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Role of probiotics in aquaculture practice of Satkhira region of Bangladesh

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Abstract
The present study was carried out to evaluate the effects of commercial probiotics on the production of fresh and brackish water fishes and shrimps in commercial culture systems in Satkhira district of Bangladesh. With considering the principles of probiotics application in aquaculture, the study was designed as to primarily compare the growth, water quality, disease and survivability of freshwater fishes and shrimps between with probiotic and without probiotic culture systems. A total 28, 60 and 12% farms applied five type of feed probiotics, seven type water probiotics and three type of soil probiotics supplied by the different animal health companies of Bangladesh. Using these probiotics there were significant differences found in case of water quality parameters, growth and survival rate between treated and non-treated ponds. The average body weight and total production were observed to be higher in probiotic treated pond6. 68% fish farmer achieves the productions rate 01-50mon whereas it was 57% only and 250 Mon of 1% farmer. The frequency of occurring several diseases like epizootic ulcerative syndrome, gill and fin rot disease, EMS etc. was significantly lower after application of probiotics in culture system.

Keywords: Probiotics, disease, shrimp, finfish, production

1. Introduction
The growth of aquaculture as an industry has accelerated over the past decades in Bangladesh and is now considered a major contributor in food production. However, the growth of aquaculture industry is hampered by unpredictable mortalities, many of which are caused by environmental damages and pathogenic microorganisms. Diseases have been attributed as biological production bottlenecks in aquaculture, hence necessitating the use of chemicals such as drugs and antibiotics in health management strategies (Newaj-Fyzul and Austin 2014) [24]. The indiscriminate use of antibiotics and antimicrobials has led to the development of drug - resistant bacteria in aquaculture environments that are becoming increasingly difficult to control and eradicate. These alarming situation prompted this industry to explore and develop strategies that are as equally effective as antibiotics, eco- and consumer-friendly and most importantly sustainable (Standen *et al*., 2013; Lazado *et al*., 2015) [37, 21]. Probiotics is one of the identified alternatives that can lessen the dependence of the aquaculture industry to antibiotics. Nowadays, there is documented evidence that the administration of probiotics appears to be a very promising research area for nutrition, biological control and disease prevention in aquaculture.

2. Materials and methods
2.1 Study area and period
Data were collected from different farms of seven upazillas namely Assasuni, Debhata, Symnagar, Kolaroa, Kaligong, Tala, Patkelgata, Satkhira Sadar where aquaculture clusters were located of Satkhira district during May to November 2016

2.3 Questionnaire preparation and interviews
A total 100 fish farms were visited for data collection (Table 1). Questionnaire covered mainly farmer’s profile, culture details, type of chemicals used with dose and price, growth rate of the fishes, water quality parameters of pond before probiotic use and after probiotic uses. Besides that, other primary data were collected through questionnaire interview of retailers of animal medicine and representatives of pharmaceutical companies. Furthermore, secondary data were

Collected from different books, thesis papers, and published research papers and so on from different sources like journals, textbooks, seminar library of FMRT Discipline and central library of Khulna University.

Table 1: Sample size of the survey.

Category	Location of the survey	Sample size
Shrimp Fish farms	Kaliganj Shyamnagor,	44
Tilapia fish farms	Kolaroa, Kajeerhat	19
Freshwater fish farms	Satkhira sadar and Tala	24
Freshwater fish and Shrimp farms	Debohata, Asasuni	13

2.3 Data Analysis
The collected data were scrutinized and summarized carefully and then they were tabulated. Some of the data were presented into local units, so those data were converted into international units. Data analysis was done by using Microsoft Excel 2010 and SPSS 16.0. One-way ANOVA was performed for comparison.

3. Result
3.1 Probiotics in the existing aquaculture practice
Probiotics were found to be used in different farms of study region could be grossly categorized in three categories feed, water and soil probiotics (Table 2). Of them 5, 7 and 3 probiotics were feed, water and soil probiotics. The major ingredients of those probiotics were *Bacillus*, *Lactobacillus*, Rhodococcus, *Rhodomonas*, Nitro bacter and so on.

