 4 to 5 days old larvae (i.e. spawn) was increased from 4,962 Kg in 1985 to 3,50,029 kg in 2004 with an increment rate 170 percent annually, while the quantity of spawn collected from natural sources was reduced from 19,362 kg in the year of 1980 to 1577 kg in 2004 (DoF, 2004). The production of carp seeds through induced breeding has made a real progress in aquaculture of the country. The hatchery produced hatchling cannot be directly stocked in the culture ponds as they need to rear an intermediate stage in a nursery pond before stocking in the culture pond. A number of fish fry nurseries have been grown alongside the hatcheries. The output from nurseries is the actual fish seed production from the country. In Bangladesh, there are about 918 private nurseries, with an average area of 1ha each and 82 Government nurseries covering an area of about 60 ha. In 1987, private nurseries produced about 666 million fingerlings of 2-3 inches size, while the public sector farms produced about 30 million fingerlings (Islam, 1989).

On the basis of assumption and observation a positive impact of hatchery produced spawn has been seen on the enhancement of fish production (Nuruzzaman, 1989). The present communication aimed to study the existing system of nursery operators and also find out their different problems and prospects in this enterprise. As the study showed an overview of present status and future prospect of fish nursery trade in Jessore region, it would add a new knowledge in the field of fish fry trade and build a foundation for further research, planning and developing programme for improving efficiency of this business enterprise.

2. Materials and Methods

The study was conducted on 50 nursery operators of Sadar, Jikhorgasha and Avynagor of Jessore district. Before finalizing the questionnaire, a draft questionnaire was developed and then tested in the study areas. The questionnaire was then changed, modified and rearranged according to the experience gathered in the testing. The final questionnaire was then developed in logical sequence so that nursery operators could answer chronologically. Questionnaire was constructed in English and translated to Bengali for face-to face interview. Both quantitative and qualitative information was gathered through formal interviews with participants from Jessore region using a well define and pre-tested questionnaire. Major sections of the questionnaire were about pond ownership, nursery layer, number of employees, fingerling production, survival rate, market system, sources of capital, prospects and problems for nursery operators.

Focus Group Discussion (FGD) was conducted with nursery operators to acquire some information which were lack in the questionnaire interview. FGD is a group meeting where nursery operators from the target communities discuss selected topics. Secondary data was collected through consulting literature and publications available in the Upazila Fisheries Office, Bangladesh Bureau of Statistics and from Government and non-government organizations involved in fisheries activities. Data were collected in local units which were converted into standard units later on to minimize error. After collection, data were sorted and edited and transferred to an Excel Master Sheet with a view to facilitating tabulation for analysis. Considering the objectives of the study a list of tables were prepared. The information (>.05%) that was collected from field survey and reviewing secondary sources was analyzed using Microsoft Excel-2007 and SPSS-11.5.

3. Results and Discussion

3.1. Nursery pond area

Nursery operators have a great contribution to increase the fish production. Most of the nursery operators in the survey areas were continued their business in two to five ponds with an average area of 1.25 ± 0.04 ha.

3.2. Fingerling rearing status

In the present study it was found that about 40% of the total nursery operators used their own ponds in their business. Rest of them used leased ponds in their business. The lease value for each hectare per year in Jossore Sadar was doubled (Tk. 90-110 thousands) than those were in Jikhorgasha and Abynagor (Tk. 45-55 thousands). Due to high lease value the nursery operator's conduct more cycles in a year with a view to compensate excessive lease cost. Among the nursery operators, 55% were used to complete 5-7 cycles/year, 30% used to complete 7-9 cycles/year and 15% of the nursery operators of this area followed three layer nursery systems. In this system 34.7% nursery operator completed their cycles within 25-30 days, 25.3% within 30-35 days, 31% within 20-25 days and 9% within 35-40 days respectively to get fingerlings up to 3-4 inch size. According to Islam (1989), in two stages nursing, fry are reared for a period of 4-6 weeks at a density of 1 million/ha, by which time they reach a size of 2-3 inches. Hatchlings, collected from natural sources or produced by induced

breeding, reared for one to two months in earthen rearing ponds to a size of about 2.5-3.5 inch before being sold to the pond culturists (Hasan, 1990).

