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Performances of resource poor households in aquaculture practices in sadar upazila, Meherpur, Bangladesh

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Abstract

The present study was conducted to evaluate the performances of resource poor farmers in fish farming at their homestead ponds in Sadar Upazila under Meherpur district from July to October 2015. Participatory Rural Appraisal tools such as questionnaire interview, cross check interview and secondary information were used to assess the performances in aquaculture activities. Thirty pond fish farmers were purposively selected, among them 10, 5, 5, and 10 participants were involved with carp-mola, carp-tilapia and carp-shing polyculture and vietnam koi mono-culture respectively. The result showed that the majority of the farmers (33.33%) had 51-100 decimal cultivable land followed by 20 and 16.67% participants who possessed 151-200 and >300 decimal of land respectively. It was found that the highest percentage of participants (73.33%) primary occupation was agriculture followed by fish farming (3.33%). A majority of the farmers (53.33%) started fish farming only before 1-5 years influenced by the positive result of fish culture by the villagers and 20% each have started before 6-10 and 11-15 years back. Only 6.67% farmers started fish culture in 16 years before who were the pioneers of fish farming in the region. The average pond size in the area was found 15 decimal with a range of 7 to 35. Before starting fish culture all the farmers got training and inputs support for fish culture from a local NGO called Daridra Bimochon Sangstha (DBS). Prior to start fish farming all of the farmers followed standard procedure of pond preparation and fish fry release in their ponds. Majority farmers (90%) applied homemade feed, whereas rest applied commercial feed to their fish. By contrast, 90% farmers used to feed their fish and rest was reluctant to provide feed to the fish. Almost twenty seven percent respondents annual income was between BDT 61,000 to 80,000 followed by 20 and 10% whose income was 100000-150000 and >150000 BDT per year. During the culture operation, farmers usually had some problems such as pond drying, disease outbreak, dike erosion, shade of tree over the ponds, theft, snakes eating the fish etc.

Keywords: resource poor households; aquaculture; practices; Meherpur; Bangladesh

1. Introduction

Bangladesh is an agro-based developing country and is striving hard for rapid development of its economy. It is often argued that the future development of the country depends particularly on the agricultural sectors and plays a vital role in the socio-economic development of rural area, fulfilling the animal protein demand, creating employment opportunity, alleviating poverty and earning foreign exchange for the country. Fish and fisheries are indispensable part in the life and livelihoods of the people of Bangladesh and it is the part of our cultural heritage. Freshwater fish farming plays an important role in the livelihoods of rural people in Bangladesh [18]. Pond fish farming has been proved to be a profitable business than rice cultivation. So many farmers in rural areas are converting their rice field into aquaculture pond [12], BBS [5] reported that there are 52, 77,572 ha water bodies of which 9, 15,506 ha ponds are suitable for fish culture. So the country has good potential for freshwater aquaculture, this potential cannot be fully utilized for various reasons, because most of them are still rare [7]. Fish resources play a very important role in the economy of Bangladesh accounting for about 4.39% of GDP. About 2.46% of annual export earning comes from the fisheries sector and it ranks 3rd among the export oriented industries [8]. Bangladesh has vast inland open water (40,24,934 ha) which is contributing 35.53% of total fish capture. In 2010-2011 about 14,60,769 MT, 10,54,585 MT and 5,46,333 MT of total catch were obtained from culture fisheries, capture fisheries and marine water fisheries respectively.

The production was recorded by [7]. Fishery resources and fishing plays a vital role in improving the socio-economic status, the fight against malnutrition, earn foreign exchange and creating employment opportunities in Bangladesh. In the study area fish farming activities are followed by the fish farmer in pond and small household pond. Most of the farmer started fish farming for their household consumption. In the recent year fish farming activities are gradually increasing in Meherpur sadar upazila. Fish culture in Meherpur sadar upazila are characterized by extensive (traditional), improved traditional (semi-intensive) system. In the study area they culture fish in polyculture system. Most of the species cultured in polyculture system were rui, catla, mrigal, silver carp, mirror carp, grass carp, bata, tilapia, shing, Vietnam koi and mola. These species are highly demandable fish species and high market value. Small portion of fish farmer are practices integrated vegetable fish farming in recent year. Fishes are cultured traditional extensive techniques in the study area, but now fish farmers are adopting scientific

technologies instead of ancient culture methods. The proper production can be estimated with focusing the importance of pond in freshwater inland fish culture. The main objectives of the present study was to investigate the performances of farmers in various aquaculture practices in some selected area of Sadar upazila under Meherpur district; to know the status of pond fish farmers in areas and to identify the constraints of pond fish production in the area. Previously, no other study was conducted to evaluate the performances of fish farmers in various aquaculture practices in that region.

