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Marketing Channels of Indian Carp Fry Collected from Halda River and Livelihood of the Fry Traders

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ABSTRACT

Halda River is the only tidal river in the world, has been reported to serve as a natural source of fertilized carp eggs. This study entails various marketing channels of carp fry of Halda River at different rearing stages and socio-economic conditions of the fry traders. Snowball sampling of data collection was followed through Focus Group Discussion (FGD), semi-structured questionnaire interview and cross-check interview with key informants. The results reveal that local egg collectors of Halda River collect carp eggs from May-July and hatch them by their indigenous hatching techniques. After 4-5 days of hatching, egg collectors start to sell the fry to fish farmers from different nooks of Bangladesh at the rate of BDT 40,000-60,000 kg^{-1}. Halda fry has a complex market chain than other hatchery fry. The fry distributed in four different ways i.e., firstly from fry sellers to local fish consumers via local fish farmers and pond owners; secondly from fry sellers to nationwide fish farmers via hatchery owners and technicians; thirdly from fry sellers to renowned public fish hatchery in order to produce mother fish and finally from fry sellers to government Halda brood restoration project in order to enrich Halda River with more brood fish. This study also evaluated the socio-economic conditions of the traders. Most of traders (84%) were satisfied by involving themselves with Halda fry collection and marketing whereas rest of them (16%) was not satisfied due to their uncertain livelihood conditions in the off season.

Key words: Carp fry, marketing channel, halda river, egg collectors, livelihoods

INTRODUCTION

Being a riverine country, fishermen of Bangladesh collected fertilized eggs from river from the time immemorial (Ali *et al*., 2010). Halda is the only river in Bangladesh where Indian Major Carps spawn naturally which makes this river a unique heritage of this country (Tsai *et al*., 1981; Patra and Azadi, 1985; Kabir *et al*., 2013). Generally, fishermen collect fertilized eggs of a white fish at Indian Major Carp, i.e., Rohu (*Labeo rohita*), Katla (*Gibelion catla*) and Mrigal (*Cirrhinus cirrhosus*) from Halda River (Tsai *et al*., 1981). In Bangladesh, most of the hatchery owners use brood fish from the same source. Inbreeding and unplanned hybridization is a major problem in seed production in most of the hatcheries of Bangladesh (BFRI., 2014). For this reason, hatchery produced fry are mostly unable to reach the highest growth. These fry are mostly

disease-prone and have high mortality rate. In this circumstance, hatchery owners need to collect the brood and fry from natural source. Halda river is the only suitable example from which they can collect wild fry. Because Halda fry are mostly disease resistant, inbreeding free, have high survival rate and able to live in stressed conditions (Kabir *et al*., 2013). Consequently, it is very important to collect fry from Halda River to avoid inbreeding and other problems. Therefore, identification of proper marketing channel of Halda fry would provide more information for the interested hatchery owners.

Although, some hatchery owners collect fry of Halda River to improve their business but there is no specific information available on quality of Halda fry over artificial fry, their market acceptance, their marketing channels and as well as profit and loss of Halda fry (Kibria, Pers. Commu). Even people who are involved directly or indirectly with the marketing of halda fry are also unknown. As a result, it is essential to determine the growth and survival rate of Halda fry and identify their marketing channels and potentials for further development and improve the livelihood of the poor people engaged in the collection of Halda fry.

According to DoF, different research works have been done on Halda River, such as, conservation and management of river Halda (Azadi, 2005; Azadi and Arshad-ul-Alam, 2011), impact of climate change on River Halda and its remedy (Azadi, 2012); collection and hatching of fertilized eggs of major carps (Patra and Azadi, 1984); restoration of natural breeding habitat of the Halda River (Rahman, 2012). However, no studies have been done on the marketing channels of Halda fry. The socio-economic conditions of personnel involved in Halda fry collection and trading are also unknown. Therefore, the present study was conducted to know the marketing channel of fry of River Halda and the socio-economic conditions of the Halda fry traders.

MATERIALS AND METHODS

The study was conducted for a period of 6 months i.e., May-October, 2013. Data were collected personally through face to face interview, using semi-structured questionnaires and Focus Group Discussion (FGD). Primary data were collected through surveying egg collectors and fry sellers of Halda River, people involved in fry rearing in Jubin Hatchery, fry buyer and fish farmers. The primary data based on field survey were collected from people who were involved in marketing channels of fry from Halda river to noakhali district. Frequent visits were made to collect data in the study area of Chittagong and Noakhali district.

