

ON THE PROBLEMS AND PROSPECTS OF FISH FRY TRADE IN JESSORE DISTRICT OF BANGLADESH



BY

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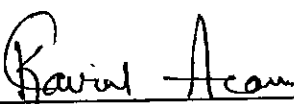
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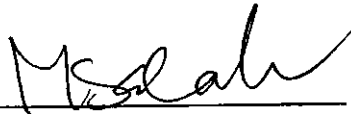
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DECLARATION

The results in this thesis are entirely the candidate's own investigation and no part of the results has been accepted for any degree, nor it is being concurrently submitted for any degree.

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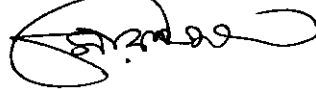
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MY BELOVED PARENTS



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The author

ABSTRACT

The thesis work was based on a survey report on the problems and prospects of fish fry trade in Jessore district. The investigation was conducted on 82 nursery operators and 50 fry traders from different parts of the country. The objective of the study was to know the present status of the trade, identify the problems associated with the business, assessment of aids needed for the nursery operator and fry traders from Government and Non-government sector to make the business more furnished. The study was made on technical knowledge of the nursery operator, number of people involve, marketing channel, means of transportation, and facilities available. It was found that approximately 45000 kg hatchlings were produced from the 85 running hatcheries. But the actual number of hatcheries is around 200 in the study area. There were 400 nursery owners operating this business. There are 1621 lac fry of 1-4"size were produced from 82 studied nurseries. The fingerling were distributed to 30 districts of the country. More than 200 fry traders came here and carried the fry by means of bus, truck, pick-up van, manual van and train. It was found that 45% fry were locally consumed and rest were distributed to the far way districts. It was also found that due to poor technical knowledge and improper transportation, fry mortality was high. Also due to high lease value, lack of credit facility and terrorism, the nursery operators deprived of getting expected profit.

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CHAPTER ONE:

INTRODUCTION

INTRODUCTION

Aquaculture is a traditional and age old practice in Bangladesh. Almost all the households possess a small to medium sized dugout earthen pond. In addition, most of the villages have relatively big sized community ponds. Other types of culture systems used are pen and cage culture, paddy cum fish culture and culture-based fisheries in lakes and seasonal water bodies.

Aquaculture has been given importance in Bangladesh because of its potential for export earnings, generation of employment for the rural sector and its contribution to the supply of animal protein for the population. Bangladeshis are rice and fish eating people. Fish is an essential daily food item for the people and as such demand for fish is increasing with the increase of population.

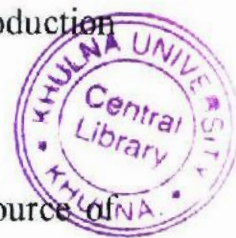
Bangladesh is blessed with vast inland waters in the form of Ponds, Canals, Ditches, Flood plain, Haors (Natural depression), Baors (Ox-bow lake), Rivers, estuaries etc. covering an area of 5.31 million ha in which Pond and Ditches covering an area of 2.42 lac ha. Fish production from this water body during the year 2000-2001 was 615,825 MT. Whereas the total country fish production in the country in the year 2000-2001 is 17.81 lac MT. This is 34.5% of the total fish production (DoF, 2002).

Fish is the principal source of food, supplying some 80% of animal protein intake of the population. On per capita basis, fish availability is very low having declined from 12.0Kg per capita per annum in mid 1960's to 7.7 kg in 1988 and 7.4kg in 1995. Even to maintain the present low consumption rate, fish production was to be increased by nearly 40% by the year 2000. Fisheries sector provides employment to over 1.4 million full time fishermen,

in addition to 11 million part time fishermen. It also contributes 9.12% of national income in 1995-96 (BBS,1996)In the year 2001 Per capita annual fish consumption increased to 12 kg and decrease in the contribution of total animal protein supply to 63% and contribution to GDP was 5.3 % (DoF, 2002).

In the past Bangladesh had abundant wild fishes. These wild fishes were used to meet the requirements of the people and therefore people showed little interest in fish culture. During the last decades, however, over fishing and the increasing control of floodwater with polders have depleted the natural stock substantially. Tasi and Ali (1997) noted that construction of Farakka dam and other embankments, sedimentation of rivers and over exploitation from the natural stock are the major factors for the decline of major carps in existing open water bodies in the river system of Bangladesh. With the decline of the natural fish production and thinking about the increasing demand, aquaculture venture has been emerged as a most vital wing of aquaculture. Therefore, it has been realized that intensification of aquaculture could be the most effective means of increasing fish production to meet the worsening animal protein shortage situation.

From the beginning the natural sources of rivers were the major source of carp seed production in Bangladesh. Millions of eggs and spawn were collected from the rivers during monsoon (May-August). In 1984 the spawn production in Bangladesh was estimated to be 23657 kg from Padma-Brahmaputra river system, 895 kg from Halda river and 625 kg from all hatcheries (Tasi and Ali, 1997). They contribute respectively 93.86% 3.55% and 2.59% of the total spawn supply (25203 kg) for pond fish culture in the country. But due to the destruction of natural habitats the natural availability



of carp seed has largely gone down and the aquaculture venture are now fully dependent on the hatchery-produced fry.

There are five large hatcheries and 106 fish seed multiplication farms established in public sector (Chowdhury et. al., 1996). Apart from Government hatcheries a large number of carp hatcheries had been built in the private sector in different parts of Bangladesh. In 1980 the total hatchery produced carp fry was estimated at about 22 million (Chowdhury et. al., 1996). In 1984 hatchery produced carp fry was estimated to be about 249 million, which is more than ten times of 1980 production.

Prior to 1982, the dependency on naturally caught spawn from various rivers was almost 100% but it has been reduced to 50% now in 1989 as more and quality seeds are produced under induced breeding . However after the spread of hatchery technology in the country, there is not a single study on the socio-economic impact on fish farmers and the economic analysis of the hatchery operation available in the country. On the basis of assumption and observation, we have to say that it has given positive impact to the fish farmers and fishermen in order to augment the production level (Nuruzzaman, 1989).

The country was depending solely on seed collected from rivers till the year 1978 when production of fish seed in hatcheries through hypophysation was initiated. Presently, fish seed is collected from rivers and also produced on a large scale in hatcheries. The species mostly cultured in freshwaters and the seed of which are produced are: Catla , Rohu, Mrigal, silver carp, Grass carp, Bighead carp species, promising results have been obtained in breeding Thai puti (Islam, 1989).

Public sector fish seed farms acted as centers of technology transfer and trained a large number of entrepreneurs who were interested in establishing hatcheries on their own because of the high returns from hatchery operations. 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 to 40 by 1985 and to 214 by 1987, producing some 2.75 billion spawn annually, the rate of annual increment being 170 percent (Islam, 1989).

The out put 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 60ha. In 1987, private nurseries produced about 666million fingerlings of 2-3" size. While the public sector farms produced about 30 million fingerling (Islam, 1989).

In view of the decline in fish availability, the Government of Bangladesh is laying more and more emphasis on increasing fish production. Studies conducted so far have revealed that the production from marine sources has almost reached the maximum sustainable yield, and there is hardly any scope for further increase in production. Hence, emphasis is being laid on the development of inland fisheries. Since management of inland capture fisheries is difficult, if not impossible, great stress is being laid to utilize the vast inland water areas of the country for aquaculture. As stated earlier, there are over 2.8 million ha of flood plains, where the Government of Bangladesh has taken up programs for the development of culture based capture fisheries, through stocking of these water bodies with fingerlings of suitable species of carps (Islam, 1989).

Since fish seed production technology has been successfully transferred to the private enterprise, as is evident from the fact that of the total hatchery produced spawn, 82% comes from private hatcheries, the Government encourages establishment of hatcheries in private sector.

It should be reasonable to say that production of carp through induced breeding has made a real progress in aquaculture in 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. Associated with the development of carp hatchery operation, major expansions of private nursery operation in different part of the country have taken place especially in Jessore region. It has now become a potential and profitable business in this region. The fish fry produced in the nursery pond are distributed to the pond culturist through different channels or levels.

There are some constraints for the development of the fry trade. Approximately 45,000kg spawn are produced per year in the study year (DoF, Jessore, 2002). But the survivability of the hatchlings is not satisfactory due to the lack of technical knowledge of the nursery operators and improper transportation. To find out the different problems of the trade an investigation was conducted. The investigation was carried out during the month of June to October, 2002. In this investigation a well formed questionnaire was used and a total of 82 persons involve in this business were made to collect the information. It was found that the nursery operators rear the hatchling in traditional method using the traditional equipment. Lack of credit support both for the nursery operator and fry traders was the major problems of the trade. Due to improper transportation the mortality of the fry

was very high. Based on the market demand the business has been well flourished and a lot of people are involved in this trade and improved their socio-economic condition. However favorable soil condition, water quality, good marketing and communication facilities provided a greater prospect for this trade. If necessary facilities including technical and credit support could be provided the trade would have been more developed and will create more employment opportunity.