2. Materials and Methods

2.1 Study area and period

The study was conducted in some selected areas of Meherpur sadar upazila during July to October, 2015 by using the survey method. Thirty fishermen of the area were interviewed during the survey. The study was carried out in the eight villages named Harirampur, Razapur, Barakpur, Ujalpur, Monohorpur, Jhaubaria, Subidpur and Kaligangni.



Fig 1: Map of Meherpur sadar upazila showing the study area.

2.2 Data collection

To collect primary data some formal interview was conducted. Before going to make an actual interview, a brief introduction about the objective of the study was given to each of the farmers and assured them that all information would be kept confidential. Each question was explained clearly and asked systematically for their clear understanding. At the time of interview the physical conditions of the ponds and the fish cultivation methods like pond repairing, application of food and fertilizers, harvesting, etc. were observed as a result there was a scope to well understanding the fish production technology in the study area. Time required for each interview was about to an hour to one and half hour. The secondary data were collected from different sources like, central library, Bangladesh Agricultural University, Mymensingh; different websites and journals and District Fisheries Office, Meherpur.

2.3 Data processing and analysis

After collection of data from the field, it's were verified to eliminate errors and inconsistencies. Then the data were tabulated into computer. The qualitative data were categorized and analyzed mainly based on descriptive statistical analysis by MS excel. All the collected data were processed and analyzed to extract the findings of the study area following careful accumulation.

3. Results

3.1. Age distribution and religion of fish farmers

In the study area, there was majority of fish farmers (33.33%) were 31-40 years old. On the other hand, 30% respondents were 21-30 years old, 20% respondents were 41-50 years old, 13.33% respondents were above 50 years old, where only 3.33% respondent were 10-20 years old (Table 1). It was found that, 30 (100%) respondent of this study were Muslim.

Table 1: Age of the fish farmers in sadar upazila, Meherpur.

Age group (years)	No. of respondents	Respondents (%)
10-20	1	3.33
21-30	9	30.00
31-40	10	33.33
41-50	6	20.00
Above 50	4	13.33
Total	30	100

3.2. Primary occupation of fish farmers

It has been observed that aquaculture was not the primary occupation of most of the fish farmers. Only 3.33% fish farmer took the aquaculture as their primary occupation. Among the 30 respondents most of them (73.33%) are involved in agriculture. Among others 10.00% business, 3.33% service holder, 6.67% other occupation and 3.33% are students (Figure 4).

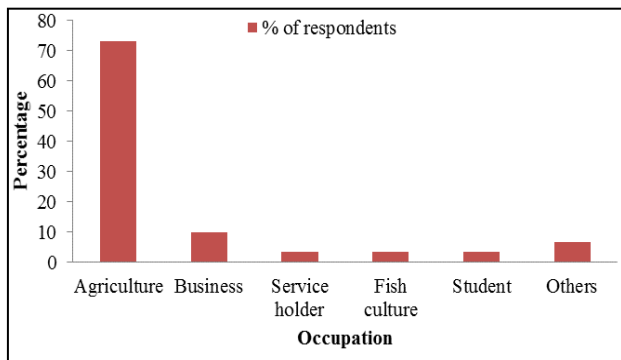


Fig 4: Primary occupation of fish farmer’s sadar upazila, Meherpur.

3.3. Family type

In the fish Pond community of the study area, it was found that 67.67% fish farmers lived in separated families and 33.33% lived with joint families (Table 3).

Table 3: Family type of fish farmers in sadar upazila, Meherpur

Family type	No. of respondents	Respondents (%)
Joint	10	67.67
Separated	20	33.33
Total	30	100

3.4. Housing condition of fish farmers

It was found that the fish farmers had own house for living in the area. Majority (40%) of the respondents had tin shed house, 23.33% had semi-paka, 20% had paka house and only 16.67% had kacha house (Figure 5).