The study was conducted in eight different places of Noakhali district and Halda region namely, Jubin hatchery, Mannan Nagor, Khalifar Hat, Rajgonj and Maijdee Court of Noakhali region and Maduna Ghat, Madarsha and Gorduara of Halda region (Fig. 1). These areas were selected as study area because most of the people involved in marketing of Halda fry are living in these areas. Jubin Hatchery was selected as this hatchery collected fry from Halda River and rear them for certain period to sell them at a good price. These fry are sold among local fish farmers of Noakhali. The study areas were also expanded towards the location of those farmer.

A total of 31 interviewees were selected in random sampling method for questionnaire interviews in eight different places. Fourteen persons were selected from Halda region and 17 different persons were chosen from Noakhali region. Among them 17 of Noakhali region, 11 were involved in Jubin Hatchery, 4 in fish farming and a driver and an assistant driver were also involved.

The data were collected using focus group discussions, snowball technique through questionnaire interviews and crosscheck interview with key informants (Fig. 2). Data was processed and finally analyzed using MS Excel-2010.

Fig. 1(a-b): (a) Path way (Red color) of the study area from (Noakhali) to Halda River (Chittagong) including the Map of Bangladesh (inset) and (b) Study areas in Halda river indicated by red circle

Fig. 2: Data collection technique of the study

RESULTS AND DISCUSSION

Halda fry marketing system: In Halda fry marketing system, there was a number of middle men involved in both Halda region and Noakhali district. The study reveals that the fry of River Halda distributed in four different ways. Firstly, 70% of Halda fry are marketed from egg collectors to the

local consumers by following channels: Fry sellers (egg collector)→Local fish farmers→Pond owners and other fish farmers→local markets/consumers. Secondly, 20% of Halda fry are marketed from egg collectors to the nationwide consumers by the following channels: Fry sellers (egg collector)→agents of hatchery owners→drivers→hatchery supervisor→hatchery workers→fry distributor→fish cultivators→market consumers. Thirdly, 7% of fry are marketed from egg collectors to the renowned public hatchery owners (such as-Raipur and Mymensingh fish hatchery) in order to develop brood fish by following channels: Fry sellers (egg collector)→hatchery owners and→persons involved in brood-stock development. Fourthly, 3% of fry are distributed to the government Halda brood restoration projects to restore the brood fish of Halda River by the following channels-Fry sellers (egg collector)→Govt. Halda Brood Restoration Projects and→river Halda (Fig. 3).

In current study, four different channels were observed in distribution channel of Halda fry. Mia (1996) and Rahaman *et al.* (2013) identified three different marketing channels in Mymensingh district of Bangladesh and West Bengal of India respectively. Roy (2008) found four different marketing channels of fish fingerlings in Dakshin Dinajpur District of West Bengal, India which is similar to the present study.

Price variation in halda fry: Prices of Halda fry varied in different stages of the marketing channel. Egg collectors sell per kg of fry at a cost of BDT 40,000-60,000 to the hatchery owners where fries comprises per kg is about 4-5 Lac. But Hatchery owners sell each fry at a cost of BDT 5-6 to the local fish farmers (Table 1).

Table 1: Price variation of fry in the marketing channel

Places	Persons	Costs/prices
Bank of Halda river	Egg collectors	Boat arrangement costs (not fixed)
Hatchery/ponds besides river Halda	Fish farmer-hatchery owner	40,000-60,000 Tk. kg^{-1} fry
Jubin hatchery	Hatchery owner-fish cultivator	5-6 Tk./fry of 1.5 inch