Table 2: Probiotics in practiced aquaculture of Sathkira district

Trade Name	Function	Pack Size	Ingredients	Standard Dose	Company Name	Price (Tk)	No of Farms Used
Navio Plus	Feed	500g	*Bacillus subtilis, B. licheniformis, B.* megaterium, *Lactobacillus acidophilus*	2-4g/kg	ACI	450	14
Pro-2	Feed	500g	*B. pumilus, B. licheniformis Lactobacillus plantarum*	5-7g/kg	CP India	3100	6
Power Lac	Feed	500g	*Lactobacillus strains.*	2-3g/kg	ACI	660	4
Pro-W	Feed	500g	*B. pumilus, B. amyloliquefaciens, B. subtilis*	7-10g/kg	CP India	3500	2
Zymetin	Feed	500g	Feed Additives and Probiotics	25.5g/kg	CP. India	800	2
Ariake-3	Water	50g	*B. pumilus, B. amyloliquefaciens, B. subtilis*	50g/100 dec	ACI	340	26
Bio prob	Water	100 g	*Rhodococcus, Nitrobacter sp.*	100 g/100 dec	Uni-Bio care	600	11
Eco-toxnil	Water	100g	*B. pumilus, B. amyloliquefaciens, B. subtilis, Rhodopseudomonas sp.*	100g/100 dec	Fish Tech BD	700	9
Pond care	Water	100g	*B. licheniformis, B. coahuilensis*	100g/100 dec	Sk+F	560	5
Proofs	Water	100g	*Bacillus sp. Nitrobacter sp.*	50g/33 dec	EON	350	4
pH Fixer	Water	1kg	*B. pumilus, B. amyloliquefaciens*	3kg/33 dec	CP. India	600	3
Super Biotic	Water	1 kg	Water and Feed Probiotics for resist luminescence bacteria	600g/33 dec	CP India	1150	2
Aquaphoto	Soil	1 litre	*Rhodococcus, Rhodomonas, Nitrobacter sp.*	70ml/33 dec	ACI	330	7
Vivo Prob	Soil	100g	*Nitrosomonas, Nitrobacter, Bacillus, Rhodo*	150g/33 dec	Nutri health	220	3
Super PS	Soil	20 litre	*Rhodobacter sp., Rhodococcuss sp.*	2 litre/33 dec	CP. India	5000	2

3.2 Status of farms
Most of the fish farms were small in size locally name as gher. About 95% of farms in this district were in between 1618.7 to 161870 sq. m and 92% farms maintained a water depth in between 0.31 to 1.5 m (Table 3). Additionally, about 13%, 59% and 28% semi-intensive, extensive (traditional) and improved traditional farms were seen to use probiotic for different purposes at different stages at culture period.

Table 3: Current status of farms visited

Type	Categories	Farms (%)	Type	Categories	Farms (%)
Farm size (sq. m)	1618.7 to 16187	51	Culture Type	Extensive	59
	17805.7 to 32374	23		Improved traditional	28
	33971.7 to 48561	7		Semi-Intensive	13
	50179.7 to 64748	3		Intensive	-
	66366.7 to 80935	6	Species	Shrimp	44
	82553.7 to 97122	-		Tilapia	19
	98740.7 to 113309	2		Freshwater fishes (Rui, Catla, Mrigal, Silver)	24
	114927.7 to 129496	-		Freshwater fishes and Shrimp	13
	131114.7 to 145683	3	Probiotics	Feed	29
	147301.7 to 161870	-		Water	43
	> 161870	5		Soil	17
Water Depth (m)	0.31-0.61	49		Feed and water	4
	0.91-1.22	36		Feed, water and soil	7
	1.52-1.83	7	Application Time	Morning	52
	2.13-2.44	4		Afternoon	39
	2.74-3.05	3		Evening	9
	> 3.05	1			

Furthermore, different types of probiotic were found to use for culture shrimp, tilapia (*Oreochromis niloticus*), different freshwater fishes (*Labeo rohita, Catla catla, Cirrhinus cirrhosis, Hypophthalmichthys molitrix*), in which 44% and 13% shrimp farms and freshwater fishes and shrimp farms. Moreover, about 43%, 29%, 17%, 7% and 4% probiotic were applied as water probiotic; feed probiotic; soil probiotic; feed and water probiotic; feed, water and soil probiotic (Table 3).