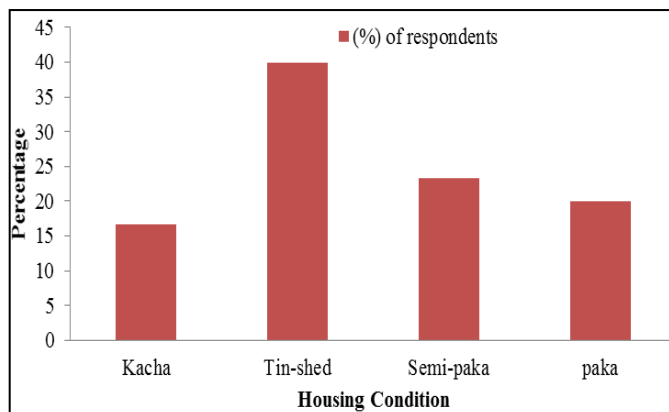


Fig 5: Housing status of pond fish farmers

3.5. Electricity facility of fish farmers

In the study area it has found that, all most all the farmers (93.33%) have electricity facilities in their house. Only few (6.67%) have no electricity in their house (Table 4).

Table 4: Electricity facility of fish farmer’s house in the study area.

Electricity	No. of respondents	Respondents (%)
Yes	28	93.33
No	2	6.67
Total	30	100

3.6. Educational status of fish farmers

Out of 30 fish farmers, 8% had no education (illiterate), 16% had primary level, 36% had secondary level, 20% had S.S.C. level, 14% had H.S.C. level, and 6% had bachelor level of education (Figure 6).

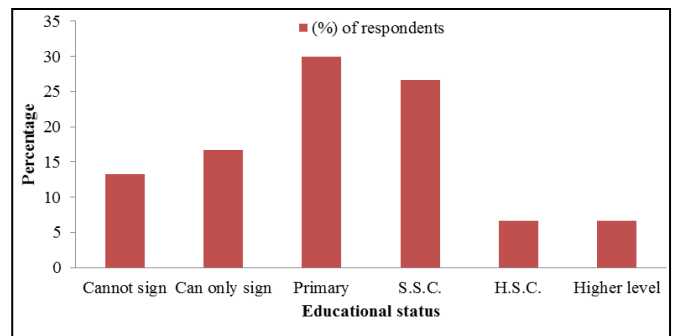


Fig 6: Educational status of fish farmers in Meherpur sadar upazila.

3.7. Agricultural land of fish farmers

Among the visited 30 farmer most of them (33.33%) had the agricultural land (51-100) decimal. On the other hand, 20% had (151-200) decimal, 16.67% had up to 300 decimal, 10% had (101-150) decimal, 6.67% had (1-50) decimal, 6.67% had (201-250) decimal, 6.67% had (251-300) decimal (Table 5).

Table 5: Agricultural land of farmer in sadar upazila, Meherpur.

Land size (decimal)	No. of respondents	Respondents (%)
1-50	2	6.67
51-100	10	33.33
101-150	3	10.00
151-200	6	20.00
201-250	2	6.67
251-300	2	6.67
Above 300	5	16.67
Total	30	100

3.8. Starting year of fish culture by the farmers in the study area

Most of the farmer 53.33% came to aquaculture within 5 years. Moreover, 20% farmer came within (6-10) year, 20% farmer came within (11-15) year, 3.33% farmer came within (16-20) year and 3.33% farmer came to aquaculture within above 20 year (Table 6).

Table 6: Starting year of farmers in aquaculture in study area.

Involvement (year)	No. of respondents	Respondents (%)
1-5	16	53.33
6-10	6	20.00
11-15	6	20.00
16-20	1	3.33
Above 20	1	3.33
Total	30	100

3.9. Size of the ponds in sadar upazila, Meherpur

The sample ponds were grouped into three categories depending upon their different sizes in the surveyed area, viz- Small pond (5-15) decimal, medium pond (16-25) decimal and large pond up to 25 decimal. From the study, it has found that most of the ponds are small (Figure 7).

