Reprint **ISSN 2076-3913 (Web Version)**

Marine Resources and Aquaculture (MRA)

(*Marine Res. Aqua.*)

Volume: 3 **Issue: 1** **July 2015**

Marine Res. Aqua. 3(1): 11-15 (July 2015)

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ISSN-2076-3913 (Online)
Marine Res. Aqua. 3(1):11-15(July 2015)

IMPACT OF AQUA DRUGS AND CHEMICALS IN FISH HATCHERIES OF MYMENSINGH AND JESSORE DISTRICTS OF BANGLADESH

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Accepted for publication on 25 June 2015

ABSTRACT

Ahmed GU, Haque MN, Hasan MT, Faruk MAR (2015) Impact of aqua drugs and chemicals in fish hatcheries of Mymensingh and Jessore districts of Bangladesh. *Marine Res. Aqua.* 3(1), 11-15.

In order to investigate the impact of aqua drugs and chemicals used in fish hatcheries, Mymensingh and Jessore districts were surveyed. Data were collected through questionnaire interview with fish hatchery operators, technicians, workers and technical people of different pharmaceutical companies. Twenty two pharmaceutical companies were recorded with fifty six different aqua drugs which used in hatchery operation and can be categorized as disinfectants, growth promoters, disease treatment, oxygen suppliers, inducing agents (hormones), antibiotics and drug used during transportation of fish. Argulosis was the disease found higher in broods than other bacterial and fungal diseases in both districts. It observed that reduced amount of aqua drugs used in Jessore region than Mymensingh. Hatchery operators of both districts received knowledge and suggestions about aqua drugs and chemicals from Technical Service Officer of different drug companies and various activities of GOs and NGOs like DoF, BFRI, DANIDA (Danish International Development Agency) and Youth Development. It was observed that there were distinct impact of aqua drugs and chemicals on successful hatchery operation in Bangladesh.

Key words: *aqua drugs, fish hatchery, mymensingh and jessore*

INTRODUCTION

Fish hatchery is a place where fish seeds are produced for stocking in the pond in a controlled way. According to Bhuiyan and Akhter (2011) and Bhuiyan *et al.* (2008) when some stimulants, hormones or pituitary extracts are injected in the brood fishes causing fish to spawn in the controlled condition out of natural environment is called induced breeding or artificial reproduction which is a common practice in our country since 1967 (Ali 1967). Production of quality fish seeds are the most important problem in the present days of aquaculture development. The problem can be solved only by producing required amount of high quality fish seeds in hatchery. Hatchery is essential to increase fish seed by induced breeding. With the expansion of aquaculture in Bangladesh, there has been increasing trend in using chemicals in aquaculture especially in hatcheries (Tarafdar 2014). The drugs can categorized as disinfectants, oxygen supplier, growth promoters, vitamins and inducing agents (hormones). Hatchery operators also use antibiotics in disease treatment of broods, spawns, fry and fingerlings. Many hatchery operators also use some chemicals in fry transportation due to long distance. Different vitamins are given to the broods to enhance maturity (Badal 2014), Hasan and Ahmed (2000), Brown and Brooks (2002) and Faruk *et al.* (2005) mentioned that commonly used chemicals in Bangladesh aquaculture are lime, rotenone, various forms of inorganic and organic fertilizers, phostoxin, salt, dipterex, antimicrobials, potassium permanganate, copper sulphate, formalin, sumithion and melathion. The present study was thus aimed on status of the most abundantly available aqua drugs and chemicals used for hatchery operation in Bangladesh.

MATERIALS AND METHODS

The study was carried out in four upazillas of Mymensingh such as Mymensingh Sadar upazilla, Trishal upazilla, Tarakanda upazilla and Gouripur upazilla and Jessore Sadar upazila of Jessore districts. The study was conducted from August 2013 to July 2014. Two questionnaires were prepared, one for collection of data from hatchery operator and another for retailers. Data was collected through questionnaire interview, personal contact and market survey. Fifty questionnaires were used to collect information by focus group discussion (FGD) and personal contacts from fish hatchery owners of Mymensingh and Jessore districts. Ten drug shops of both districts were also investigated. The impact and recovery percentages of aqua drugs and chemicals were measured through the hatchery operator's observations. After data collection, all the data were arranged in tabular form to fulfill the objectives of the study. By combining the both information from Mymensingh and Jessore districts the final result was prepared.