Additionally, about 52%, 39% and 9% probiotic applied at morning, afternoon and evening respectively (Table 3). Application of probiotics in the morning showed the better results rather than other time.

3.3 Role of probiotic to control water quality parameters

3.3.1 pH

Probiotic is the beneficiary bacteria which work to control the pH level of water. From the table we could see that before the use of probiotics 63% of the water pH level was between (6. 5-7. 4). But after the probiotic use, 77% of the fish farmer achieved the optimum pH level of the water which range was 7.5-8.4 (Table 4). Among these we could understood that through using probiotic we could control the pH level of the water. If we can control it, the fishes will get the actual growth of their body.

Table 4: Role of probiotic on water quality parameters

Water quality parameters	Ranges	Before (%)	After (%)
pH	6.5-7.4	63	23*
	7.5-8.4	37	77*
DO (mg/l)	0-5	26	13*
	05-10	74	87*
Ammonia gas (mg/l)	0.00-0.50	24	89*
	0.51-1.00	76	11*
Water Color	Clear	4	2
	Addle	35	17
	Light-green	47	78
	Dark-green	14	3
Temperature (°C)	25-30	46	24*
	31-35	54	76*

* Significantly different at 1% level of significance ($p < 0.01$)

3.3.2 Dissolve oxygen

From the table 4 we can see that before the use of probiotics 26% and 74% farms range of water DO level was 0-5 mg/l and 05-10 mg/l. But after the probiotic use 13% and 87% fish farmer achieved the optimum do level of the water which range was 0-5 and 05-10mg/l. Among these we could understood that through using probiotic we can control the do level of the water.

3.3.3 Ammonia gas

From the table we can see that before the use of probiotics 24% and 76% of the water ammonia gas level were between 0.00-0.50 and 0.51-1.00. But after the probiotic use 89% and 11% of the fish farmer achieved the optimum DO level of the water which were 0.00-0.50 and 0.51-1.00 (Table 4). From these we could understand that using probiotic we can able to control the ammonium level of the water.

3.3.4 Water transparency

In the aquaculture water transparency is the main factor. From the table we can see that before the use of probiotics 4%,35%, 47% and 14% fish farms water color were clear, addle, light green and dark-green. On the other hand, after use, 2%, 17%, 78% and 3% were clear, addle, light green and dark-green (Table 4). Among these we can understand that through using probiotic we can control the water natural feed.

3.3.5 Temperature

In view of temperature, probiotics also control the optimum water temperature. Before using probiotic 46% and 54% farms range of water temperature were 25-30℃ and 31-35℃. But after the probiotic uses, there were only 24% fish farmer had the 25-30 ℃ temperature and 76% of the fish farmer had the optimum level of temperature that was 31-35°C (Table 4).

3.4 Role of probiotic to gain weight of the fish

The growth performance and feed utilization of fed with different probiotics as dietary supplementation is given in table 5. The highest production was obtained at 21-25g in shrimp, 451-600g in tilapia, 1000g above in the freshwater fishes and 700-1000g in the both freshwater and shrimp where all used their probiotics with feed or water or soil.