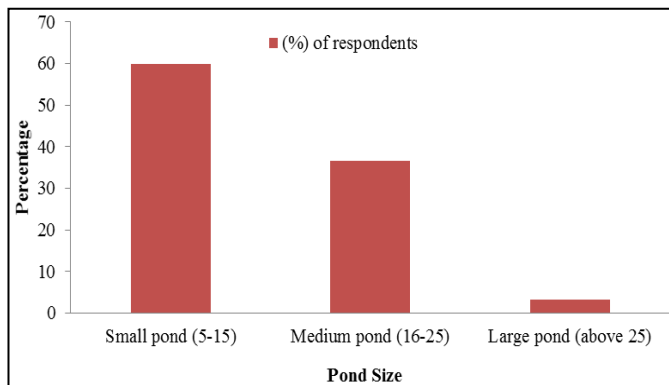


Fig 7: Size of the ponds in decimal in sadar upazila, Meherpur.

3.10. Ownership of ponds in surveyed area

Ownership of pond is an important factor for proper management of the fish culture system. A pond having single ownership is very easy to monitor but in case of multiple ownership, it is very difficult. As a result these types of ponds are less productive than the pond under single ownership. In the study area 66.67% of farmers were flows having single ownership and 30%, having multiple ownerships or joint family and only 3.33% pond was taken from lease from other (Figure 8).

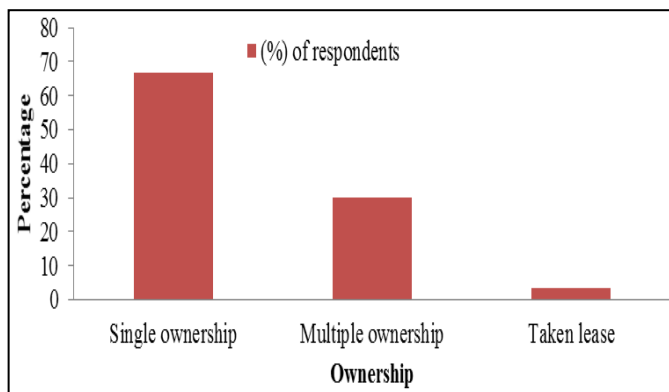


Fig 8: Ownership of the pond in the study areas.

3.11. Training on fish farming

In the study areas all the selected farmers (Table 7) received an inspiration and training on fish poly culture from the local NGO named Daridra Bimochon Sangstha (DBS), Meherpur with the financial support by Palli Karma Shahayok Foundation (PKSF). The training was performed by the Senior Upazila Fisheries officer (SUFO) and Fisheries officer of DBS.

Table 7: Receiving of training of fish farmers in sadar upazila, Meherpur.

Training receive	No. of respondents	Respondents (%)
Yes	30	100
No	0	0
Total	30	100

3.12. Culture systems in sadar upazila, Meherpur

In the study areas there were are culture practices have done by the fish farmers. Among 30 farmers, 10 (33.33%) farmers followed carp-mola poly culture, 10 (33.33%) farmers followed Vietnam koi mono-culture, 5 (16.67%) farmers followed carp-tilapia poly culture and 5 (16.67%) farmers followed carp-shing polyculture (Figure 9).

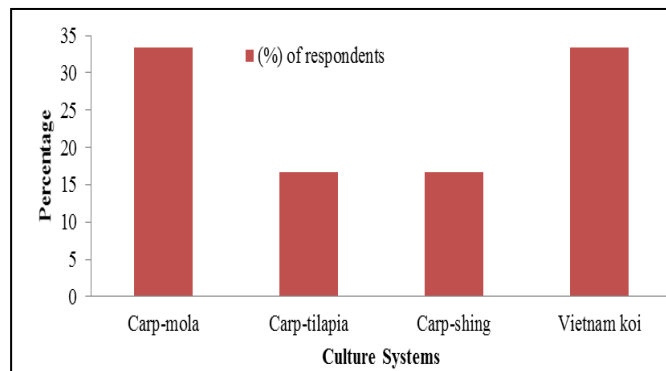


Fig 9: Culture systems followed by fish farmers in the study area.