1.1 Objectives

The main objective of the study was to identify exiting problem of the fish fry trade in Jessore region and make their probable solutions. However the study was based on the following objectives:

- To know the existing condition of the trade
- To know the fry marketing channel
- To know the existing nursery operation system
- To find out the technical problems associated in this trade.

1.2 Justification of the study

Fish and fisheries sector contributes 6% of the total export earning and 5.3% of total GDP of the country. It contributes 63% of the animal protein consumption of the country (DoF, 2002). 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 2.27 lacs MT in the year 1990 and now it increases into 6.15MT in 2000-2001 which contributes 40% of the total inland culture fish production. There is a 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 hatchling 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. The carp nursery trade in Jessore region has been developed based on the increasing seed demand 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 2.42 lacs 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. However, still now seed production is not sufficient. The nursery operators in Jessore region especially in Chanchra

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, mode of transport, credit support on this trade. They are now partially successful and within very short time they will be completely successful if necessary supports can be provided from Government and Non-Government sources. 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. As the study will show an overview of present status and future prospect of carp nursery trade in Jessore region, it will add a new knowledge in the field of fish fry trade and build a foundation for further research on this field. Finally, this study will be helpful for planning and developing programme for improving efficiency in this trade.



CHAPTER TWO:

MATERIALS AND METHODS

MATERIALS AND METHODS

(This chapter deals with the methodology which was adopted for selection of the study area and collection of data. The methodology that was used for this study is briefly described below)

2.1 Study area

The study was conducted on 82 nursery operators of Jessore district. Due to importance of fish fry trade Chanchra of sadar upazilla was taken as the main study area. Two other upazillas namely Monirampur and Bagherpara were also considered as study area and similar numbers of customers come from different parts of the country. Both the nursery operators and the customers were selected randomly.

2.2 Types of data collection

For collection of data a structured questionnaire was prepared. Before formulating the questionnaire, visits were made in the study area. Different information about carp nursery trade were collected during the visit. After finalizing the questionnaire relevant data were collected by interviewing both the nursery operators and the fry traders directly. The researcher himself collected the data during pick season (June to October, 2002) of the business.

2.3 Questionnaire preparation

The questionnaire was prepared emphasizing the objective mentioned above. Before finalization of the questionnaire, it was pre-tested through a field visit. Then the questionnaire was finalized and prepared for survey work. The questions were specific and were free from any kind of influence.

Appendix-1

2.4 Limitation of the study

The nursery owners hardly kept systematic record of their business. They took only year wise purchase and sell record. They tried to report from their memory and thus in most cases it was difficult to get accurate information about specific lot, actual production of a lot, monthly income and the buyers coming from different parts of the country .In such case the parameters had been estimated on the basis of the statement of respondents .

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CHAPTER THREE:

RESULTS

RESULTS

3.1 Pond status

Most of the nursery operators in survey area were continuing their nursery program in three to nineteen ponds. A few of them have more than nineteen ponds. It's pond area ranges from 1.5acare to 20acare. Few of them have more than 20 acres.

Farmer's technical knowledge in respect of pond preparation is not bad. They prepare their ponds by following scientific method without some exception. They are following the step of pond preparation but not declared dosage of lime and fertilizer. Most of the farmers follow own experienced dosage of rotenone or thiodene for wild fish control, manuring and liming frequency. With these they normally get good results.

3.2 Use of lease ponds

In the present study it was found that about 47% of the total nursery operators used leased pond in their business. Beside this, the nursery operators also used their own ponds.

Table-1: Farmers own and lease pond status

Types of pond	No. of farmers	Percentage (%)
Own pond	44	53.7
Leased pond	38	46.3
Total	82	100

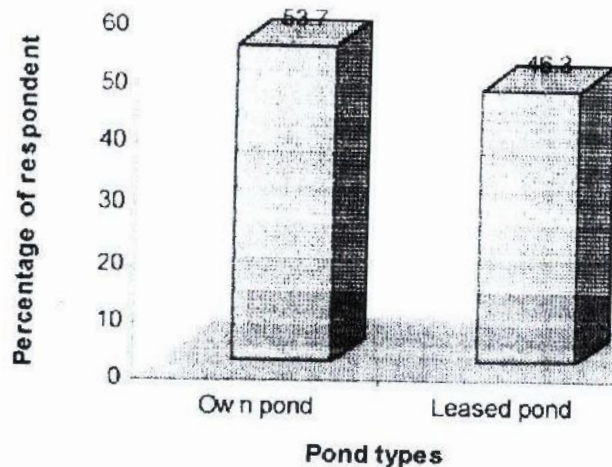


Fig -1: Farmer's own and lease pond status

3.3 Type of nursery

Most of the nurseries in the study area are of two layers. According to the results obtained, two layer nurseries can complete more cycles in a year than one layer.

3.3.1 One layer

In this system, nursery operators use their single pond from spawn rearing to fingerling stage. The nursery operators can complete one or two cycle in a season. This system was found not to be economically viable.

3.3.2 Two layer

In the present study, it was found that most of the nursery operators had been practicing this system. In this system, the nursery operators use three prepared ponds for rearing the seed from to fingerling stage. The nursery operators can complete 8-10 consecutive complete cycles in a season. Through this system, the nursery operators can have the best use of their ponds and as a result of that the system was found to be economically viable.

3.4 Manpower

In this trade there had been a greater opportunity of employment for the local community. With a consequent contribution to the progress of socioeconomic condition of the local people. On an average 12 persons are engaged in each nursery. Permanent manpower engaged in this trade is very poor. In some small nursery there are no permanent labours. During the production season a large number of labors get involved as full time basis. Apart from those full-time labours, the nursery operators had to hire the part time labour in every week for harvesting, pond repair and other related works. In the study it was found that 4-10 full-time labours involved in each nursery. Beside this 6-10 part time labours also get involved in peak season.

Table- 2: Permanent manpower employed



Range of labour	No. of farmers	Percentage (%)
0-2	48	58.5
2-4	16	19.5
4-6	8	9.7
6-8	6	7.3
8-10	2	2.4
10-12	2	2.4
Total	82	100

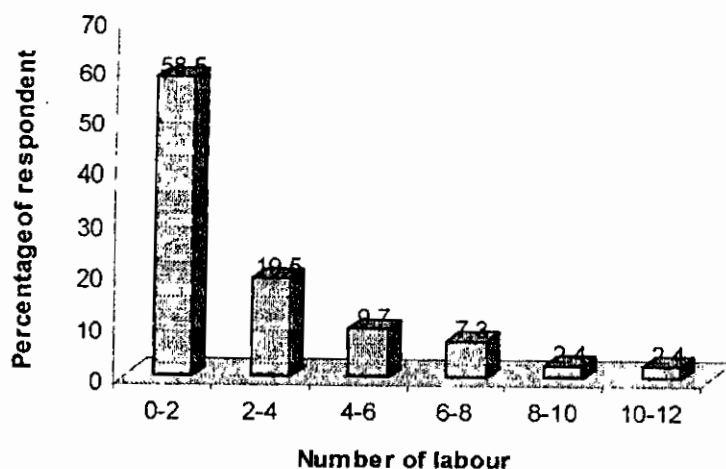


Fig-2: Number of permanent manpower employed in each nursery.

Table-3: Part-time manpower employed

Range of labour	No. of farmer	Percentage (%)
0-2	--	--
2-4	7	8.5
4-6	5	6.1
6-8	26	31.7
8-10	40	48.8
10-12	4	4.8
Total	82	100

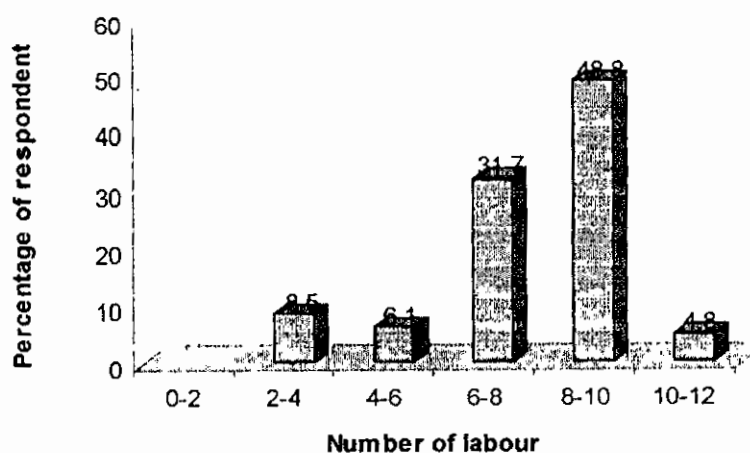


Fig-3: Number of temporary manpower employed in each nursery.

