Aqua-Internship Program

Asia Link project

Faculty of Fisheries

Bangladesh Agricultural University, Mymensingh

Title:

Factors influencing tilapia (*Oreochromis niloticus*) fry mortality during transportation

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Name of Aqua-Industry : Agro3, Boilor, Trishal, Mymensingh.

BACKGROUND

There are 12 exotic fish species of Bangladesh. Among the cultured fishes tilapia (*Oreochromis niloticus*) is one of the fast growing species. Tilapia was introduced to Bangladesh from Thailand in 1954. Genetically Improved Farmed Tilapia (GIFT) was introduced to Bangladesh by International Center for Living Aquatic Resources Management (ICLARM) and Bangladesh Fisheries Research Institute (BFRI) in 1994 (Hussain *et al*., 2004). Performance of GIFT was found to be significantly superior to that of tilapia previously introduced. Technologies to produce all male tilapia or sex-reversed GIFT, locally known as mono-sex tilapia, have been developed to avoid unwanted reproduction. Moreover, the male tilapia grows 35% faster than female. Monosex tilapia fry that are produced in the hatchery are transported to distant aqua farms for producing marketable sized tilapia. There are instances of mortality during transportation. There may be many factors that influence the mortality of tilapia fry during transportation. Optimum and standard conditions must be maintained to reduce mortality. The current project was carried out Agro-3 fish hatchery, Boilor, Trishal, Mymensingh. The hatchery faces mortality problem during transportation. I tried to select the best optimum condition of tilapia fry transportation for reducing their mortality.

OBJECTIVES

- **i.** To identify the factors that influences the mortality of tilapia fry during transportation.
- **ii.** To identify optimum duration for safe transportation.
- **iii.** To identify the optimum limits of factors to reduce mortality.
- **iv.** To select a good method for conditioning and better survival of fry during transportation.
- **v.** To compare between the optimum practices and the traditional hatchery practices.

METHODOLOGY

The project was carried out at Agro3 fish hatchery where monosex tilapia (all male) fry are commercially produced. When the fry become 1-2 cm, they get ready for marketing.

Before marketing the fry needs conditioning for transportation. My experiment on mortality of tilapia fry during transportation was stated with conditioning prior-to transport.

1. Conditioning prior-to transportation:

Tilapia fry must was conditioned prior to transportation. Fry were transferred to transitory tank hapa for conditioning. Freshwater was supplied to the tank continuously. Conditioning was done for 12 hours. During conditioning stocking density was high compared to normal rearing. Feeding was stopped during conditioning.

The purposes of conditioning were-

i. To adopt the fry with stress conditions.

ii. To reduce the mortality during transportation.

iii. To increase survival when the fry face stress condition during transportation.

Fig. 1: Conditioning of tilapia fry at Agro3 prior-to transportation

2. Packaging:

In Agro3 polythene bags of 33inch × 18inch size are used for packaging of fry for transportation. Polythene bags were checked carefully for any leakage by filling water. One polythene bag was then put into another polythene bag for security. Empty polythene bags were then put into plastic meshed bag. The bag was then filled with 8-liters of water from the conditioning tank. Fry were then weighed and poured into polythene bag. Bags were then filled with oxygen form an oxygen-cylinder. It was then tied carefully by rubber.

Fig. 2: Packaging of fry after conditioning

3. Transportation of fry:

In my experiment, transportation of tilapia fry from the Agro3 fish hatchery to different aqua farms were done by pick-up motor vehicle. For finding out the optimum condition for transporting monosex tilapia fry, two different durations (2 hours and 6 hours) were trialed. Three stocking densities (250 gm/bag, 300 gm/bag and 350 gm/ bag) and three O_2 concentrations ($1ft^3$/bag, $2ft^3$/bag and $3ft^3$/bag) were also trialed to find out optimum stocking density and oxygen concentration. The following three important factors were studied to find out the optimum condition for transportation of tilapia fry.

A. Duration of transportation: The effect of transportation time on mortality of tilapia fry has been studied during the experiment. Two different duration *viz.* 2-hours and 6-hours were trialed to the select the optimum time duration for transportation.