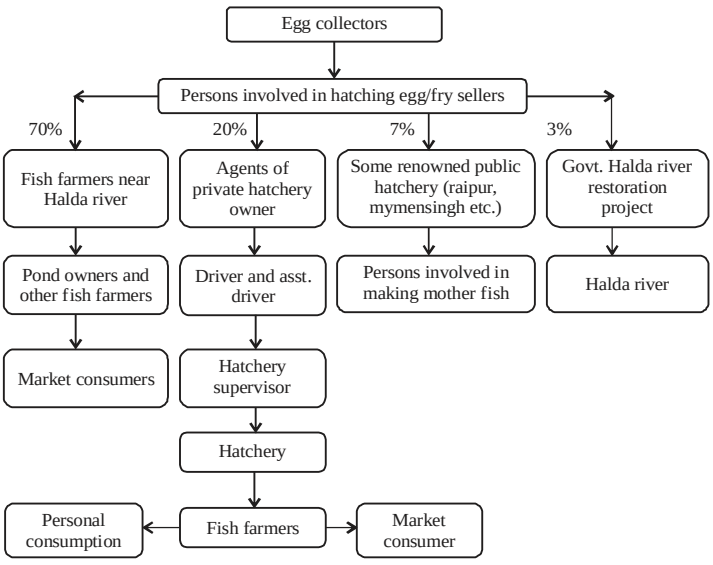

Fig. 3: Marketing channels of Halda fry

Generally, a ordinary hatchery fry of 1-1.5 inch size is sold at a cost of BDT 1-2 whereas similar sized Halda fry is sold at a cost of BDT 5-6. This data was evaluated by surveying different private hatcheries of Noakhali district.

Sharif and Abdulla-Al-Asif (2015) reported that the average price of Rui, Katla and Mrigal fry at different hatcheries in Jessore was 1900, 2400 and 1500 BDT kg^{-1}, respectively. He also reported that the price was high at the beginning and end of the season but comparatively less when the supplies of fries were available.

Islam *et al*. (2005) reported that considering both government and private Fish Seed Farms (FSFs), per kg sale price of spawn for GFSFs (BDT 2250) was higher compared to PFSFs (BDT 1660). It is clear that the price of Halda fry is much higher than the ordinary hatchery produced fry. The finding reveals that the quality and subsequent good-will made this elevated price for Halda fry.

Transport mechanism and cost: Eggs and Fry were transported in a sophisticated mechanism in every stage of marketing channel. Adequate oxygen (O_2) was supplied in the polythene bag during transportation of fry. Oxygenated polythene bag were handled carefully in micro bus. Assistant driver of the micro bus usually observed the fry condition continuously. Air Conditioning (AC) system was used in the micro bus to control the temperature of the water in polythene bag. After long journey fry were usually conditioned in the pond for half an hour for acclimatization.

Transportation cost is varied with time and distance of places. In this study, the transportation cost from Halda River to Jubin Hatchery was BDT 5,000 due to the long distance and extra fry handling facilities. However, Roy (2008) reported that transportation cost was negligible in West Bengal, India due to less interfere of middlemen and short distance of places.

Survival rate of fry: According to hatchery operators, the survival rate of the fry during different stages of the rearing process and transportations was more than 95% and as a result the mortality rate was less than 5%.

Rahaman *et al*. (2007) found that the fry mortality was 24% due to improper management in Jessore district of Bangladesh which is much more than this finding. The fry of river Halda was more disease resistant and had capacity to adapt with little environmental stressed condition even. As a result their survival rate was highly satisfactory.

Socio-economic conditions:

Age, family types, religious pattern and educational condition: Most of the interviewee was less than 30 years (39%) and minimum number of interviewee was higher than 70 years old (3%) (Fig. 4).

Pravakar *et al*. (2013) reported that age group of 41-60 years was the highest (44%) and 20-30 years was the lowest (20%) considering all fish farmers in Shahrasti Upazila of Chandpur, Bangladesh which is totally different to present study as because young and energetic persons are becoming more interested to culture Halda fry.

Most of the interviewee was married and living in single or joint family with their parents. Maximum 58% interviewees were in single and minimum 42% interviewees were in joint family. Abdulla-Al-Asif *et al*. (2015) found that most of the fry traders (73%) had single family but only 27% had joint family in Chachra of Jessore which is more or less similar to present study.

Three types of religions was identified among them Muslims-71%, Hindus-16% and Buddhists 13%. Pravakar *et al*. (2013) found that about 75 and 25% of the fish farmers were Muslims and