3.3. Number of employees

In the present study, it was found that 4.5 ± 3.25 persons were associated in each nursery but the permanent manpower was minimal. During the production season a large number of labors get involved as fulltime basis. Apart from those full-time labours, the nursery operators had to hire the part-time labor in every week for harvesting, pond repair and other related works. In each nursery there were 3.5 ± 2.25 and 5.5 ± 3.15 full-time labors and per time labors involved in peak season.

3.4. Source of spawn

There were 85 hatcheries operated in the Jessore district of which 97.65%, 1.60% and 0.75% situated in Jessore sadar, Jikhorgasha and Avynagor upazilla respectively. Most of the fries were reared by nursery operators.

3.5. Fingerling production

The total fingerlings production in the selected nurseries was 1685 laks of which silver carp contributed the highest position in fry production (400 laks) followed by Rohu (350 laks), Catla (320 laks) Mrigal (250 laks), Common carp (180 laks), koi (50 lac) Thai Puti (100 laks), Grass Carp (20 laks) and pangus (15 laks). In 1984 the spawn production in Bangladesh was 93.86% (23657 kg), 3.55% (895 kg) and 2.59% (625 kg), respectively from Padma-Brahmaputra river system, from Halda river and from all hatcheries respectively (Tasi and Ali, 1997).

3.6. Survival rate

The survival rate of the fingerlings were 60-70% claimed by 15.5% nursery operator, 70-80% claimed by 49.5% nursery operator, 80-90% claimed by 27% nursery operator and 90-100 claimed by 6% nursery operator. From the above result, it was found that about half of the total nursery operator claimed the survival was 70-80% with an average value of 76 ± 1.92 %. This was due to lack of proper pond management, optimum level of water quality parameters and lack of technical knowledge. Transportation hazards also cause mortality to some extent. Islam (1989) showed in a study the survival rate of the transported spawn was 70%.

3.7. Price of fingerling

The price of the fries of diverse species was found to vary through the year round. The price of the fries of diverse species was found to differ complete the year round. The price was high at the opening of the season and at the completion of the season but the price was moderately less when the deliveries of fries were available. Average price were Indian major carps- Tk. 350 to 500, Chinese carp Tk. 200 to 400 and Thai sharpunti 350-400 and Pungus- Tk. 400-500 fingerlings/kg (Table 1). A total 1685 laks of 300-500 fingerlings/ kg were reared during the study period.

3.8. Fry marketing channel

Fringerings produced from the nurseries in the area distributed among the upazillas of Jessore district as well as in most part of the country. Jessore is one of the most important fringerlings markets of the country. More than 60-70% fry demands of the country are met by Jessore district. Fry traders used to come from Bogra, Natore, Pabna, Kushtia, Dhaka, Manikgonj, Comilla, Chandpur, Barisal, Faridpur, Khulna, Satkhira and other district of the country. Marketing channel are the alternative routes of product flows from producer to consumer (Kholo and Uhi, 1980). In the study, it was found that the marketing channel consists of hatchery owner; Nursery owner, aratdar, fry seller and pond owner. The middlemen bought the fingerlings from the nursery operators on cash payment and sold them to pond owners at a profit of 100-200% on credit (Islam, 1989).

3.9. Transportation

In the study area, the fry were transported by means of bus, truck, train, pick-up van and manual van. About 40.50% fry traders used pick-up van and 11.25% fry traders used Manual van for fry transportation in the local areas. In case of far way districts bus, pick-up van, bus and train were used by 40.50%, 32.25% and 16% buyers respectively (Table 2). The fry traders usually followed the traditional approach for fry carrying. Traders are aware of the fish seeds requirement for oxygen and thus they continuously agitate the water in the *hundies* during transportation (Haq *et al.*, 1991).

Table 1. Average price of fingerlings of different species.

Species	Scientific name	Price (Tk/kg)
Rui	<i>Labeo rohita</i>	300-400
Catla	<i>Catla catla</i>	350-400
Mrigal	<i>Cirrhina cirrhosis</i>	400-500
Silver carp	<i>Hypophthalmichthys molitrix</i>	200-350
Grass carp	<i>Ctenopharyngodon idella</i>	300-400
Mirror carp	<i>Cyprinus carpio var. specularis</i>	350-400
Common carp	<i>Cyprinus carpio var. flavipinnis</i>	380-400
Thai puti	<i>Puntius gonionotus</i>	350-400
Black carp	<i>Mylopharyngodon piceus</i>	340-4000
African magur	<i>Clarias lazera</i>	3-4 *
Pangus	<i>Pangasius hypophthalmus</i>	300-500

*Tk/piece

Table 2. Modes of transportation used by nursery fish traders and buyers.