RESULT AND DISCUSSION

Hatcheries investigated in the present experiment could be categorized into three types: such as A, produced only monosex tilapia, B, produced carps and catfish and C, produced tilapia, carps and catfish. Percentages of the categories were 8.70, 26.09 and 65.22, respectively in the above mentioned types (Figure 1). On the other hand Rashadujjaman (2011) mentioned that among the visited 19 hatcheries, 50% hatcheries produced carp with catfish, 10% produced tilapia with catfish, 20% produced only carp, 10% produced tilapia with prawn and 10% produced only catfish. Ahmed (2002) observed that three Indian major carps (rui, catla and mrigel) and three exotic carps (silver, grass and common carps) were the dominant fish species cultured in most hatcheries of Bangladesh. In the present investigation two hatcheries produced prawn seeds till 2011, but they could not continue due to technical and financial problems.

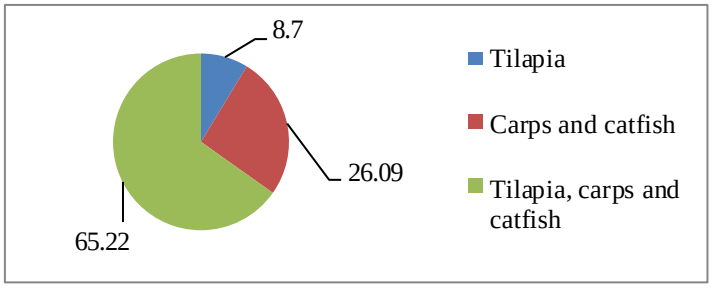

Fig. 1. Percentages of different fish seed produced in hatcheries

Twenty two different aqua drugs producing and selling companies were recorded during the present investigation to supply aqua drugs and chemicals in fish hatcheries. Fifty six aqua drugs with different trade names were supplied by the companies. Faruk *et al.* (2008) mentioned that, 33 pharmaceutical companies were found either producing or marketing aqua-drugs in Mymensingh district. The present study observed that, pharmaceuticals companies had attractive leaflets with information to sell their products to the hatchery operators. According to Rahman (2011) at present 150 products of 40 animal health companies were seen to market at field level and companies were found to provide these drugs and chemicals with different trade names to meet the farmers demand.

Seven and five types of disinfectants were recorded from the hatcheries of Mymensingh and Jessore district respectively. Some hatchery operators in Mymensingh used harpic and detergent powder before use of disinfectants in tanks and nets. In the present study Timsen, bleaching powder, formalin, potassium permanganate and lime were found with higher effect of 90-99% and EDTA with lower success 80% on disinfection in both the investigated districts. Islam *et al.* (2013) mentioned that the disinfectants available in the markets were EDTA, Bleaching Powder, Timsen, Water clear, Omicide, Formalin and BKC Efinol. According to the information provided by the hatchery operators, Timsen was not only used as disinfectant but also used in fungal disease treatment. Ali (2008) observed that Timsen was effective to prevent some bacterial and fungal infections. Formalin, lime and salt were also used by the hatchery operators in disease treatment of brood fish. In early winter when fungal and protozoan infection occurs in brood fishes, these chemicals were applied with low doses. Apud (1984) observed that farmers used formalin as disinfectant and to control protozoan diseases and lime as disinfectant. Trade names, active ingredients, doses, prices, pharmaceutical companies and effectiveness (%) of the disinfectants are mentioned in Table 1.