3.5 Production of hatchling

It was found that there were 85 hatcheries running in Jessore district and 42,111.5 Kg hatchlings were produced from these hatcheries in the year 2002. About 80% of the hatchlings were reared in the study area and the rest were reared in other areas of the country.

3.6 Price of hatchling

The entire nursery operator purchased hatchling from the hatchery situated in Chanchra region, in Jessore. Some nursery operators purchased hatchling from local hatchery situated in his upazilla and stock it in the nursery pond. The price of the hatchling of different species is different. The price of same species also varies from starting to end of the season. Average price of hatchling of different species shown in the table:

Table -4: Price of hatchling

Name of species	Price (Tk. / Kg)
<i>Cyprinus carpio var flavipinnis</i> <i>Cyprinus carpio var specularis</i>	1000-1600
<i>Labio rohita</i> <i>Catla catla</i> <i>Cirrhina mrigala</i>	1200-1800
<i>Puntius gonionotus</i>	900-1200
<i>Hopthalmichthys molitrix</i> <i>Ctenopharyngodon idella</i>	1200-1500

3.7 Number of Cycle

Spawn collecting from hatchery, the nursery operator reared them in the prepared nursery pond up to 2-10cm before selling it to the pond culturists, Aratdars, or other fry traders. In the survey it was found that 3-12 cycles were conducted in a season. To make spawn to the marketable size the fry traders had to rear the spawn in the prepared nursery ponds for up to 40 days. Growth of the spawn depends on proper management of the ponds. Those who had good technical knowledge kept the spawn for short period and therefore they could get chance of doing more cycles in a season with more returns or benefits from the business. In the present survey it was found that most of the fry traders reared the spawn in their nursery ponds for 20-35days and eventually they complete around 10 complete cycles in a year.

Table -5: Number of cycle nursing

No. of cycle / Year	No. of farmer	Percentage (%)
2-4	8	9.7
4-6	11	13.4
6-8	28	34.1
8-10	24	29.2
10-12	11	13.4
Total	82	100

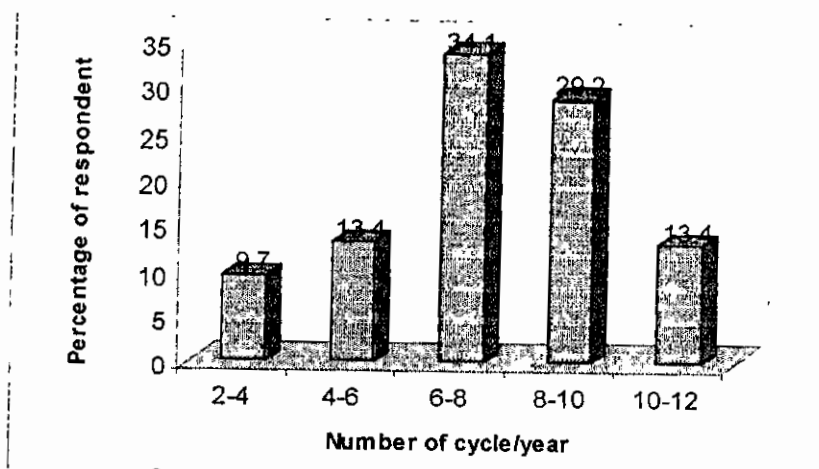


Fig-4: Number of cycle nursing per year by nursery operator.

3.8 Duration of days of nursing

In the study it was found that the nursery operator reared the hatchling to the nursery pond up to 40 days to make it to the marketable size (2-10cm). Growth of the spawn depends on proper management of the ponds. Those who are experienced kept the spawn for short period and therefore get chance of doing more cycles in a season with more returns or benefits from the business. In the survey, it was found that most of nursery operator reared the spawn in their nursery pond for 20-40 days and eventually they complete around 12 cycles in a year.

Table -6: Duration of days of nursing

Range of Days	No. of farmers	Percentage (%)
15-20	5	6.1
20-25	21	25.6
25-30	26	31.7
30-35	23	28.05
35-40	7	8.53
40+	--	--
Total	82	100

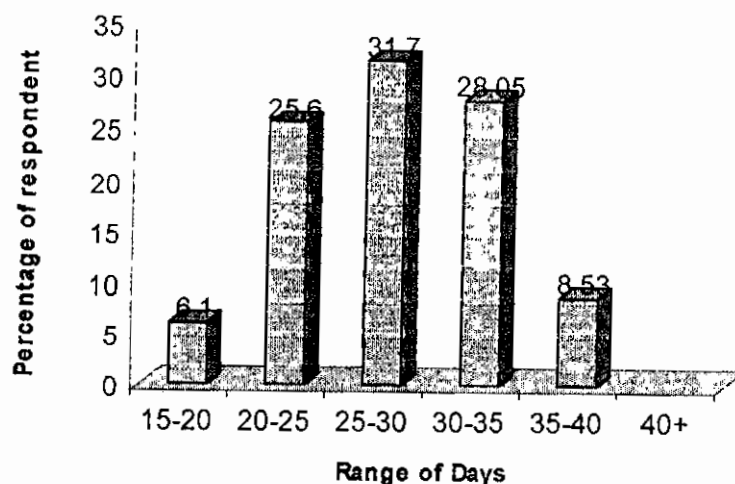


Fig-5: Percentage of the duration of cycle done by the nursery operator

3.9 Source of spawn

There are 85 running hatchery in the Jessore district of which two are in Monirampur Upazilla. The fry traders of sador upazilla as well as other upazillas collect spawn from the hatchery situated in chachra region of Jessore district. The two hatchery owner of Monirampur Upazilla uses all of their spawn in their own nurseries.

3.10 Survival rate

The survival rate of the spawn was 60-70% claimed by 19.5% nursery operator, 70-80% claimed by 47.5% nursery operator, 80-90% claimed by 28% nursery operator and 90-100 claimed by 5% nursery operator. From the above result, it was found that about half of the total nursery operator claimed the survival rate was 70-80% and the average survival rate was 76%.

Table-7: Survival percentage

Range of survival percentage	No. of farmers	Percentage (%)
60-70	16	19.5
70-80	39	47.5
80-90	23	28
90-100	4	5
Total	82	100
Average		76.8

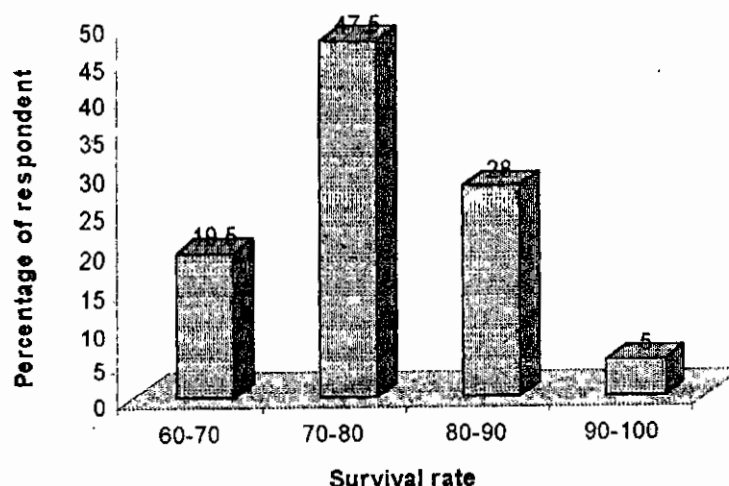


Fig-6: Survivability of hatchling in different nurseries

3.11 Production of fry

From the study, it was observed that 1621lacs fry was produced in the surveyed 80 hatcheries of Jessore district during the year 2002. Size of the fry was 1-4". It was found that silver carp possesses highest position in fry production (386.7 lacs) followed by Rohu (345 lacs), Catla (321.9 lacs), Mrigal (197.4), Common carp (183.5), Thai Puti (104.3 lacs), Grass Carp (51.7lacs) and pangus (30.5lacs).

Table- 8: Production of fry in some selected nurseries of Jessore district

Species	Production in lacs (1-4" size fry)
Silver Carp	386.7
Rohu	345
Catla	321.9
Mrigal	197.4
Common Carp	183.5
Grass Carp	51.7
Pangus	30.5
Thai puti	104.3
Total	1621

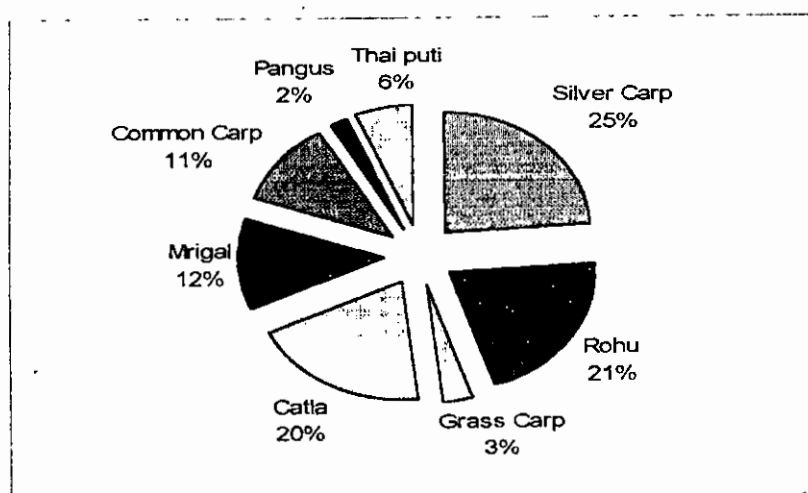


Fig-7: Production of fry in some selected nurseries of Jessore district

3.12 Fry distribution area

Fry produced from the nurseries in the area distributed among the upazilla of Jessore district and also distributed in most part of the country. Jessore is one of the most important fry markets of the country. More than 50% fry demand of the country is met by Jessore district supply. Fry traders used to come from Bogra, Nator, Pabna, Kushtia, Dhaka, Manikgonj, Comilla, Chandpur, Barisal, Faridpur, Khulna, Satkhira and other district of the country.