Type of transport	No. of farmer	Percentage (%)	No. of buyer	Percentage (%)
Pick-up van	27	54	8	40.50
Bus	13	26	10	32.25
Manual van	7	14	3	11.25
Train	3	6	4	16.00
Total	50	100	25	100

Table 3. Ranking of the problems faced by the nursery operators.

Rank	Constraints	Percentage (%)
1	Diseases problem	21.25%
2	Lack of capital and credit facilities	19.75
3	High lease value of pond	15.00
4	Shortage of water	5.00
5	High price of production inputs	11.00
6	Flooding	3.00
7	Terrorism	11.00
8	High temperature	3.00
9	Intense market competition	4.00
10	Lack of policy support	3.00
11	Lack of proper training	2.00
Total		100

3.10. Problems faced by the nursery operators

The nursery operators were found to face various problems which are more or less common as like as other parts of the country (Table3). Sound health management practice is a key to success in nursery operation. In the study areas, nursery operators were mentioned several problems. When ranking problems, 21.25% mentioned the occurrence of disease as their major problem. Hussain *et al.* (1994) reported that 61% of carp fry in nurseries of the greater Mymensingh District were infected with ectoparasites. The highest mortalities of carp fingerlings were due to the infection by *Trichodina*, *Myxobolus* and *Dactylogyrus*. Chandra *et al.* (1996) reported that the high prevalence of myxosporeans in juvenile Indian major carps (*L. rohita* and *C. cirrhosus*) in nursery ponds of Mymensingh. Heavy mortalities of carp associated gill myxoboliasis have raised concern among Bangladeshi fish farmers (Chandra *et al.* 1996).

Pond owners frequently receive fingerling on credit from nursery operators where the cost of credit is high. About 19.75 nursery operators were reported lack of capital and credit facilities in the study areas. Bangladesh Bank co-ordinates and monitors the credit activities of other Banks like, Sonali Bank, Janata Bank, Agrani Bank, Rupali Bank, Bangladesh Krishi Bank, etc. About 90% of the pond fish culture credit was granted by Bangladesh Krishi Bank with a recovery rate of 20% (Ahsanullah, 1989).

About 15% nursery operators were reported the high lease value of the nursery ponds were great problem. The lease value for each hector per year in Jossore Sadar was doubled (Tk. 90-110 thousands) than those were in Jikhorgasha and Avynagor (Tk. 45-55 thousands).

In the present experiment about 3% nursery operators were reported that the high temperature was important issue for their nurseries. The water temperature fluctuated from 25 to 32°C at the time of peak trading season April to September. But 2016 (April to September) time the water temperature was fluctuated 11 to 42° C. Ali (1998) found that the water temperature of ponds 20.5 to 36.5°C which was favorable for fish culture. While 5.00% nursery operators ranked shortage of water was their major problem (Table 3). Other problems faced by the 3.00% were flooding, 11.00% were terrorism, 4.00% were intense market competition, 3.00% were lack of policy support and 2.00% were lack of proper training.

3.11. Prospects of nursery operator

Bangladesh placed 4th position for the production of fresh water fish throughout the world. Fish and fisheries sector contributes 1.92% of the total export earning and 3.69% of total GDP of the country. It contributes 60% of the animal protein consumption of the country (DoF, 2015). It creates full time employment of 1.4 million people and part time of nearly 11million people (Mazid, 1992). Total fish production from pond culture was 2.38 lacks MT in the year 1990 and now it increases into 36.84 lacks MT in 2014-2015 which contributes 83.72% of the total inland culture fish production. There are total of 220,217 kg hatchling produced in the country in the year 2001 of which capture from the natural sources is 1872 kg hatchery produced spawn is 218,345 kg. The contribution of the private hatchery to the total fingerlings production is 97.5%; Government hatchery produced only 1.6% and 0.85% from the natural sources. In the year 2001 the carp hatchling production from private hatchery was 214,682 kg of which Jessore district contributes 45,000 kg that is 21% of the total hatchling production of the country. Now a day's Jessore region supplies 60-70% fingerlings throughout the country. The carp nursery trade in Jessore region has been developed based on the increasing seed demands all over the country. The ultimate goal of this business in these regions is to meet the seed supply for pond fish culture all over the country, solve the employment problems and improve socio-economic condition of fish fry trade community. Bangladesh has 3.72 lacks ha area of pond and ditches all over the country. All these water bodies are very much potential for fish production. In spite of being high potential all these water resources do not use for fish production due to lack of seed supply. Carp seed production through induced breeding in Jessore region has made a real progress in inland fresh water aquaculture.