3.13. Pre-stocking Management

Pre-stocking management of ponds in the study area comprised dike repairing, removing aquatic weed and undesirable branches of trees, watering, liming and fertilizing that were followed by all of the farmers. It was found that all farmers controlled aquatic weeds manually. All the farmers followed same the fertilizer and liming doses as it given by the NGO. The fertilizer and liming doses are shown in Table 8.

Table 8: Application rate of lime and fertilizer during pond preparation.

Materials used	Application rate
Lime	1 kg/decimal
Urea	200 g/decimal
TSP	100 g/decimal

3.14. Amount of fish Stocked under four culture systems

After one week of pond preparation, all the 30 farmers had received fish from NGO. All the farmers not receive same amount and same species of fish. The fishes were given to the farmers according to the culture system they practiced. Among four systems 10 (33.33%) farmers received 51 kg (50 kg carps+1 kg mola) that were highest and 10 (33.33%) farmers received 20 kg (Vietnam koi) of fishes that were lowest in amount. On the other hand 5 (16.67%) farmers received 35 kg (30 kg carps+5 kg shing) and 5 (16.67%) farmers received 45 kg (30 kg carps+5 kg tilapia) of fishes (Figure 10).

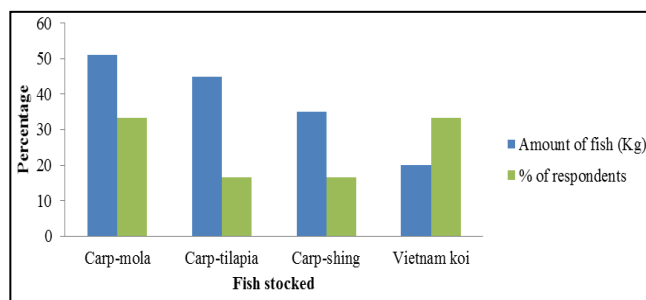


Fig 10: Amount of fish stocked under four culture systems in study area.

3.15. Feed the fish

Most of the farmers gave feed to their cultured species. Almost 90% farmers gave feed to their cultured species and

remaining 10% farmers depended on only natural food produced in the pond (Table 9).

Table 9: Giving feed to pond by fish farmer in the study area.

Give feed	No. of respondents	Respondents (%)
Yes	27	90
No	3	10
Total	30	100

3.16. Feed preferred by farmer/feed type

It was found that 90% of the farmers applied supplementary/homemade feed prepared with rice-bran and

mustard oil cake and 10% farmers used company made feed/commercial feed (Figure 11).

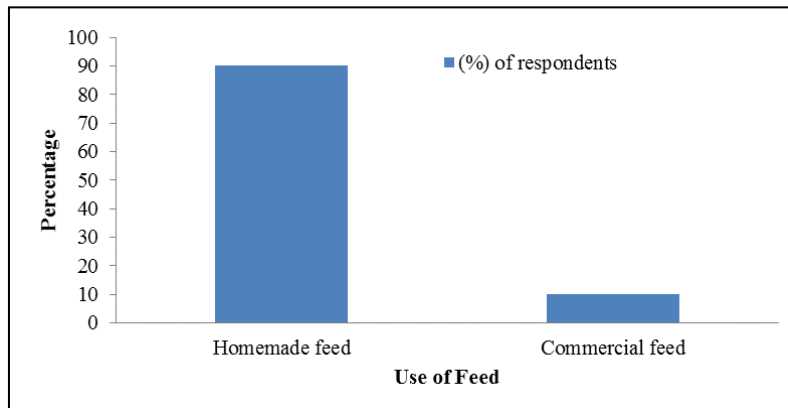


Fig 11: Feed preferred by fish farmers in sadar upazila, Meherpur

3.17. Production of fish in sadar upazila, Meherpur

Fish production is continuously increasing in the surveyed area because of gaining knowledge on fish culture. The average fish production of 16.67% respondents were high

(3188 kg/ha/year), 33.33% respondents were medium (2627/kg/ha/year), 16.67% low (1864 kg/ha/year) and 33.33% were very low (1407 kg/ha/year) that are shown in Table 10. The average production is 2271 kg/ha/year in the study area.

Table 10: Average fish production of 30 ponds in sadar upazila, Meherpur.