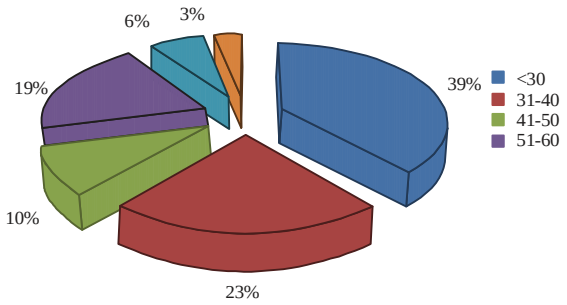

Fig. 4: Age distribution of persons involved in marketing channel

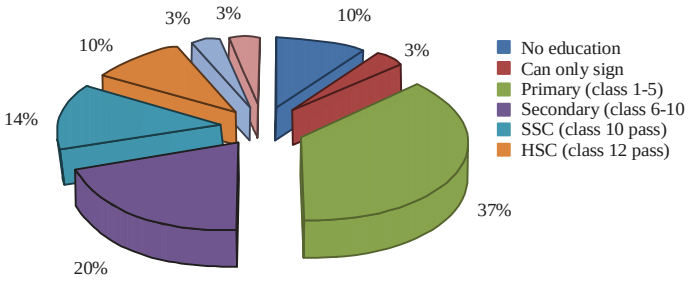

Fig. 5: Percentage of education of persons involved in marketing channels

Hindus, respectively in Shahrasti Upazila of Chandpur which is different to present study as because there was a number Buddhists family near Halda river.

Some of the interviewee was highly educated, such as, hatchery owner, hatchery manager, technician etc. They occupy only 3% in the education percentage category (Fig. 5). But most of the interviewee (37%) was not fully educated. They have just the knowledge of primary education. Abdulla-Al-Asif *et al.* (2015) found that 46% of traders have institutional education that range from primary to higher education and other 54% of traders have no experience in education in Chachra region of Jessore which is different to present study.

Experience on business of halda fry and income status: Experience of interviewee on Halda fry varies according to their ages. Most of the interviewee has about one or two years knowledge on Halda fry. Highest (55%) percentage of persons was slightly experienced on Halda fry. Besides some much more experienced persons are also involved in the marketing channels of fry of River Halda. Lowest (9%) percentage of persons was moderately experienced on Halda fry (Fig. 6).

Income source: In the on-season at of Halda fry, the income source of most of the interviewee was fry collection, hatching, rearing, selling etc. But in the off-season at of Halda fry, interviewee involved themselves in agriculture, hatchery works, daily labor, fish culture (Table 2).

Income of egg collectors: Average income of egg collectors depends on the availability of eggs in river Halda in a given year. But average income of hatchery workers was the same all the year round.

In this study, the 'On-season' income of maximum (37%) egg collectors was Tk. 651-700 and minimum (12%) egg collectors was less than BDT 600 per day (Fig. 7). Besides, 'Off-season' income

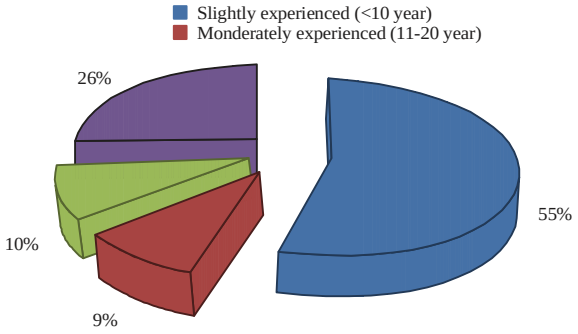

Fig. 6: Experience on business of Halda fry

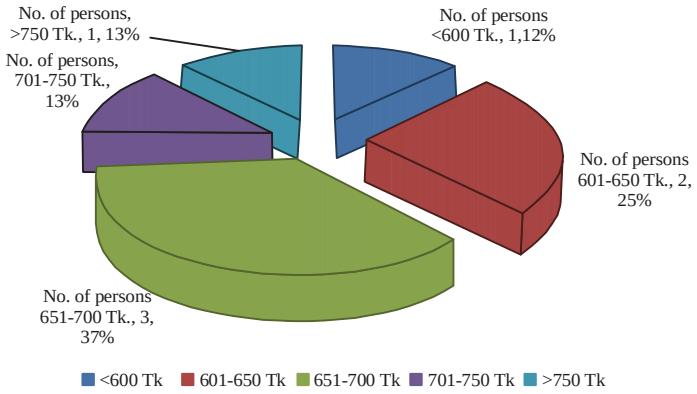

Fig. 7: On-season income

Table 2: Income sources during on-season and off-season

On seasons	Percentage	Off season	Percentage
Egg collection	26	Fish culture	9
Net setting and fishing	16	Day labor	10
Hatchery advising	3	Poultry business	7
Hatchery management	27	Agriculture	35
Pond preparation and feeding	13	Business	7
Feed apply	10	Hatchery technician	3
Sampling and reporting	16	Hatchery works	20
Fish culture	13	Service holder	3
Driving	6	Driving	6
Total	100	Total	100

of maximum (37%) egg collectors was BDT 251-300 and minimum (12%) egg collectors was BDT 301-350 (Fig. 8). Abdulla-Al-Asif *et al.* (2015) reported that the average monthly income of traders in the on-season was BDT 18000/month (i.e., 600/day) and in the off-season was less than BDT 7000/month (i.e., 233/day). It is clear that both on-season and off-season income of this finding is lower than the present study as because Halda fry traders get more financial benefit.