Table 5: Role of probiotic on weight gain of fishes and shrimp

Type	Body weight	Before (%)	After (%)	P value
Shrimp (g)	15-20	21	9	0.075
	21-25	10	23	
	26-30	13	12	
Tilapia (g)	150-300	7	1	0.235
	301-450	4	4	
	451-600	6	11	
	> 600	2	3	
Freshwater fishes (g)	250-500	2	1	0.034
	501-750	3	4	
	751-1000	8	3	
	>1000	11	16	
Freshwater fishes and shrimp (g)	250-500	6	2	0.105
	501-750	3	5	
	751-1000	2	4	

* Significantly different at 5% level ($p < 0.05$)

3.5 Role of probiotic on total production

From the table 12 before using probiotic in shrimp 31% farmer got (50-150) kg, 4% got (150-250) kg and 9% got (250kg above) but after probiotic use there it reach to 8% farmer got (50-150) kg, 11% got (150-250) kg and 25% got (250kg above) in amount of total production. For tilapia before using probiotic 8% farmer got (500-1500) kg, 5% got (1500-2500) kg and 2% got (2500-3500) kg & 4% got (3500kg above) but after probiotic use there it reach to 1% got (1500-2500) kg and 5% got (2500-3500kg) & 13% got (3500kg Above) in amount of total production. For Freshwater Fishes before using probiotic 8% farmer got (1000-2500) kg, 4% got (2500-4000) kg and 9% got (4000-5500kg) & 5% got (5500kg above) but after probiotic use there it reaches to 3% got (2500-4000) kg and 5% got (4000-5500kg) & 18% got (5500kg Above) in amount of total production. For Freshwater Fishes & Shrimp before using probiotic 5% farmer got (50-200) kg, 4% got (200-350) kg and 2% got (350kg above) but after probiotic use there it reaches to 2% got (200-350) kg and 9% got (350kg above) in amount of total production (Table 6).

Table 6: Role of probiotic on total production

Name	Production	Before (%)	After (%)	P value
Shrimp	(50-150)kg	31	8	0.411
	(150-250)kg	4	11	
	(250kg above)	9	25	
Tilapia	(500-1500)kg	8	0	0.005
	(1500-2500)kg	5	1	
	(2500-3500)kg	2	5	
	(3500 kg Above)kg	4	13	
Freshwater Fishes	(1000-2500)kg	8	0	0.058
	(2500-4000)kg	4	3	
	(4000-5500)kg	9	5	
	(5500kg Above)	5	18	
Freshwater Fishes and Shrimp	(50-200)kg	5	0	0.036
	(200-350)kg	4	2	
	(350 above)kg	2	9	

3.6 Role of probiotic to control disease

When fish farm owners were asked about kind of diseases in their ponds, a range of diseases was reported by them according to their occurrence. Before the probiotic use the most frequently reported diseases were EUS, mineral deficiency, gill and fin rot disease, WSSV, ems, *streptococcus* and *enterococcus*, black gill disease, Zoothamnium, Argulesis and leison (Table 7) (Fig. 1). But after probiotic use these problems are cured mostly. As like as say after using probiotic found 2%, 1%, 19%, 3%, 1% and 2% farms suffered EUS gill and fin rot disease, WSSV, EMS, black gill disease, zoothamnium. After continuous using the probiotics they disease can be controlled with a little amount (Table 7) (Fig. 1)

Table 7: Role of probiotic to control diseases

Type	Name of Disease	Before (%)	After (%)	P value
Viral Diseases	Epizootic Ulcerative Syndrome	13	2	0.118
	White Spot Syndrome Virus Disease	19	19	ND
	Black gill disease	9	1	0.221
Bacterial Disease	Early mortality syndrome or Acute hepatopancreatic necrosis syndrome	6	3	0.003
	Streptococcal Infection and Enterococcal infection	13	6	0.001
Bacterial or Fungal infection	Gill rot (Branchiomycosis) and Fin rot disease	8	1	0.098
Nutritional diseases of shrimps	Mineral deficiency	7	0	0.105
Parasitic disease	Protozoan Infestation (Zoothamnium)	3	2	0.143
	Crustacean Infestations (Argulosis)	16	0	0.082
	Crustacean Infestations (Leison)	6	0	0.310