Culture systems	Average production (kg/ha/year)	No. of respondents	Respondents (%)
Carp-Mola	2627	10	33.33
Carp-Tilapia	3188	5	16.67
Carp-Shing	1864	5	16.67
Vietnam Koi	1407	10	33.33

3.18. Cost-benefit ratio of 30 pond farmers under four culture systems

The fish production varied from farmer to farmer due to various size species and pond. It also varied due to amount of fish stocked and their management. Among the four culture systems, it was found that average size of carp-mola pond was 17 decimal, carp-tilapia pond 20, carp-shing pond 13.4 and

Vietnam koi pond was 11 decimal. The highest average net income had come from carp-tilapia culture system and lowest average net income had come from Vietnam koi culture system (Figure 12). From the above analysis at last we can say that the culture of tilapia with carps is the most suitable culture system among four aquaculture practices.

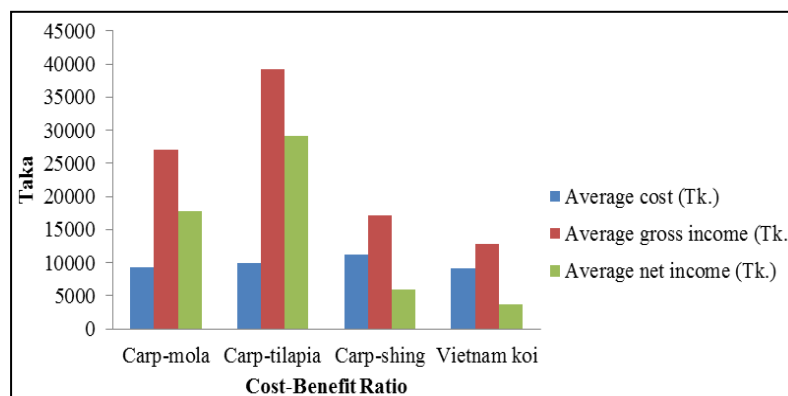


Fig 12: Cost-Benefit Ratio of 30 pond farmers under four culture systems.

3.19. Annual income

In the study area, it was observed that 26.67% of respondents had annual income between Tk. 61000-80000. On the other hand, 20% respondents had annual income in the ranges of Tk. 100001-150000, 20% respondent had Tk. 41000-60000, 13.33% respondents Tk. 81000-100000. Moreover only 10% respondents had high annual income that is Tk. 150000 and 10% fish farmer income was lower income as Tk. 21000-40000 (Figure 13).

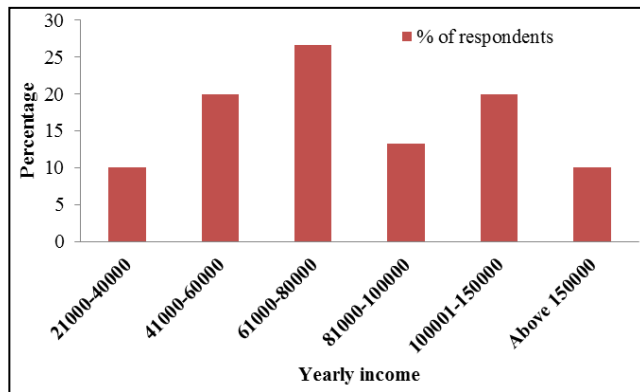


Fig 13: Annual income (Tk.) of fish farmers in Sadar Upazila, Meherpur.

3.20. Problems faced by the fish farmers in sadar upazila, Meherpur

A number of constraints and risks were reported by the farmers. These problems were, diseases; sudden fall of oxygen; theft; shadow of trees; fallen leaves of tree; lack of quality fish fry; cheating of fry traders; water quality deterioration by washing clothes; rapid water decrease in dry season; dike erosion; overflow of water during rainy season; snakes eating fish in the ponds and multiple ownerships of ponds.