Fig. 3: Marking of bag prior-to transportation to identify mortality after transportation

B. Stocking density: The effect of stocking density on mortality of tilapia fry has been studied during the experiment. Three different densities *viz.* 250 gm, 300 gm and 350 gm/ bag were trialed to select the optimum density for transportation.

C. Oxygen concentration: The effect of O_2-concentration on mortality of tilapia fry has been studied during the experiment. Three different O_2-concentrations *viz.* $1ft^3$, $2ft^3$ and $3ft^3$/ bag were trialed to select the optimum concentration for transportation.

RESULTS & DISCUSSION

By this experiment, I tried to select optimum conditions on time duration, stocking density and oxygen concentration to reduce the mortality of tilapia fry during transportation.

A. Duration of transportation: Tilapia fry mortality was found to be high at transportation longer time duration (6-hours) compared to short duration (2-hours). However, there was no mortality of fry at low density (250 gm/bag) (Table 1& Fig. 4.).

Table 1: Mortality of tilapia fry during transportation at different durations and stocking densities

Density (gm/bag)	O_2 (ft^3/bag)	Water (liter/bag)	Water temp. (^{0}C)	Mortality (%)	
				2 hours	6 hours
250	2	8	35	0	0
300	2	8	35	0	0.506
350	2	8	35	0.187	0.687

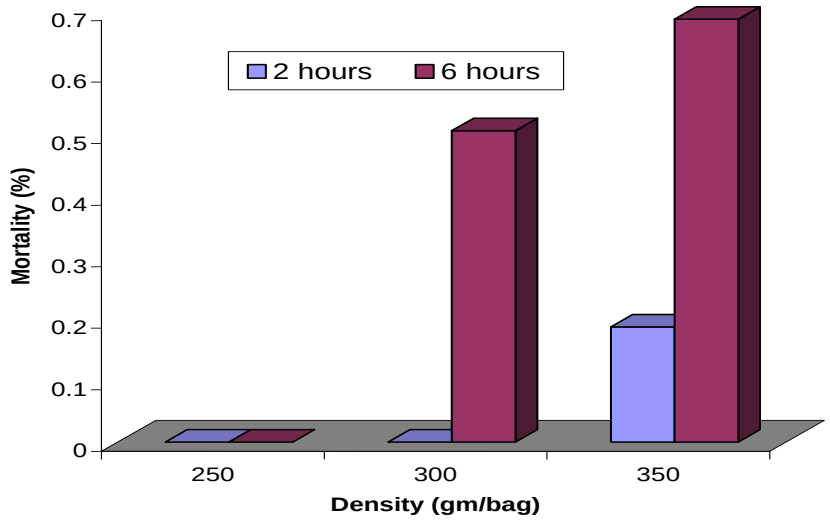

Fig. 4. Mortality of tilapia fry at different stocking densities on 2- and 6-hours transportation, respectively.

B. Stocking density: Fry transportation mortality was found to be high at high stocking densities compared to low densities. Moreover, high density together with longer transportation time enhances fry mortality (Table 1& Fig. 4). No mortality was found at the lowest stocking density (250 gm/bag).

B. Oxygen concentration: Fry mortality on transportation was found to be occurred at the lowest (1 ft^3/bag) and highest (3 ft^3/bag) O_2-concentration used in the experiment. There was no mortality at 2 ft^3/bag concentration at different densities.

Table 2: Mortality of tilapia fry during transportation at different durations and oxygen concentrations

Duration (hour)		Density (gm/bag)		O_2 (ft^3/bag)	Water (liter/bag)	Water temp.(^{0}C)	Mortality (%)	
							2-hour	6-hour
2	6	300	250	1	8	35	0.219	0.51
2	6	300	250	2	8	35	0	0
2	6	300	250	3	8	35	0.273	0.354