** Significantly different at 1% level ($p < 0.01$)

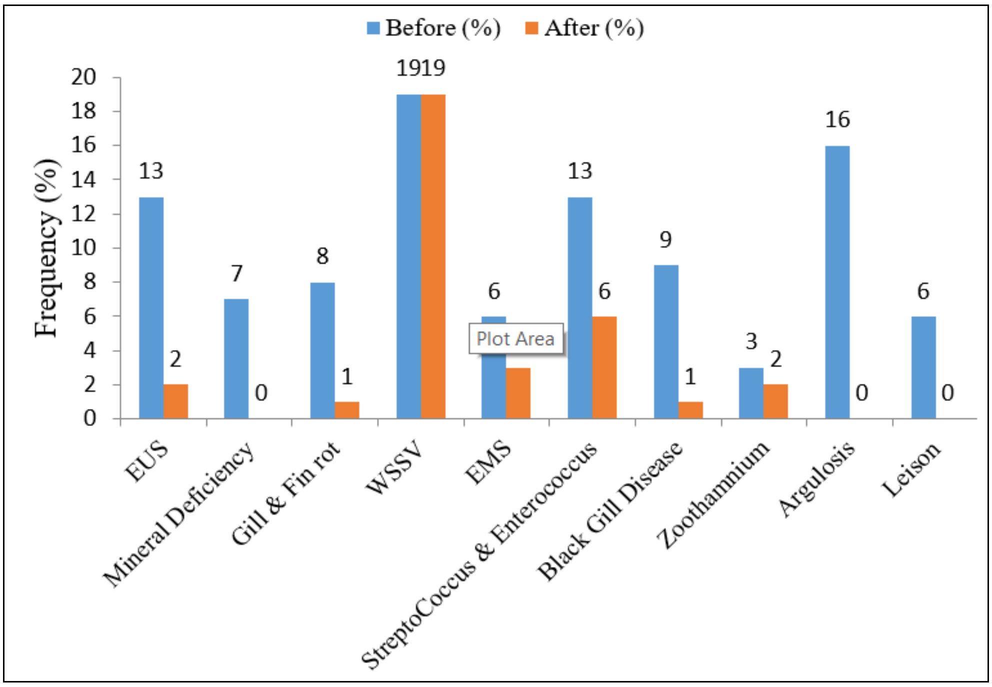

Fig 1: Role of probiotic to control disease

4. Discussion

According to Belton *et al.,* (2011) [6], the majority of shrimp farms in the coastal region of Bangladesh. Shrimp farming can also be grouped into three categories based on the level of intensity; extensive culture: in which shrimp depend entirely on naturally produced organisms in the ponds for their growth; improved extensive or semi-intensive culture which depends on both natural food and the application of fertilizer to the pond water, and sometimes supplementary feeds are also given to enhance the growth rate; and intensive culture, depends entirely on artificial feeds and utilizes intensive management practices, i.e., aeration, draining of water between cycles, adjustments to water quality. Number, total area and average size of shrimp and prawn gher in this district were 33285, 58,680ha, 1.76ha and 7753, 7203ha, 0.93ha respectively during May 2010. Farmers also culture white fish in this region in a great amount. Participation of household members in fish culture activities were pond excavation, pond preparation, applying manure, fish selection, stocking, feeding, harvesting and sale. According to participation of men, women, girls and boys in fish culture activities were 66.75%, 13.75%, 3.75% and 17.13%. Above findings were more or less similar to the recent findings.

In the present study, it was found that mostly ten different categories of commercial probiotics were used by farmer for different aquaculture activities like disease treatment, pond preparation, and growth promotion and improve disease resistance. All these activities were related for better health management of aquatic animal. Farmers of the selected area used mainly Ariake 3, Proofs, Super PS, pH fixer, Zymetin, Eco-toxnil, Navio plus, Pro-W, Pro-2, Aquaphoto etc as trade name for disease treatment which were supported by Hossain *et al.*, (2018) [16].

Present studies showed that several probiotics namely water probiotic; feed probiotic; soil probiotic; feed and water probiotic; feed, water and soil probiotic had been applied in fish and their culture management in this region which was supported by Zorriehzahra *et al.*, (2016) [40].