4. Discussions

It was observed that the highest numbers of the fish farmer's age were 31 to 40 (33.33%) and lowest age (3.33%) were 10-20 years. Khatun *et al.* [16] and Islam [13] reported in his study area of Charbata in Noakhali district that the age group of 36-50 years was the highest (46%) and 51-65 years were the lowest (26%) considering all fish farmers. The almost same findings were found Asif *et al.* [4]; Hossain *et al.* [9]; Islam *et al.* [11], Hossain *et al.* [10] and Islam *et al.* [12]. These results are more or less relevant to the present study. Rana [25] found in his study in Sirajgonj district that 70% of pond farmers were in 18-45 years. This study is slightly related with my study. Ali *et al.* [2] found that most of the fish farmers (50%) belonged to age group of 31 to 40 years in Mymensingh district. This study is relevant with the present study. It was observed that all the farmers (100%) were Muslims in the present study. Khatun *et al.* [16] observed in his study in Charbata in Noakhali district that 82% of fish farmers were Muslims and 18% were Hindus. Sharif *et al.* [29] observed that all of fish farmers (100%) were Muslims that relates with my study. Asif *et al.* [4]; Hossain *et al.* [9]; Islam *et al.* [11] and Islam *et al.* [12] also found the similar results.

It has been observed that aquaculture was not the primary occupation of most of the fish farmers. Only 3.33% fish farmer took the aquaculture as their primary occupation. On the other hand, 73.33% of farmers were involved in agriculture, 10% business, 3.33% service holder, 6.67% other

occupation and 3.33% are students. About 60% farmers were involved in agriculture, 12.5% farmers involved for vegetable growing, 12.5% farmers involved in poultry rearing and 5% farmers involved in livestock farming, which are not comparable to the Kabir [14]; Masum [17]; Rahman [23]; Saha [26]; Ahmed [1] and Biswas [6]. In the study area, it was observed that the majority (26.67%) of respondent had an annual income between Tk. 61000-80000. On the other hand, 20% respondents had annual income which ranges Tk. 100001-150000, 20% respondent was Tk. 41000-60000, 13.33% respondents was Tk. 81000-100000, 10% respondent was high annual income up to Tk. 150000 and 10% fish farmer income was low annual income from Tk. 21000-40000. Asif *et al.* [4]; Hossain *et al.* [9]; Islam *et al.* [11]; Sharif *et al.* [29]; Rahaman *et al.* [20] and Islam *et al.* [12] found the similar results about monthly or yearly income of fish farmer. In the study of Sadar upazila, Meherpur it was found that 66.67% of fish farmers lived in nuclear families and only 33.33% lived in joint family. Asif *et al.* [4] found that, 73% of traders have single family but only 27% have joint family. This result is not relevant to the present study. Ali *et al.* [2] was found that, in Mymensingh region about 28% farmers lived with joint families and 72% lived with nuclear families. This result is almost parallel to the present study. It was found that the fish farmers had own house for living in the area. Majority (40%) of the respondents had tin shed house, 23.33% had semi-paka, 20% had paka house and only 16.67% had kacha house. Rahman [24] reported that 70% of houses were katcha, while 21% were semi-paka and only 9% were paka that is not equivalent to the study. Islam *et al.* [11] reported that, 36% of housing structures were Katcha, 30% were semi pucca and 34% were pucca in Jessore region.

Out of 30 fish farmers, 8% had no education (illiterate), 16% had primary level, 36% had secondary level, 20% had S.S.C. level, 14% had H.S.C. level, and 6% had bachelor level of education. Islam *et al.* [11] found that, in Jessore area there was 4% graduate, 8% H.S.C, 27% S.S.C. 26% had passed class 6-10, 25% had passed class 1-5 in the study area. Khan [15] stated that the level of education is a factor affecting utilization of pond for fish farming. From the study, it has found that most of the ponds are small. Khan [15] reveals that average pond size was 0.13 ha in Sreemongal upazila of Maulvibazar district which is not as much of similar to the present study. Mollah *et al.* [19] reported that the average pond size was 0.16 ha with a range from 0.04 ha to 0.81 ha in some selected areas of Dinajpur district. In the study area 66.67% of farmers were having single ownership and 30% having multiple ownerships or joint family and only 3.33% pond was taken from lease from others. The present findings are relatively similar with the report of Saha [28] who found that 52% pond owners were under single ownership and 27% were multiple ownership and the rest 12% ponds were public or organization properly. All the farmers (100%) had received training from NGO. These results differ with findings of Biswas [6] and Rahman [21]. Rahman [24] found in his study in Gazipur district that about 49% farmers gained fish farming experience from friends and neighbors. Khatun *et al.* [16] reported that 14% of farmers received training from DoF, 7% of farmers gain fish farming experience from relatives which is different from my study. In the study areas there were are culture practices have done by the fish farmers. Among 30 farmers, 10 (33.33%) farmers followed carp-mola polyculture, 10 (33.33%) farmers followed Vietnam koi mono-culture, 5 (16.67%) farmers followed carp-tilapia