4. Conclusions

The seed production is not sufficient. The nursery operators in Jessore region especially in Bablatola takes the carp nursery trade as a challenge to build up the trade as an industry. Through the study it was to be known the existing condition of the trade like marketing channel, distribution area, credit support lack of technical knowledge, modern equipment, transportation facility, availability of inputs in right time, lack of nursery trade, lack of fingerling development strategy, terrorism etc on this trade. They are now partially successful and within very short time they will completely successful if necessary supports can be provided by the Government and Non-Government organizations. The suggestion based on the findings of the study will help to improve the fish fry trade. The study may suggest an urgent inquiry into the overall business with a view to find out the actual problems and possible solution.

Conflict of interest

None to declare.

References

- Ahsanullah M, 1989. Fisheries Extension and Credit in Bangladesh. Proceeding of the SAARC Workshop on Fish seed Production, 11-12 June, Dhaka, Bangladesh. pp. 84-91.
- Ali ML and MZ Islam, 1998. An assessment of the economic benefits from stocking seasonal floodplains in Bangladesh. pp. 289-308. In: T. Petr. (ed.) Inland Fishery Enhancements. FAO Fish. Tech. Pap. 374.
- Chandra KJ, AA Begum, GU Ahmed and R Wooten, 1996. Infection of myxosporean ectoparasites of juvenile carps in nurseries of Mymensingh, Bangladesh. Bangladesh J. Aquacult., 18: 39-44.
- DoF, 2002. Annual Hatchery and Nursery Report, 2002. Department of Fisheries, Ministry of Fisheries and Livestock, Government of the Peoples Republic of Bangladesh, pp. 10-14.
- DoF, 2002. Fish Fortnight Compendium, Department of Fisheries, Ministry of Fisheries and Livestock, Government of the Peoples Republic of Bangladesh, pp. 50-54.

- DoF, 2004. Fish Fortnight Compendium, Department of Fisheries, Ministry of Fisheries and Livestock, Government of the Peoples Republic of Bangladesh, pp. 71-74.
- DoF, 2015. Matsha Pakkha, Government of the Peoples Republic of Bangladesh, pp. 45-46.
- Hasan MR, 1990. Aquaculture in Bangladesh, Aquaculture in Asia (Chap-4). MM Joseph ed Asian Fisheries Society, pp. 106-140.
- Haque MZ, MA Rahman and MS Shah, 1991. Studies on the density of Rohu (*Labeo rohita*) fingerlings in polyethylene bags, for transportation. Bangladesh J. Fish., 14: 145-148.
- Hossain MA, ANH Banu and MH Khan, 1994. Prevalence of ectoparasite in carp nursery operations of greater Mymensingh. Progress. Agricult., 5: 39-44.
- Islam MA, 1989. Fish Seed production in Bangladesh. Proceeding of the SAARC Workshop on Fish seed Production, 11-12 June, Dhaka, Bangladesh. pp. 1-12.
- Kohls RL. and JN Uhi, 1980. Marketing of Agricultural Products (5th ed.), Macmillon publishing Co. Inc., New York.
- Mazid MA, 1992. Supplementary feed for fry and fingerling. Nursery Pond Management, Trainers Training Manual, BFRI, Mymensingh. pp. 1-3.
- Nuruzzaman AKM, 1989. Socio-economic Consideration of Fish Seed Production in Bangladesh. Proceeding of the SAARC Workshop on Fish Seed Production, 11-12 June, Dhaka, Bangladesh. pp. 60-71.
- Tasi C. and MY Ali, 1997. Open Water Fisheries of Bangladesh. Bangladesh Center for Advanced Studies.