3.13 Fry marketing channel

3.13.1 Fry marketing

Marketing system may be thought of as the connecting link, the bridge between specialized producers and consumers (Kohls and Uhi, 1980). It is both a physical distribution and an economic bridge designed to facilitate the movement and exchange of commodities from the farm to the fork. It is composed of alternative product flows (marketing channel), a variety of firms (Middleman) and numerous business activities (Marketing function).

Marketing channel are the alternative routes of product flows from producer to consumer (Kohls and Uhi, 1980). The marketing channel may be short or long for a particular commodity depending on the quality of the marketed products, nature and size of the consumers and producers. In the study, it was found that the marketing channel consists of hatchery owner, Nursery owner, aratdar, fry seller and pond owner (Consumer).

Table -9: Customers percentage to the nursery operator

Type of buyer	No. of farmer	Percentage
Aratdar	37	45.2
Money lender	16	19.5
Middleman	11	13.4
Hawker	10	12.2
Pond owner	8	9.7
Total	82	100



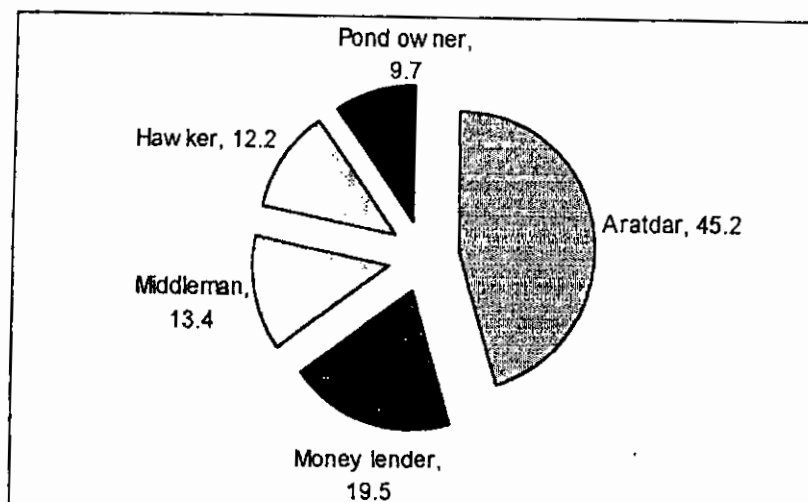
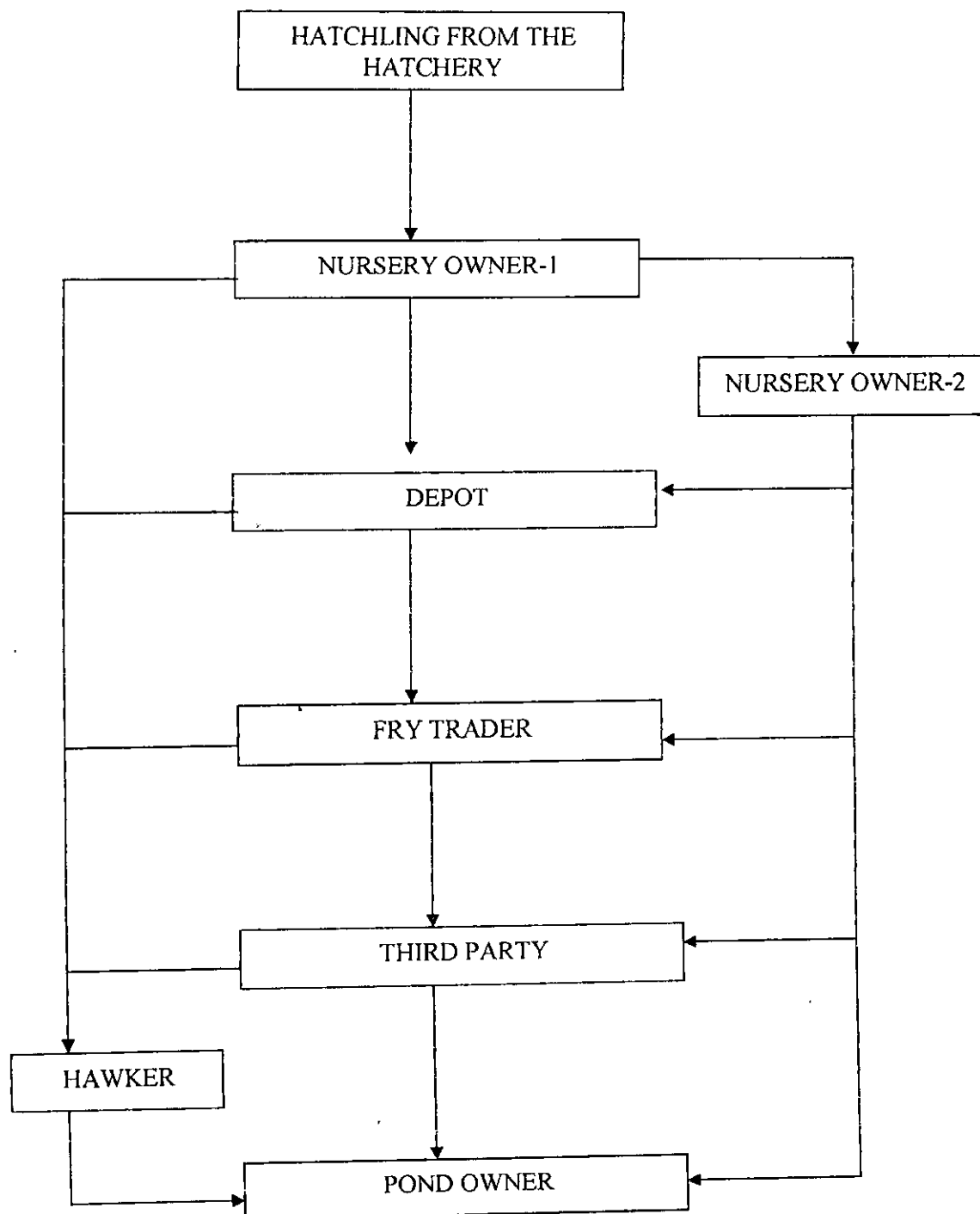


Fig-8: Different types of buyer to the nursery operator

Table -10: Rate of fry / Kg to the respective buyer (2-4" size fry)

Name of species	Aratdar	Hawker	Pond owner
Rohu, Catla, Mrigal	40-50/Kg	60-70/Kg	75-80/Kg
Common Carp	40-45/Kg	50-60/Kg	60-80/Kg
Puti	40-45/Kg	50-60/Kg	60-80/Kg



Flow Chart – 1: Fry marketing channel

3.13.2 Hatchery owner

Hatchery owner is the first man in this channel. He is also the key person in this trade. He produces hatchlings that are purchased by the nursery owner directly for rearing in the nursery pond. In the study area, there were 85 running hatcheries that produce around 45000Kg hatchling. About 70% of the hatchlings were reared in the study area which is later contributed to the farmers of fry marketing channel in the area as a whole.

3.13.3 Nursery owner

The nursery owner is also called the primary nurserer, the second man in this channel. He collects spawn from the hatchery owner and rears it in the nursery pond. After 20-50 days of culture, the fry are sold to the nursery owner-2 or transfer to the depot or sales center where the fry are kept in small hapa. Buyers come both from within and other districts of the country and buy it from the depot. Buyers from far away districts come with container and pick-up van and small buyer (Hawakers) with two aluminium pots buy the fry from the depot and distribute the fry in their respective area. The nursery owner -2, again stock the fingerling into his rearing pond up to another 30-40 days. Sometimes the nursery owners sell it directly to the pond culturists from his nursery pond. Sometimes the middleman contract to the primary nurserer to sell the fry to the second party and take commission.