Table 1. List of chemicals recorded as disinfectants in hatcheries

Trade name	Active ingredients	Doses	Price (BDT)	Company	Effectiveness (%)
Timsen	n-alkyl dimethyl benzyl ammonium chloride40%, stabilized urea60%	Pond Pre. 33g/33dec, Culture 20g/33dec	260/50g	Eon Animal Health Products Ltd.	95-99%
Bleaching powder	Chlorine	0.1-1ppm	50/kg	ASM Chemical Industries Ltd.	95-99%
Formalin	38% formaldehyde	1-3ppm	70/kg	Chemical seller	95-99%
Chun/lime	CaO, $Ca(OH)_2$ and $CaCO_3$	0.5-1kg/dec	15/kg	Chemical seller	90-95%
Potassium permanganate	$KMnO_4$	5-15mg/dec	400-600/kg	Chemical seller	85-90%
EDTA	Sodium thio sulfate	0.1-1ppm	40/kg	Chemical seller	80%
Salt	NaCl	1kg/dec	20/kg	Chemical seller	90-95%

Nine drugs from Mymensingh and four drugs from Jessore were found to use by the hatchery operators as oxygen supplier. The oxygen suppliers were Oxyflow, Oxyfighter, Oxymax, Oxylife and Fish care powder which had positive effect towards increasing oxygen in hatchery water. Oxyflow, Oxymax, Oxyfighter, Fish care powder, Oxylife, Oxygrow, Oxy-Gold, Oxygen Plus and Bio-ox were the chemicals used as oxygen suppliers in hatcheries of Mymensingh and Jessore districts. In Jessore region the hatchery operators used only Oxyflow, Oxygen Plus and Oxy-Gold with 80-90% success during oxygen deficiency. Nine oxygen suppliers were recorded from Mymensingh region among which Oxygrow showed lower success (70-75%) than Oxyflow, Oxymax and Bio-ox (80-90%) comparatively. Rahman (2011) mentioned that Oxy flow, Oxy max, Oxy-gold,

Pure oxy and O_2-marine were the commercial oxygen suppliers. According to the information provided by leaflet of Eon Animal Health Products Ltd., Oxymax ensure oxygen supply rapidly and prevent fish and shrimp from death. Ali (2008) mentioned that Oxyflow and Oxymax were used to remove hardness and poisonous gases also.

Fifteen different types of aqua drugs were recorded from the present investigation used as growth promoter and vitamin among which Vitax-ES, Fish Premix, Aqua Fighter, Aquamin, Panvit aqua and ARC Z are important. In Jessore region Megavit-Aqua and Panvit-Aqua were recorded with higher impact (80-90%) in growth promotion. Vitax-ES, Aqua Boost, Spa, Square Aquamix and Ranvit-C were also recorded with same effect and Fish Premix and ARC Z with lower effect (75-80%) in growth promotion in Mymensing region. According to the representative of ACI Animal Health and Novartis Animal Health, Acimix Super-Fish and Megavit-Aqua help to increase reproduction power and also prevent various diseases.

For induced breeding of fishes, fish pituitary gland (PG) extract, Human Chorionic Gonadotropic (HCG), Ovaprim, Ovaprim-C, Ovatide, S-GnRHa/Ovaprim^{TM}, Pregnyl and 17-α methyl testosterone were recorded as inducing agents. Bhuiyan and Akhter (2011) observed that hatchery owners used mainly two types of hormones for induced breeding such as Pituitary Gland (PG) and Human Chorionic Gonadotropin (HCG). 80-90% of hatchery operators in Jessore used pituitary gland (PG) extract as inducing agent. In our country PG extract mainly produced in Jessore with bearing different names such as Mamu vaggne and Dolphin enterprise. Another agent which is very important for sex conversion of Tilapia is 17-α methyl testosterone. PG and Spawnig Fish Hormone were recorded with higher ovulation rate 85-90% than others like Ovapina and Flash with 70-80% ovulation in both districts. According to the hatchery operator of Sarker Hatchery, Shomvugonj, Mymensingh, HCG is very effective for Silver carp (*Hypothalmys molitrix*) and Shing (*Heteropneustes fossilis*) than PG. According to Jhingran and Pullin (1985) and Woynarovich and Horvath (1980) slightly higher dose of hormone was required at the beginning and latter part of the spawning season and comparatively lower dose was required at the peak of the breeding season. List of some inducing agents found during the study period are mentioned in Table 2.

Three commercial aqua drugs from Jessore and three aqua drugs from Mymensingh district were recorded to be used by the hatchery operators during transportation of fish seeds and broods. In the present study Methylene blue, Osmo saline, Energy plus and Orsaline were recorded to use by the hatchery operators and seed traders during transportation in both districts. Methylene blue, Osmo saline and Energy plus exhibited overall similar effectiveness (80-90%). But the hatchery operators of both districts used only very few amount of Methylene blue in oxygenated poly bag during transportation of fish seeds. Some hatchery operators were found to use very little ice during transportation of fish seeds in poly bags. Many hatchery traders exhibited reduced interest to use chemicals during transportation of both the regions.