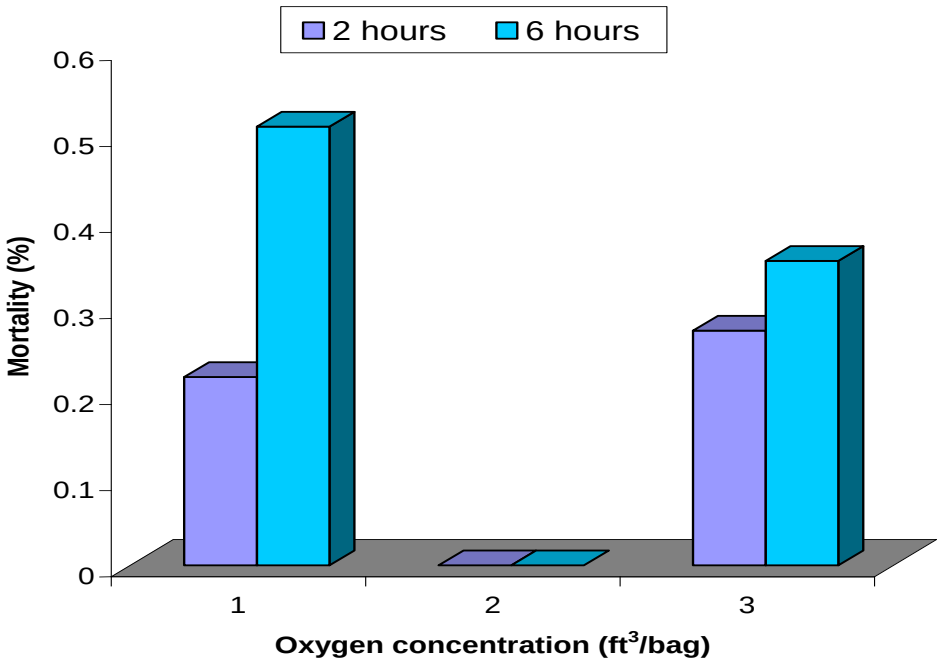

Fig. 5. Mortality of tilapia fry during transportation at different durations and oxygen concentrations

BENEFITS DERIVED FROM MY RESEARCH WORKS

Benefits for myself:

During three-month internship program in Agro3 fish hatchery I am benefited most as follows:

i) I have learnt knowledge and skills on of tilapia brood stock management, brood selection, egg collection from oral cavity, incubation and hatching of eggs, fry rearing, hormone treatment and finally production of monosex tilapia fry.

ii) I have learnt good and safe packaging of tilapia fry for transportation.

iii) I have researched to identify the problems of tilapia fry transportation and have tried to find out optimum conditions of transportation duration, stocking density and oxygen concentration to reduce the mortality of fry during transportation.

Benefits for the entrepreneurs:

My research on tilapia fry transportation will be beneficial and useful for the entrepreneurs in the following different ways:

i) Previously hatchery owners did not know the standard condition of stocking density, oxygen concentration and time duration for safe transportation of tilapia fry. My findings on the three parameters will furnish new useful information for the hatchery entrepreneurs for safe fry transportation.

ii) New information obtained in this finding will be useful to reduce mortality fry during transportation.

iii) As mortality of tilapia fry reduced, financial loss of hatchery owners, fry suppliers and also fry buyers will reduce.

iv) Total fish production of the country will be increased and national income will ultimately be increased.

CONSTRAINTS FACED DURING INTERNSHIP

In Agro3 farm all are very helpful. I did not face any problem during my work. Farm owner supplied all types of necessary instruments and support for internship and experiment. But unavailability of fry, at the time of experiment, due to high water temperature was a major problem.

RECOMMENDATIONS

To reducing mortality of tilapia fry during transportation the following recommendation can be made to the hatchery owners, fry traders and aqua farms:

i. Conditioning prior-to transportation for 12-hours prepares the fry to face stress during transportation.

ii. Short duration (2-hour) of transport is safer and results low mortality compared to long time (6-hour) transportation.

iii. The optimum oxygen concentration in the transportation bag is 2 ft^3/ bag for safe tilapia fry transportation.

iv. The best stocking density is 250 gm/ bag to get maximum survival.

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