3.13.4 Aratdar/ Depot holder

It is the third step in the channel. Whole selling is a major step in the dispersion activities of marketing, they are the big merchants or with possession of fixed business premises in the whole sale market and they perform the business with a large volume of transactions. The Aratdar who is situated especially in the central area, Chanchra region, invest a large amount

of money in his business, supplying fry into other districts as well as within the district. The Aratdar purchase fry from local nursery owner's stock it in his hapa or other stocking pond and sell it to far way district buyers. Though they are not nursery operator, they are playing vital role in progressing this trade and earning big commission.

3.13.5 Fry traders

He is also a middle man in the marketing channel. In the study it was found that the middleman had no possession of nursery. They had only information where the fry will be available. They make connection between nursery owners and buyers from far way district. In this way they are sharing with the benefit of the nursery owner.

3.13.6 Retailers / Hawkers

The retailers are also called the fry Hawkers, the last link of inter mediateries in the channel of fry marketing. . The retailers buy fish from the aratdar, secondary nurserer, or from the primary nurserer for release directly to the pond owner. They buy 4-5 kg of fingerlings per day and sell them door to door.

3.13.7 Pond owner

They are the ultimate consumer in this trade. They purchase fry from the retailer or aratdar. Sometimes they purchase fry directly from the nursery owners also. Due to the intermediate stage of this trade the pond owners had to pay more than the actual price of the fry and eventually they are loosing their benefits.

3.14 Transportation

Way of transport is badly essential for live product like fish fry. So, the fry must be moved as early as possible from nursery pond to the stocking pond even in long distant areas. For fry or fingerlings carrying, they used aluminum pot or plastic barrel with no specified densities with hand agitation of water.

3.14.1 Means of transport

In the study it was found that, the fry were transported by means of bus truck, train and pick-up van. In local markets the fry were transported by manual van, public bus and in some cases by truck. But train or pick-up vans were found to be the main mean of transport to the far way district.

Table -11: Modes of transportation used by fry traders

Type of transport	No. of farmer	Percentage (%)
Pick-up van	44	53.6
Bus	13	15
Manual van	25	30.4
Total	82	100

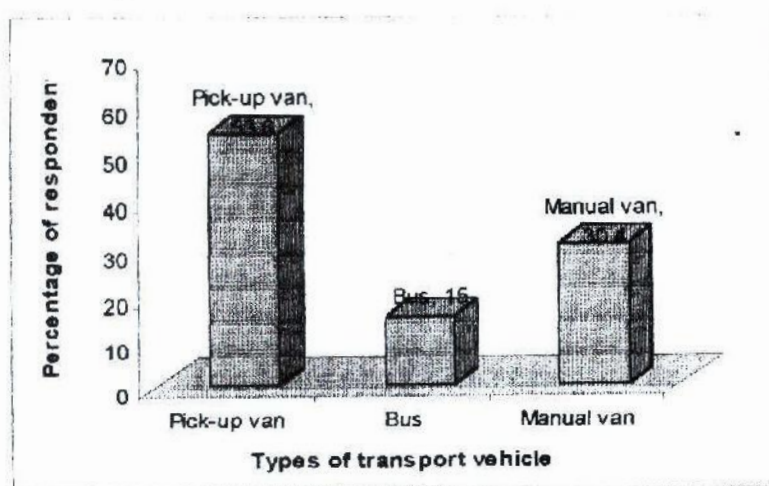


Fig-9: Modes of transportation used by nursery operators

Table -12: Modes of transportation used by buyers from far way district

Type of transport	No. of buyer	Percentage (%)
Train	4	18.1
Pick-up van	8	36.4
Bus	10	45.5
Total	22	100

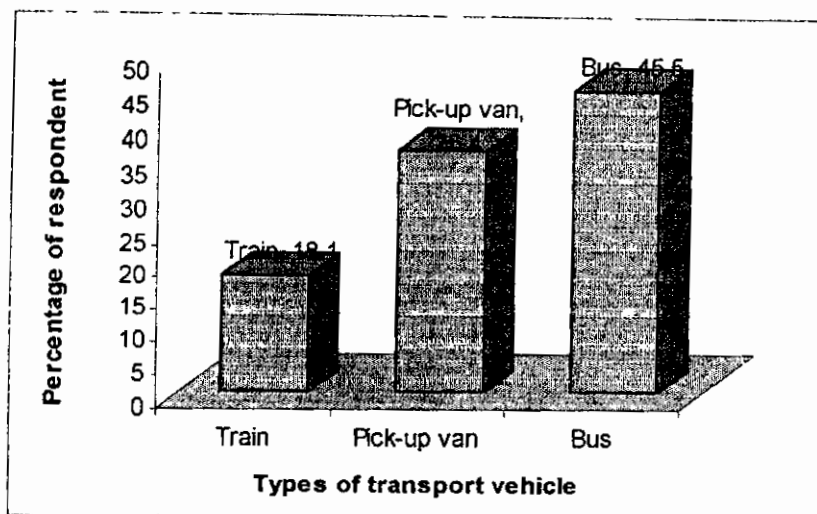


Fig-10: Modes of transportation used by fry traders.

3.14.2 Mortality due to transportation

In the study area, the fish seed were seem to be transported by using indigenous technique. In this system fish seed were transported in watered plastic tank or other metal tank with hand agitation of water. In case of long distance, plastic drum and pick-up van were used for transportation. Though modern technique of fish seed transportation is by using polythene bag filled with oxygen, it was seen not operating in the area. Improper transportation of the fish fry caused much mortality, which resulted into loss in the overall business. In the investigation it was found that the average mortality was around 25% which ranged from 10-40%.

Table -13: Mortality percentage of fry

Range of mortality percentage	No. of customers	Percentage (%)
0-10	15	18.3
10-20	23	28
20-30	36	44
30-40	8	9.7
Total	82	100

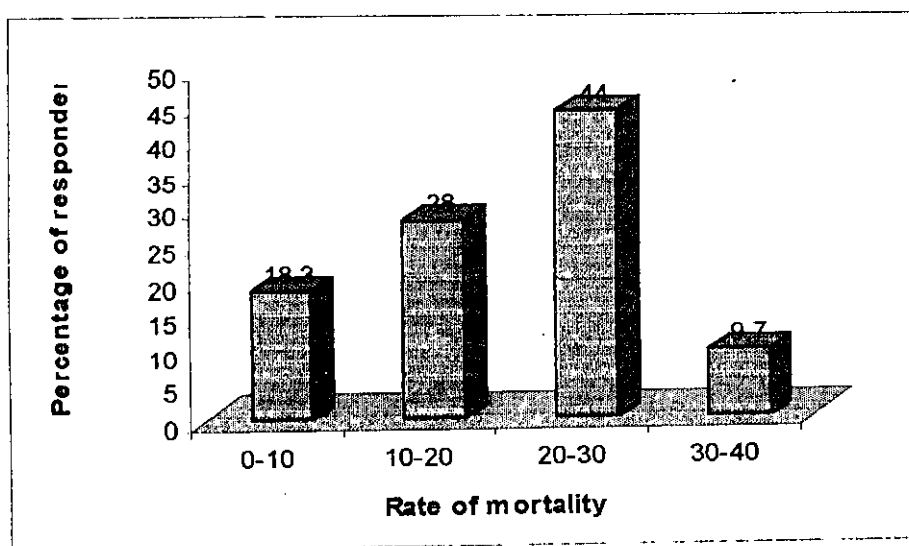
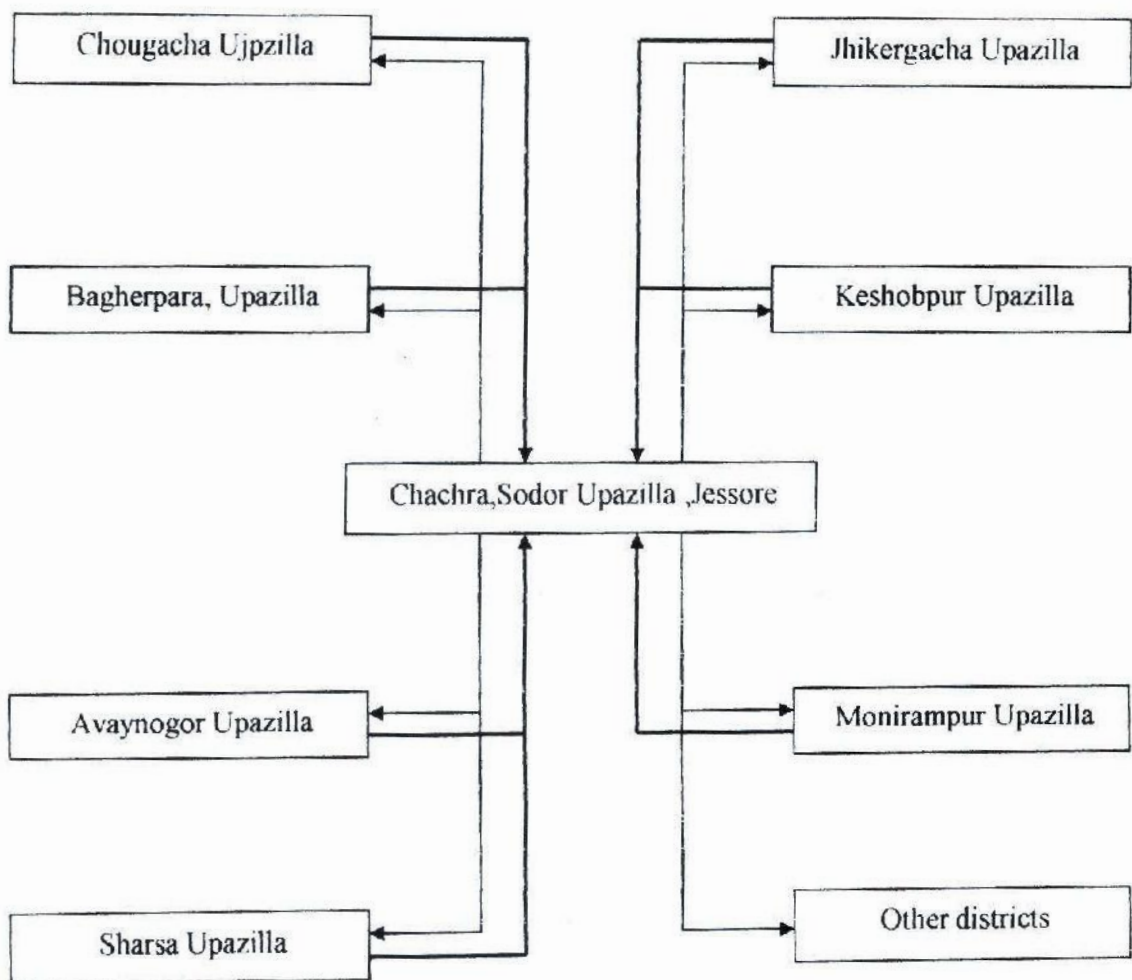