In this present study the water quality parameters of the pond, which were applied with microbial supplements through probiotics, were good because of various rules played by the microbes. Salinity is the most important factor influencing many functional responses of organisms. At high salinity the shrimp will grow slowly but they are healthy and resistance to disease. pH of the culture is having an important say on the metabolism and other physiological process of organism. It is a very good indicator of presence of metabolites, photosynthetic activity and fertility of culture medium. It changes with accommodation of residual feed, dead algae and excreta under farming conditions. It is at its maximum when photosynthesis is maximum (vigorous) and decrease when there is none. Reddy (2000) [31] was recommended pH of (7.5-8.5) for freshwater fish and shrimp culture. This range is considered well for freshwater fish and shrimp culture because certain salts like bicarbonate are to be present essentially in the culture medium for growth, reproduction and other physiological activity. In the present study the pH didn't show significant differences between control and treated ponds. Dissolved oxygen in the culture medium is an important factor not only for the respiration of aquatic organisms but also maintain favorable chemical and hygienic environment of the water body. It controls many oxidation reactions and maintain aerobic condition in water. Low level of oxygen tension hampers metabolic performance in shrimp and can reduces growth and molting and cause mortality (Molluae, 2001) [22].

Oxygen level in the culture medium can be maintained in the desired ranges by aeration. Continuous aeration was provided during the present study therefore oxygen level both in control and treat were in the range of 4.5-8.5ppm. Present investigation showed that probiotic we can control the do level of the water which was supported by Haroun *et al.*, (2006) [15] who stated that supplemented the food of nile tilapia *Oreochromis niloticus.* With a commercial probiotic made from *bacillus Licheniformis* and *B. Subtilis* in 17 weeks of culture. Assessment of water quality parameters showed an acceptable range for fish cultivation: 5.7–6.3mg $l^{-1}$for dissolved oxygen concentration, 0.36–0.42 mg $l^{-1}$for ammonia concentration, and pH between 6.3 and 8.2.

Dalmin *et al.*, (2001) [9] said that improved water quality has especially been associated with bacillus sp. The rationale is that gram positive bacteria are better converters of organic matter back to CO_2 those gram-negative bacteria. During the production cycle, high levels of gram-positive bacteria can be minimizing the buildup of dissolved and particulate organic carbon. It has been reported that use of *Bacillus* sp. Improved water quality, survival and growth rates and increased the health status of juvenile *Penaeus monodon* and reduced the pathogenic *Vibrio*s.

It is well known that the quality of water during culture period will deteriorate mainly due to accommodation of metabolic waste of living organisms, decomposition of unutilized feed and decay of biotic materials. Change in the equilibrium throughway of impairment of water quality parameters can influence survival of organisms as they become vulnerable to disease due to stress, so also growth. However, additional some commercial preparation as probiotics is reported to effectively deal with these substances and that way helpful in maintaining water quality parameters. Thereby improving growth rate, weight gain, and survival rate with an attractive fcr in framed organisms (Sissons, 1989) [36]. Sissons (1989) [36] reported that improved water quality has specially associated with *bacillus* sp.

Sunitha and Krishna (2016) [38] stated that the probiotics played a major role in maintaining water quality parameters like temperature, transparency, dissolved oxygen, pH, nitrite, nitrate, ammonia, phosphorus and iron of water which was more or less similar to the recent findings.

Bacterial infection was observed in the freshwater fish and shrimp of control ponds. During the cultured period some freshwater fishes like as rui, catla, silver etc were seriously affected by EUS. This is due to dark brown color of the water. The above problems were not found in probiotics treated ponds. Probiotics improve the aquatic environment and ultimately increase the freshwater fishes and shrimp production.

Austin *et al.,* (1995) [2] mentioned that *Vibrio alginolyticus* was effective in reducing diseases caused by *Aeromonas salmonicida*, *Vibrio anguillarum* and *Vibrio ordalii*. Additionally, Nikoskelainen *et al.,* (2001) [26] reported that some human- and dairy derived probiotics for prevention of infectious diseases in fish. Austin and Newaj-fyzul (2017) [1] reported that different range of probiotics effective against fish diseases.