polyculture and 5 (16.67%) farmers followed carp-shing polyculture. The farmers used same doses of fertilizer and lime. They used lime at a dose of 1 kg/decimal, Urea 200g/decimal and TSP 100g/decimal. Moreover most of the farmers used cow dung in their pond. Saha ^[27] found that the only 25% of farmers give fertilizer in the pond, which has not similarity with the present work. Saha ^[26] observed that the average dose of inorganic fertilizer was urea 387 kg/ha/yr and TSP 176 kg/ha/yr. Rahman *et al.* ^[22] found in his study that doses of organic and inorganic fertilizer were 11,075 kg/ha and 739 kg/ha, respectively. This study is not equivalent with present study. Rana ^[25] found that the organic fertilizer was 8,122 kg/ha/yr and for urea 315 kg/ha/yr and TSP 111 kg/ha/yr. Ali *et al.* ^[3] stated same fertilizer with the dose in their study on Pangus farming at Jhikargachha upazila, Jessore. In the visited area 10 (33.33%) farmer stocked carp with mola, 10 (33.33%) farmers stocked carp with tilapia, 5 (16.67%) farmers stocked carp with shing and 5 (16.67%) farmers stocked only Vietnam koi. About 10 fish species were found to be cultured in the study area. On the other hand, Tanjina ^[30] stated that there were 17 available fish species under five orders were found during the study period in Shinghorkhali beel in Dinajpur District. Ahmed ^[1] also stated that there are about 15 different fish species were found to culture in the farms in Naogaon District. Biswas ^[6] stated that there are about 14 different fish species were found to culture in the farms of Mymensingh District. From the survey it was found that 90% of farmers preferred supplementary feed such as rice bran, wheat bran, mustered oil cake etc and 10% of the farmers preferred commercial feed for fish culture. It was also found that 90% of the farmers gave feed in pond and 10% of the farmers did not used any feed in their pond and depend on the natural food in the pond. The average fish production of 16.67% respondents were high (3188 kg/ha/yr), 33.33% respondents were medium (2627/kg/ha/yr), 16.67% low (1864 kg/ha/yr) and 33.33% were very low (1407 kg/ha/yr) that are shown in Table 10. The average production is 2271 kg/ha/yr. Mollah *et al.* ^[19] reported that the average annual yield of fish was estimated at 2609 kg/ha/yr. This study has further similarity with the present study. Saha ^[28] reported in his study that the production of the pond fish was 2,890 kg/ha/yr, this result was not related to the present study. Ali *et al.* ^[2] reported that lack of scientific knowledge, multiple ownership of ponds, attack of fish disease and non-availability of good quality fish fry were the major problems in pond fish culture in Bangladesh. Mollah *et al.* ^[19] conducted that the farmers have major constraints as; 72.50% of farmers reported theft was one of the main problems followed by financial problem (40%), lack of contact with fisheries officer (37.75%), lack of fish seeds (27.50%) and lack of feeds (23.75%) which hampered the production in Laxmipur district that is more or less similar to my study.

5. Conclusion

Fish farming plays a vital role in the uplifting of the life style and socio-economic condition of Meherpur District. It is an opportunity for employment contributing to increase food production, diversifying the economy and poverty alleviation of large number of population. The present study explored some major problems which were faced by the local people after starting the fish culture. From the survey, it was found that high production cost, diseases, lack of oxygen, theft, shadow of tress, fallen leaves of trees, multiple ownership, lack of scientific knowledge, lack of feed, lack of quality fish fry,

water contamination by human baths and clothes washing, rapid water decrease in dry season, dike breaking in rainy season, snakes in the pond etc. were the major problems of fish production. If the farmers are given appropriate training, financial credit on easy terms and conditions, more profit would be reflected. Thus it can be concluded that fish culture is a profitable business that can help the farmers to improve their livelihood condition as well as economic situation.

6. References

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