Fig-11: Mortality due to transportation



Flow chart 2: Transport channel of fry

Legend:

- = Transport of hatchling
 → = Transport of fry

3.14.3 Absence of transport vessel

Whole sale customers came from far way districts, carry the fry by means of pickup van or truck. The retailers who dealt with small business carried the fish seed by means of public bus or running truck. In absence of availability of this transport facility, they had to wait for long time. Longtime waiting with the fish seed without any oxygen caused oxygen shortage and survival rate became very low. Transportation hazard also cause physical damage which resulted into much more mortality of the fry.

3.15 Credit support

Most of the fry traders started their business in a small scale without some exception. Somebody started it, in his own small pond and expand it step by step. Fry traders try to manage capital from their inherited and own sources. During pick season for more running capital, they look for credit from bank, local money lender or other family source.

Availability or lack of credit support was a major problem in this trade. At the beginning of the season the nursery owners need money for pond preparation, stocking of spawn, collection of feed and fertilizer and maintenance of the pond. But the nursery operators hardly get credit support from Government sector. Finding no other alternative, the fry traders loan money from local money lenders with high rate of interest. They also take credit support from feed and fertilizer supplier with high rate of the interest. A major portion of their profit goes to pay for the loan and supplier, and therefore they can not improve their lot. In the present study it was found that only 18% of the local community get bank loan and only 32% took loan from local moneylenders.

Table – 14: Credit facility of the nursery owner

Sources	No. of farmers	Percentage (%)
Bank	15	18.3
Money lender	26	31.7
Youth dept.	2	3
Total	43	54

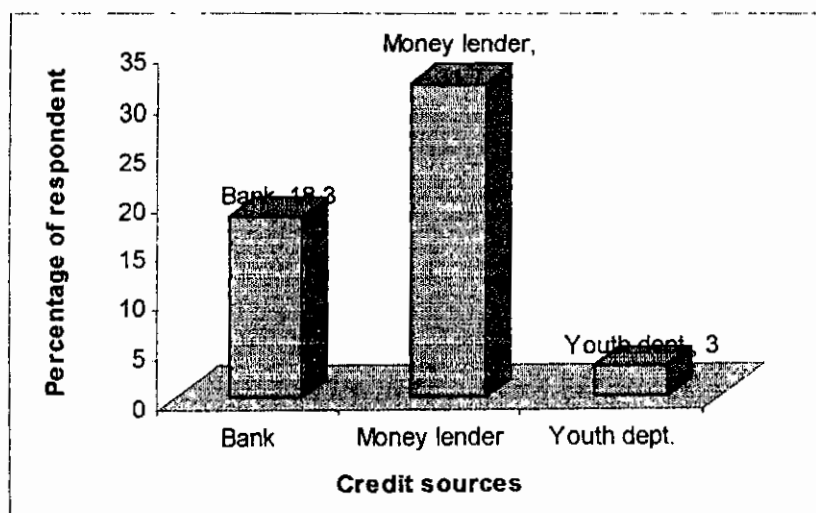


Fig-12: Source of Credit Support

3.16 Interest of loan

The rate of interest of bank and local money lender varied considerably. The local money lenders give the money with three time's high rate of interest than that of the bank. Sometimes they come to the local co-operative society for loan. But the rate of interest is the same. In the present study it was found that interest of the bank loan was 12% per year and around 36% from the local money lender.

Table-15: Interest of loan

Source	Interest % / year
Bank	12
Local money lender	30-36
Youth department	5

3.17 Technical knowledge of the nursery operator

In the study it was found that technical knowledge of the nursery operators was very poor. Most of them had no institutional knowledge. They were doing the job on the basis of their practical experience that they achieve from long time observation. Due to lack of their technical knowledge they can not manage their ponds properly. Sometimes they fail to diagnoses any disease and also fail to face any sudden problem. As a result sometimes mortality rate become very high and they fall in loss, which results into loss of the total business. In the study it was found that only 25% of the nursery operator attained training and the rest had no technical knowledge.

Table-16: Training of the farmers

Type	No. of farmer	Percentage (%)
Trained farmer	21	25
Non-trained farmer	57	75
Total	82	100

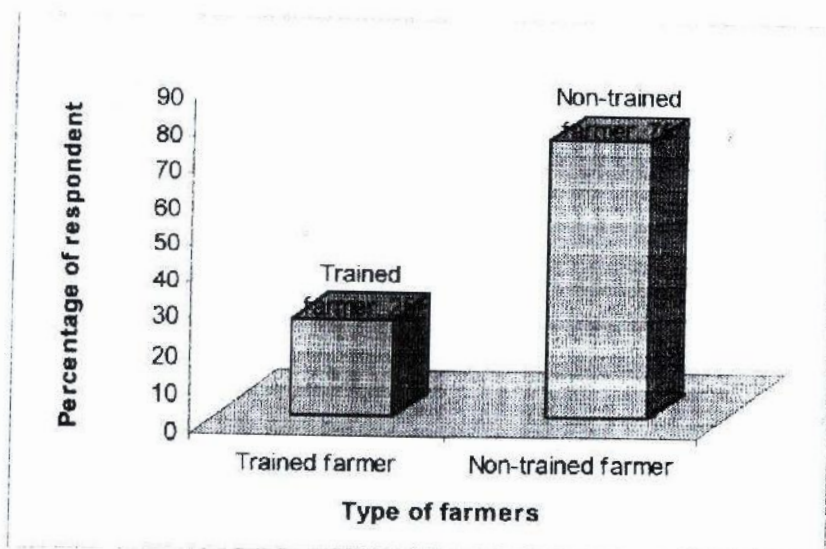


Fig-13: Training status of the farmers

3.18 Use of modern equipment

In the study area it was found that no modern equipment was found to be in use. They commonly use traditional equipment for diagnosis and to maintain the water quality parameter. Therefore the outbreak of disease is a common phenomenon in the area. In the investigation it was found that only 8.5% of the nursery operators partially got the opportunity of using modern equipment like test kit, DO meter pH meter, aerator and the like.

Table – 17: Use of modern equipment

Type of equipment	No. of farmer	Percentage (%)
Modern equipment	7	8.5
General equipment	75	91.5
Total	82	100

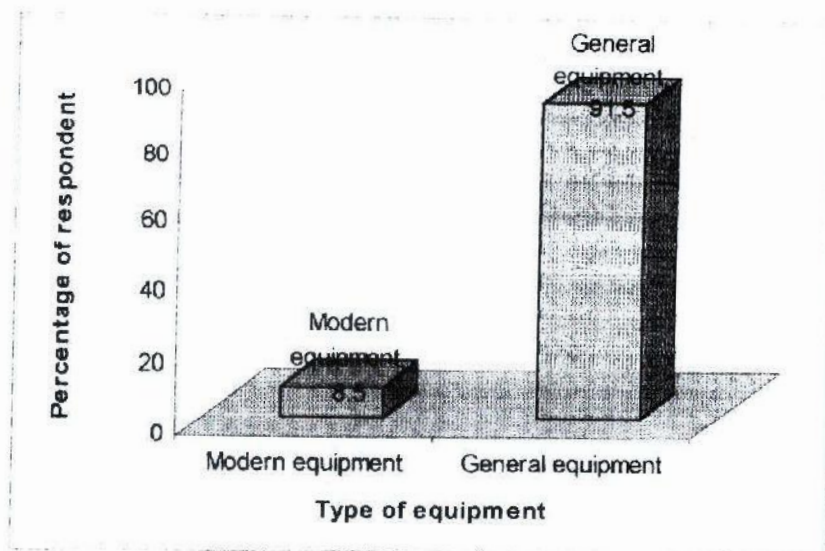


Fig-14: Modern equipment using by the farmers

3.19 Problems faced by the nursery owner

The selected farmers were asked whether they faced any problems in nursing of the fish fry. The fish farmers were found to face various problems which are stated shortly in the below.