Balcazar *et al.,* (2006) [4] reviewed that bacterial antagonism is a common phenomenon in nature; therefore, microbial interactions play a major role in the equilibrium between competing beneficial and potentially pathogenic microorganisms. In aquaculture, *Thalassobacter utilis*, has shown inhibitory effects against *Vibrio anguillarum*. This strain increased the survival of larvae of the crab, *Portunus trituberculatus*, and also reduced the amount of *Vibrio* sp. In the water used to rear the larvae (Nogami and Maeda, 1992; Nogami *et al.,* 1997) [28, 27]. Subsequently, it has been reported that bacterial strains associated with intestinal and skin mucus of adult marine turbot (*Scophthalmus maximus*) and dab (*Lim*and*a lim*and*a*), suppressed the growth of the fish pathogen *V. anguillarum* (Olsson *et al.,* 1992) [29]. The use of *Vibrio alginolyticus* strains as a probiotic has been recommended to increase survival and growth of white shrimp (*Litopenaeus vannamei*) post-larvae in ecuadorian hatcheries. Competitive exclusion of potential pathogenic bacteria effectively reduces or eliminates the need for antibiotic prophylaxis in intensive larviculture systems (Garriques and Arevalo, 1995) [11]. Recently a marine bacterial strain, pseudomonas i2, was isolated from estuarine environmental samples that produced inhibitory compounds against shrimp pathogenic *Vibrio*s. This antibacterial compound was shown to be of low molecular weight, heat stable, soluble in chloroform, and resistant to proteolytic enzymes (Chythanya *et al.*, 2002) [7].

According to Balcazar *et al.,* (2006) [4] the non-specific immune system can be stimulated by probiotics. It has been demonstrated that oral administration of *Clostridium butyricum* bacteria to rainbow trout enhanced the resistance of fish to *Vibrio*sis, by increasing the phagocytic activity of leucocytes (Sakai *et al.,* 1995) [34]. Rengpipat *et al.,* (2000) [32] mentioned that the use of *Bacillus* sp. (strain s11) provided disease protection by activating both cellular and humoral immune defenses in tiger shrimp (*P. Monodon*). Balcazar (2003) [5] demonstrated that the administration of a mixture of bacterial strains (*Bacillus* and *Vibrios* sp.) Positively influenced the growth and survival of juveniles of white shrimp and presented a protective effect against the pathogens *Vibrio harveyi* and white spot syndrome virus. This protection was due to a stimulation of the immune system, by increasing phagocytosis and antibacterial activity. In addition, Nikoskelainen *et al.,* (2003) [25] showed that administration of a lactic acid bacterium *Lactobacillus rhamnosus* (Strain atcc 53103) at a level of ~105 CFU g^{-1} feed, stimulated the respiratory burst in rainbow trout (Oncorhynchus mykiss).

Balca´zar *et al* (2006) [4] also reported that some bacteria used as candidate probiotics have antiviral effects. Although the exact mechanism by which these bacteria do this is not known, laboratory tests indicate that the inactivation of viruses can occur by chemical and biological substances, such as extracts from marine algae and extracellular agents of bacteria. Kamei *et al.* (1988) [19] reported that strains of *Pseudomonas* sp., *Vibrios* sp., *Aeromonas* sp., and groups of coryneforms isolated from salmonid hatcheries, showed antiviral activity against Infectious Hematopoietic Necrosis Virus (IHNV) with more than 50% plaque reduction. Girones *et al.,* (1989) [13] reported that a marine bacterium, tentatively classified in the genus moraxella, showed antiviral capacity, with high specificity for poliovirus. Direkbusarakom *et al.,* (1998) [10] isolated two strains of *Vibrio* spp. Nica 1030 and nica 1031 from a black tiger shrimp hatchery. These isolates displayed antiviral activities against IHNV and *Oncorhynchus masou* virus (OMV), with percentages of plaque reduction between 62 and 99%, respectively.