Income of hatchery workers: Hatchery workers are involved with Halda fry in a certain period of time during Halda season. In this case, they did not get any extra salary for the work on Halda fry. They only paid their regular monthly salary for the works in the hatchery (Fig. 9).

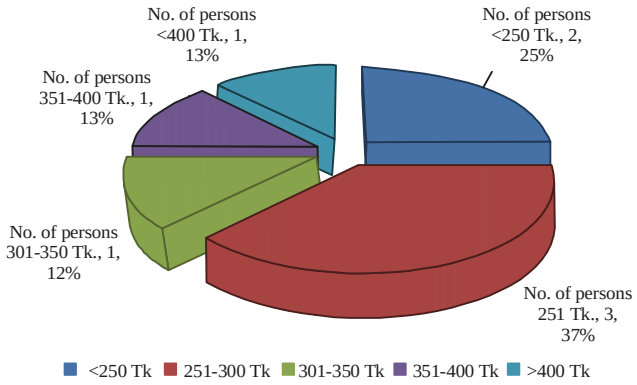

Fig. 8: Off-season income

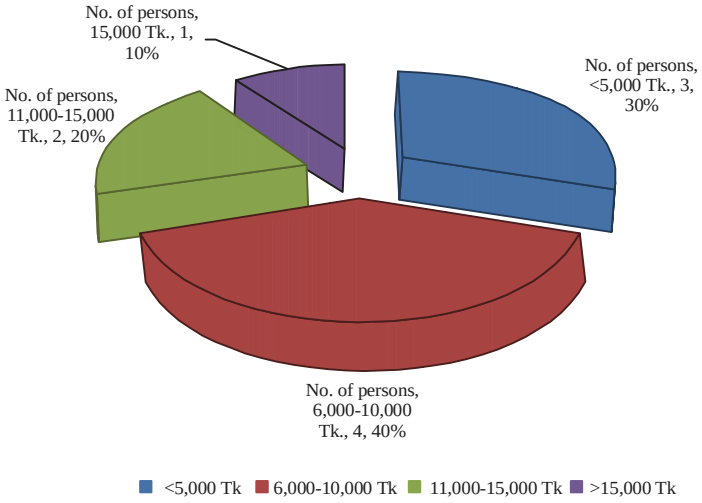

Fig. 9: Monthly incomes of hatchery workers

Income of Jolodas (fishermen cum net-maker): Jolodas (capture fishers) are comparatively lower income-class people in the study area. Their livelihood condition seemed uncertain due to limiting the harvesting facility from the Halda river. Most of the types of net setting and fishing in Halda river were banned from 1997. As a result, they became helpless and worried about their livelihood. Alternative livelihood opportunities need to be created in urgent basis.

Satisfaction about Halda fry trading: Most of the interviewee (84%) was satisfied by involving themselves with the fry of Halda river. But some Jolodas (capture fishermen) were not satisfied (16%) as because they are unable to collect fry and larger fish from the river. They were worried about their livelihood and seeking alternative income source to meet up their livelihood. Besides, some dishonest traders mixed hatchery-made fry with original Halda fry to get more profit. As a result, the quality of Halda fry was deteriorated and ordinary fish farmers was cheated in some cases.

CONCLUSIONS

In marketing system of Halda River generated fry, a number of intermediaries were involved actively for selling fry. There are four different types of marketing channels found in Halda fry distribution from fry seller to final consumer. Egg collection and hatching technique applied by local egg collectors was almost indigenous. They developed the indigenous technology by gathering their practical knowledge years after years. During transportation of fry, oxygenated polybags and extra care of handling is essential to avoid the mortality. The mortality rates of Halda fry in the farm and in the transportation were near less than 5% percent due to disease resistant power and high adaptability of the fry with the environment. As a result, most of the hatchery owner wants to make their brood fish from Halda originated fry. Besides these, fry has no chance of inbreeding problem so that demand of Halda fry is much more than hatchery fry. If every hatchery owners determine to make brood fish from Halda fry then the culture system of Halda fry would be developed and practiced commercially in mass scale. On the basis of the findings of the present study, it can be concluded that a specific marketing channel should be established to ensure the supply of the original Halda fry as some dishonest farmers supply hatchery fry saying as Halda fry. Technical Training is essential for hatchery technicians/workers to take proper care of Halda fry rearing.