3.19.1 Lack of technical Knowledge

It is found to be the most vital problem of carp nursery. This is due to the lack of technical knowledge of the nursery operators. There is no fisheries specialist among the nursery operators. Most of them practice nursery operation on the basis of their own knowledge and practical experience that they gathered by observation. One of the problems is sudden death of the fry. This is due to sudden change of water quality parameter or oxygen deficiency or toxicity of pond water. Some times the nursery owner failed to diagnosis this simple situation and resulting lose of the business.

One of the most important problems the nursery operator commonly faced was disease outbreak of the stocked hatchling in the nursery ponds. It has been observed that the hatchlings were commonly died by gas bubble disease, which had occurred mainly due to rise of temperature above the ambient level and shortage of oxygen. Some times the farmer failed diagnosis this situation. Some farmers controlled these sorts of problems by controlling the water depth and providing water flow, while the others applied lime or other chemicals which had no scientific basis.

3.19.2 High lease value

The lease value of nursery pond varies considerably from place to place. The lease value of Chanchra region in Jessore district was 12,000 to 15,000 taka per year for each bigha (33 dec.) and it was 5000 to 7,000 taka both at Manirampur and Bagharpara. In comparison with the paddy land lease value of a nursery pond is five times higher. So, high lease value of pond was a major constraint for expansion of the business.

3.19.3 Lack of credit facilities

The fry traders reported that they could not use proper dose of fertilizer and other inputs, in addition to special care with respect to timely due to insufficient capital. It can be seen that lack of capital was one of the major production problems as reported by the fry traders.

3.19.4 Transport problem

Most of the nursery owner had no transport vehicle. They had to depend on public transport facility even in far way district. The local fry traders transport by means of van, bus or truck. Some time they had to wait for long time with fry into plastic drum or earthen pot. This will cause much more

mortality of the fry. In the study it was found about 40% mortality occurred due to bad transport.

Before supplying fry into long distance there is need to conditioning. Some times the farmers make hurry for conditioning the fry or maintain some complex procedure. This unfair means of conditioning weaken the fry and cause more mortality.

The farmers transport the fry in plastic drum with water or in aluminium pot by hand agitation of water. This kind of transport will cause physical damage of the fry and resulting much more mortality.

3.19.5 Marketing problem

As the nursery owners are poor and they have either pond or take ponds on lease, they took credit from local money lender, feed and fertilizer supplier, hatchling from hatchery owner. For these, they sold fry to middleman or aratdar for cash payment at lower market price but the middlemen sold those fry at higher price to the pond owners. Due to these reason the nursery owners were deprived from getting actual price of the fry.

3.19.6 High price of various inputs

There was a general problem faced by the farmers in the country. Fertilizer, feed and seed were vital inputs in the production of fish fry. Most of the nursery owner mentioned that they had to purchase seed, fertilizer, feed and other inputs with a very high price during pick season.

3.19.7 Lack of modern equipment

In the study it was found only 8.5% of the respondent farmer are using modern equipment. The major part of the nursery operator in the study area possessed no facilities of using modern equipment. Due to lack of modern equipment they cannot maintain the physiochemical health of the nursery pond .they can use test kit for diagnosis water quality like DO, hardness, alkalinity etc. They can also use ph paper for determining water ph and locally made aerator for maintaining dissolve oxygen level. Now a day all these equipments are available and cheap.

3.19.8 Terrorism

Terrorism was found to be a big problem in the nursery area .They create problem in leasing pond and any construction work of the nursery etc. The terrorist use to ask for a large amount of money from the nursery owners. The nursery owners were bound to pay the money otherwise they would damage the fish seed or beat the farmer. Some times the terrorist create life risk of the farmer.

3.19.9 Unexpected market competition

It was found that there is no uniform market price for selling the fry. Some times this creates a big problem in this trade. Nursery operators use to sell the fry bellow the prevailing rate. This destabilizes the uniformity of the market price and resulted loss of the business.

3.19.10 Lack of policy

There is no business policy in the study area so the fry traders can do anything they can expect. Due to lack of policy the hatchery owner produced fry without maintaining any regulation; the fry traders produced and sold fry without any regulation. This unwanted situation create massive problem of the trade.

3.19.11 Record keeping system

In the study area it was found the nursery owner had no systematic record keeping system. So they could not find out of the difference between the lots. Some times they could not find out the actual production of a lot. They only took purchase and sell record in taka of a year. Due to lack of systematic record keeping system the nursery owner loss themselves as well as the trade.

3.19.12 Socio economic consideration

Fry trade is a prospective and profitable sector in fishery business. The farmers who are engaged in this trade are middle class and mostly poor. They have either ponds or take ponds on lease. The educational background of these people is very low. They are usually indebted to money lenders, as they have to loans from these people at high rate of interest. Some of these farmers take advances from the money lender or aratdar with a condition to supply to them at a very low rate. Thus the farmers are deprive of their legitimate earnings and are exploited by money lenders. Since these farmer or fry traders are poor and in some cases landless, they do not have any collateral for obtaining loans from the commercial banks.



There are a remarkable number of cultivable ponds in the study area that could be used as nursery ponds, but are either not being utilized for aquaculture or are under utilized. Pond leasing is also cumbersome, due to multiple ownership.

The other problems were stocking of hatchling in the nursery pond. The nursery operator had got a tendency of stocking extremely high density in the nursery pond. This is due to ensure his profit within short culture period. The high density stocking sometime cause mortality of the stocked fry resulting into loss of the business. The farmer used to applied high dose of fertilizer to ensure the growth of the hatchlings within short rearing period. Intensive fertilization sometime caused the deterioration the water quality and resulting into higher mortality.

CHAPTER FOUR:

DISCUSSION

DISCUSSION

Carp seed production through induced breeding in Jessore region has made a real progress in inland freshwater aquaculture. About 47% of the total nursery operators used leased ponds in their business to grow out hatchlings to fingerlings. The lease value of Chanchra was doubled than what were in Manirampur and Bagharpara. Due to high lease value the nursery operators conduct more cycles in a year with a view to compensate excessive cost.

Among the 82 farmers, 28 farmers (34.1%) were used to complete 6-8 cycles/year and 24 farmers (29.2%) were used to complete 8-10 cycles/year. Cent percent of the nursery operators of this area followed two layer nursery systems. In this system 31.7% nursery operator completed their cycles within 25-30 days; 28.05% within 30-35 days, 25.6% within 20-25 days and 8.53% within 35-40 days respectively to get fingerlings up to 3 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 inch. 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 5-7 cm before being sold to the pond culturists (Hasan, 1990).

In the present study, it was found that 4-10 full-time labours were involved in each nursery. Besides this, 6-10 part-time labours were involved in the peak season. During the peak season, the nursery operators themselves and other family members like women and children were also involved in the work. They are not considered as full-time or part-time labour.

Survival rate of the spawn in different nursery varied considerably. 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. The average survival rate of fry was 76% which was ranged from 60% to 90%. FRI undertook a study, where the survival rate was recorded 70% (Islam, 1989).

The total fry production in the selected nurseries was 1621 lacs of which silver carp contributed the highest position in fry production (386.7 lacs) followed by Rohu (345 lacs), Catla (321.9 lacs) Mrigal (197.4 lacs), Common carp (183.5 lacs), Thai Puti (104.3 lacs), Grass Carp (51.7lacs) and pangus (30.5lacs). The price of the hatchling of different species was different. This was due to the variable demands of the species to the customers, availability and growth rate of the species and culture system. However, the price of same species also varied from starting to the end of the season.

The marketing of fingerlings was generally done by the middlemen, since a very few fish farmers buy the seed directly from the nursery farms. The fry marketing channel consisted of hatchery owner, Nursery operator, Aratdar, Fry seller and pond owner (consumers). Aratdar was the main customer of the nursery operator and it was reported by 45.2% farmers. Aratdar sold the fry to the middlemen or the retailers and they used to sell to the pond owners.

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). It was found that the problems associated with fry marketing

were created by the invasion of intermediaries and the nursery owner did not get the actual price of fry which was paid by the pond owner.