Balca´zar *et al* (2006) [4] reported that probiotics are source of nutrients and enzymatic contribution to digestion. In fish, it has been reported that bacteroides and *Clostridium* sp. Have contributed to the host's nutrition, especially by supplying fatty acids and vitamins (Sakata, 1990) [35]. Some micro-organisms such as *Agrobacterium* sp., *Pseudomonas* sp., *Renibacterium* sp., *Micro bacterium* sp., and *Staphylococcus* sp. May contribute to nutritional processes in arctic charr (Salvelinus alpinus l.) (Ringø *et al.,* 1995) [33]. In addition, some bacteria may participate in the digestion processes of bivalves by producing extracellular enzymes, such as proteases, lipases, as well as providing necessary growth factors (Prieur *et al.,* 1990) [30]. Similar observations have been reported for the microbial flora of adult penaeid shrimp (*Penaeus chinensis*), where a complement of enzymes for digestion and synthesize compounds that are assimilated by the animal (Wang *et al.,* 2000) [39]. Microbiota may serve as a supplementary source of food and microbial activity in the tract digestive may be a source of vitamins or essential amino acids (Dall and Moriarty, 1983) [8].

In the present study higher survival was found in the probiotics treated ponds and lower survival was in controlled ponds. It was achieved due to the application of probiotics. Krantz and Norris (1975) [20] stated that survival rate of 60-80% are to be expected for *P. Monodon* under suitable rearing condition. The total production of the present study was observed to the maximum of the probiotics treated ponds then control ponds. Jory (1998) [18] mentioned that probiotics are used in aquaculture to mainly modify and manipulate the microbial population of the environment and to reduce or eliminate selected pathogenic species of microorganisms leading to better growth and survival.

In the present study the maximum production was achieved using probiotics comparing with control treatment which indicated that highest production of freshwater fishes and shrimps are possible to achieve using probiotics that practiced to date and considered as new arena in fish and shrimp farming. The present finding is well supported by (Ghosh *et al.*, 2016) [12] who demonstrated the more and less (similar level of production) in their research work. Several researchers reported that probiotics in aquaculture can be alive or dead preparations, including cellular/extracellular components of micro-organism(s), administered either as feed supplement or to the rearing water, that provide host benefits by improving disease resistance, growth and health status, immunity, feed utilization/conversion, microbial balance and rearing water quality (Hai, 2015; Irianto and Austin, 2002; Nayak, 2010; Newaj-fyzul *et al.*, 2014) [14, 17, 23, 24]. Which were more or less similar to the recent findings?

In conclusion present research showed the immense potential of probiotics as health-promoting alternative through the identified different modes of action of probiotics following their application in finfish aquaculture. It showed how they improve the quality of the rearing environment, protect fish from biological hazards, and modulate physiological processes that eventually promote the health and welfare status of fish in culture. It also stated that probiotics are beneficial to fish and we can utilize these microorganisms in fostering more sustainable aquaculture practices as well as applying probiotics it could be possible to produce more production than the probiotic non-treated pond.

5. Conclusion

Many private industries have promoted their probiotic product without understanding the environmental impacts. Before using any type of drugs we should know about that drugs properly but most of the farmers use aquatic drugs unwisely which cause harmful effect on culture system. Probiotics can play a vital role increasing survival rate, enhance growth, reduce pathogen, keep the friendly culture environment, and thus farmer ultimately would get higher production with satisfactory economic return. In aquaculture system probiotic treatment offers a promising alternative to the antibiotics.

Improved Traditional aquaculture could enhance fish production and produce quality fish through using probiotics, as a developing country this could be a great opportunity for us to expand our export market. It's a new invention in aquaculture system that's why it's not widely spread to all farmers' level yet. These eco-friendly probiotics based fish culture should be practice more to know the better way of culture system. However, findings of this study should be applied extensively to the farmers' level to increase more fish production. We never can ignore the role of fish culture as fish is our main source of protein, source of million people's livelihood and one of the important earning sources of foreign currency.

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