REFERENCES

Abdulla-Al-Asif, M., A. Samad, M.H. Rahman, M. Almamun, S.M.Y. Farid and B.S. Rahman, 2015. Socio-economic condition of fish fry and fingerling traders in greater Jessore region, Bangladesh. Int. J. Fisher. Aquat. Stud., 2: 290-293.

Ali, M.A., S.A. Rahman, U. Roy, M.F. Haque and M.A. Islam, 2010. Problems and prospects of fish fry trade in Jessore district, Bangladesh. Mar. Res. Aquat., 1: 38-45.

Azadi, M.A., 2005. The Halda river, only breeding ground of major carps in Bangladesh: Conservation and management. National Fish Fortnight Compendium, Directorate of Fisheries, Ministry of Fisheries and Livestock, Bangladesh, pp: 27-31, (In Bengali)

Azadi, M.A. and M. Arshad-ul-Alam, 2011. Diversity of finfish and shellfish of the river Halda with notes on their conservation. Proceedings of the International Conference on Biodiversity-Present State, Problems and Prospects of its Conservation, January 8-10, 2011, Chittagong, Bangladesh, pp: 91-101.

Azadi, M.A., 2012. Halda river's fish natural spawning ground: Impact of climate change and measures to be taken. National Fish Week Compendium, Directorate of Fisheries, Ministry of Fisheries and Livestock, Bangladesh, pp: 42-44, (In Bengali).

BFRI., 2014. Quality fish seed in Bangladesh: Contribution of BFRI. A Project of FAO In Collaboration with DoF, Mymensingh, Bangladesh, pp: 2-3.

Islam, M.S., M.H. Rahman and S. Sharmin, 2005. Fish seed marketing system in Bangladesh. Bangladesh J. Agric. Econ., 18: 49-60.

Kabir, M.H., M.M. Kibria, M. Jashimuddin and M.M. Hossain, 2013. Economic valuation of tangible resources from Halda-the carp spawning unique river located at southern part of Bangladesh. Int. J. Water Res., 1: 30-36.

Mia, M.G.F., 1996. A study of production and marketing of culture fishes by the selected pond owners in Mymensingh District. M.S. Thesis, Department of Co-operation and Marketing, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Patra, R.W.R. and M.A. Azadi, 1984. Collection and hatching of fertilized eggs of major carps. Chittagong Univ. Stud., 8: 45-49.

Patra, R.W.R. and M.A. Azadi, 1985. Limnology of the Halda river. J. NOAMI, 2: 31-38.

Pravakar, P., B.S. Sarker, M. Rahman and M.B. Hossain, 2013. Present status of fish farming and livelihood of fish farmers in shahrasti upazila of Chandpur district, Bangladesh. Am. Eurasian J. Agric. Environ. Sci., 13: 391-397.

Rahaman, M.M., M.A. Sayeed, A. Paul and M. Nahiduzzaman, 2007. Problems and prospects of fish fry trade in Jessore district of Bangladesh. Prog. Agric., 18: 199-207.

Rahman, M.K., 2012. Restoration of Natural Breeding Habitat of the River Halda: Final Report-June 2012. Department of Fisheries, Bangladesh Fisheries Research Institute, Dhaka, Bangladesh, ISBN: 9789843356475, pp: 13-36.

Rahaman, S.M., B.K. Bera and G.S. Ananth, 2013. A study on problems and constraints in production and marketing of fish in West Bengal. J. Crop Weed, 9: 110-113.

Roy, T.N., 2008. Analysis of marketing of fish fingerlings and environmental awareness level of fisherman in Dakshin Dinajpur District of West Bengal. Agric. Econ. Res. Rev., 21: 425-432.

Sharif, B.M.N. and Abdulla-Al-Asif, 2015. Present status of fish hatchlings and fry production management in greater Jessore, Bangladesh. Int. J. Fisher. Aquat. Stud., 2: 123-127.

Tsai, C.F., M.N. Islam, R. Karim and K.U.M.S. Rahman, 1981. Spawning of major carps in the lower Halda River, Bangladesh. Estuaries, 4: 127-138.