Transportation of live fish is wide spread practice particularly in the rural areas of developing countries and often represents the only means of supplying fry/fingerlings for culture (Ross and Taylor, 1989). In the study area, the fry were transported by means of bus truck, train, pick-up van and manual van. About 53.6% fry traders used pick-up van and 30.4% fry traders used manual van for fry transportation in the local areas. In case of far way districts bus, pick-up van and train were used by 45.5%, 36.4% and 18.1% buyers respectively.

The fry traders usually followed the traditional approach of fry carrying. They normally used aluminum pot or plastic barrel with no specified densities. For oxygen supply they always agitated the water in the pot or plastic barrel continuously during transportation. For long period of transportation they also changed water of the pot or plastic barrel. In Bangladesh, Fish seed-spawn, fry and fingerlings are transported traditionally in earthen/aluminum hundies (pots). Density of fish seed transported through this method is not based on any scientific basis, but on empirical knowledge resulting in high mortality. 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).

The transportation of fry and fingerlings was a problem in the study area. Not only the transportation system as a whole was unsatisfactory here; the mode of carrying the fry and fingerlings also leaves much to be desired. The prevailing fry transportation system is traditional as described by Saha and Chowdhury (1956), and results in lowering of vitality of the fry and resultant

mortality. In the study area, it was reported that twenty to thirty percent mortality of fry were caused due to transportation claimed by 44% customers.]

[Modern technique of fish seed transportation is by using polythene bag filled with oxygen and fish hauling tank with agitator. This could not only reduce mortality rate and extend survival time, but could bring down the carrying cost considerably (Haq *et. al.*, 1968).] The densities of fingerlings computed for transportation in eight liters of water under oxygen packing at 30°C temperature are 150, 80 and 4 fingerlings for 6, 12 and 24 hours duration of transport respectively (Santhanam *et. al.*, 1999).

Lack of credit support was another vital problem in developing the business. The nursery operators needed credit support at the beginning of the season for pond preparation and collection of necessary inputs. [The main sources of capital of fry traders were from their inherited and own sources, bank loan, local money lender and other family sources.] In the present study, it was found that only 18% of the local community got bank loan and only 32% took loan from local moneylenders and the interest was 12% and 36% per year respectively.

[Credit for investment in aquaculture has traditionally come from non-institutional sources, most commonly from family members, village money lenders, fish brokers, fry/fingerlings suppliers and fish merchants. Pond owners frequently receive fingerling on credit from nursery operators where the cost of credit is high. In the banking system of Bangladesh, there is provision for credit in aquaculture. 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).

Availability of suitable credit system in aquaculture operations is a problem. The institutional credits operated by a few commercial banks in Bangladesh are not easily available to all types of farmers. The poor and marginal farmers have no access at all to the institutional credits; although reportedly, a few of the rural banks viz. [The Grameen Bank operates credits to the rural farmers with a high success of utilization. The poor have the inherent difficulty of interacting with the situation of credit utilization and recovery (Shah, 1991).

It has been observed in Bangladesh that, large-scale farmers have been the main beneficiaries for institutional credit. Most of the small farmers have limited or no access to institutional credit, most of which is short term credit. Providing security is always a problem with small fish-farmers and some kind of arrangement has to be made to guarantee loans to them for investment and working capital. It should also be accepted that credit administration costs are relatively higher for smaller loans. Recent experience suggests that supervised credit is at present the only alternative now available to replace the traditional ways of providing security, namely collateral or mortgage (Bhuiyan and Chowdhury, 1995)

Multi-ownership is another problem for getting institutional credit in fish fry trade. Bank officials are not familiar with fisheries activities and not trained in identifying credit request. The weekly or fourth nightly return of NGO's credit is another problem for collection of these loans for the fry traders.

In the present investigation, it was found that only 25% of the nursery operators attained training and the rest had no technical knowledge. The training was provided by the Department of Fisheries and the Youth Development Department. Modern equipment like test kit, DO Meter, P^H meter, aerator and the like were used by only 8.5% of the nursery operators and the rest did not get opportunity of using the equipment.

The most vital problem of carp nursery in the study area was the lack of technical knowledge of the nursery operator. There was no nursery operator with fisheries technical education. Most of them practice the nursery operation on the basis of their own knowledge that they attained by observation. The most important problem of the nursery operator commonly faced was the disease out break of the stocked hatchlings in the nursery ponds. The nursery operators in the study area possessed no facilities of using modern scientific equipment. The other problems were high price of various inputs, terrorism, unexpected market competition, record keeping system and lack of policy.

CHAPTER FIVE:

CONCLUSION AND RECOMMENDATIONS

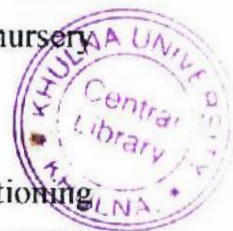
CONCLUSION AND RECOMMENDATIONS

Availability of spawn / fry is the key point for the development of the pond fish culture in the country. But the production of carp seed is still very poor in Bangladesh so that it cannot meet with the demand. In the field of nursery operation in Bangladesh no striking technologies have so far been practiced by the nursery operators as like hatchery technology. Nursery operation is the consecutive step of hatchery operation as well as pond fish culture. But it is very good news that nursery trade in Jessore region playing a vital role in producing the carp spawn / fry and is providing not only in Jessore region but also throughout the country. It has now become a potential and profitable business at this region. In spite of high potentiality , there are some barrier in nursery trade at this region such as lack of technical knowledge, modern equipment, credit facility, transportation facility , lengthy marketing channel , availability of inputs in right time , lack of nursery trade , lack of fingerling development strategy , terrorism etc. Among all the problems technical knowledge and credit facility is most important. If it is possible to remove these problems of this business of the region, the production of carp spawn / fry will increase and will create more employment opportunity for the people of this area. This will also help the development of their overall socio-economic condition. The increased production will be able to meet with the demand of carp fry in Bangladesh.

The carp nursery trade in Jessore region has been developed based on the increasing seed demand all over the country. The ultimate goal of this business is to meet the seed supply for pond fish culture, solve the employment problems and improve socio-economic condition of fish fry trade community. But there were some problems which hinder the prospects

of this trade. To mitigate the problems the following recommendations can be made:

1. Government should take step for the improvement of the technical knowledge of the nursery owner through training programme with the help of NGO's, FRI and other related institution.
2. There should be monitoring programme set up in the nursery owner's pond as well as in all aspects of fry trades through Department Of Fisheries.
3. An effective mechanism for information exchange between the researcher, extension worker and the nursery operator has to be developed through arrangement of workshop and seminar. There should be provision for exchange of information among the nursery owners of the Jessore district.
4. Nursery operators and fry traders should be trained up on conditioning of fry that is very important for transportation of fry to far away districts.
5. Credit supply is one of the important issues in fish fry trade. Government should take step with the help of Bangladesh Krishi Bank for easy disbursement of loan. In that case they can follow the way of crop loan. Credit facilities should be made available to buy their inputs in time, in quality and in quantity with easy repayment conditions.
6. Involvement of too many steps-the process is a problem that demands attention for improvement of the trade. Elimination of certain stages in the trade not only would allow cutting down the time of transportation, it would also keep down the prices.



7. In order to solve the fry transportation problems, Government can encourage private sector for the development of transport system. There should be Bank credit facility on easy access.
8. Private sector should be encouraged on the use of modern equipments in businesses related to fry trading. There should be some facilities on behalf of Government like tax free access of these equipments. This will reduce the cost of these equipments.
9. An effective mechanism for information exchange between the researcher, extension worker and the nursery operator has to be developed.
10. Off-season breeding venture should be undertaken with necessary environmental modification so that the fry traders could be engaged during off-season months in as early as February and in as late as November of every year.
11. A planned fingerling development strategy has to be developed throughout the country, by which quality fish fingerling can be supplied largely from local sources.
12. The government should give special attention in providing proper training and credit support for the development of this trade. The government can give emphasize on the further research and extension for this particular technology.

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APPENDIX

ON THE PROBLEMS AND PROSPECTS OF FISH FRY TRADE IN
JESSORE DISTRICT OF BANGLADESH.

Questionnaire for collection of data from different carp nursery

1. Nursery

Name:.....

Address:.....

2. How long has the nursery been operated ?

3. Number of Ponds

Own pond:.....

Leased ponds:.....

4. Total area of ponds:.....

5. Type of nursery :

One layer:.....

Two layer :.....

6. Number of employee

i. Full time :.....

ii. Part-time :.....

7. Production capacity of your nursery & size of fingerling

8. Season of business

i. Peak from.....to.....

ii. Lean fromto.....

9. How many turns do you complete is a season ?

10. Actual production & size of fingerling ?

11. Where do you obtain the spawn from ?

12. What is the survival rate ?

13. What kinds of problem you are facing for obtaining spawn ?

14. What is the preferable size of fry ?