Table 2. List of inducing agents (hormones) found in hatcheries

Trade name	Active ingredients	Doses (ml/kg body weight)	Price (BDT)	Company	Ovulation (%)
Ovapina	S-GnRHa 0.02mg, Domperidone 100g	Male 0.10-0.30, Female 0.30-0.50	450/10ml	First Care Agro Ltd.	70-80%
Pregnyl	Chorionic Gonadotrophin	Male 0.15-0.25, Female 0.25-0.40	1000/10ml	Organon (India) Limited.	80-85%
Spawnig Fish Hormone	100mg DOM, 0.2mg S-GnRHa	Male 0.15-0.25, Female 0.25-0.40	1500/5 vial	Ningbo Sansheng China.	80-90%
Flash	S-GnRHa 0.02%, Domeperidone 0.998%,	Male 0.10-0.30, Female 0.30-0.50	1175/10ml	Eon Animal health Ltd.	75-80%
PG	Pituitary gland	Female 1st 1-2, 2nd 2-6 Male 1-2	4500-5000/g	Dolphin enterprise	80-90%
Agent Hormone	17-α-Methyl Testosterone	60-70ml hormone and 300ml alcohol/kg feed	50000-60000/100g	Always Marketing Co.	80-90%
Ovatide	A(sGnRHA)-20mg, Dompenidone 10mg, Benzyl Alcohol 1.5%	Catfish Female 0.2, Male 0.1-0.2 Carps Male 0.1-0.3, Female 0.2-0.5	1000/10ml	ACI Animal Health	75-85%
HCG	Human Chorionic Gonadotropin	Preliminary 200-250 IU, finally HCG 500IU	1750/10ml	Chemical seller	80-85%

Disease found in brood fish of both Mymensingh and Jessore districts was Argulosis. Sometimes fishes were also affected by water insects (locally called Hash Poka) and parasites. Hossain *et al*. (1994) reported that 61%

of carp fry in nurseries of the greater Mymensingh district were infected with ectoparasites. The highest mortalities of carp fingerlings was due to the infestation by *Trichodina*, *Myxobolus* and *Dactylogyrus*. Eleven different aqua drugs were recorded from both districts which were used as disease treatment. According to the data provided by the hatchery operator and owner of Sornolota Hatchery, Radhakanai, Mymensingh, Paratics of Advance Agrotech Bangladesh was able to result in 95-100% recovery against ectoparasites. Timsen, Lime, Salt, Argulex and Deletix were also recorded from the hatcheries of Mymensingh region with 80-90% recovery which were higher than Booster yielded 70-75% comparatively. Ahmed (2004) reported that the freshwater louse, *Argulus* causing the argulosis has become a major threat to the fish farmers in Bangladesh as it induces mortality, growth loss and economic loss to the carp farms and hatcheries. Hatchery operators of both districts were found to apply Lime and Salt with a dose of 500g and 500g/dec on the onset of winter for preventing diseases and gain positive impact.

Maximum visited hatcheries only produced fish fry and reared broods for which they maintained water quality properly. Normally the hatchery operators use disinfectants and vitamins of different companies if disease found in winter. When serious condition occurs then antibiotics with different trade names were found to be used by the hatchery operators for the treatment of fish diseases in both Jessore and Mymensingh districts. Renamycine, Aquamycin, Oxy-Dox-F and Oxysentin 20% were recorded antibiotics used by the hatchery operators of both regions. Renamycine and Aquamycin yielded 90-95% success against bacterial diseases and most of the hatchery operators used Renamycine than the others. MacMillan (2001) mentioned that antibiotics should be used only for the treatment of bacterial diseases. According to the local agent of ACI Animal Health, Oxy-Dox-F is preventive for bacterial, viral and fungal diseases. Ali (2008) and Rahman (2011) also observed that antibiotics like Oxysentin 20%, and Orgacycline 15% were effective against EUS.

It was observed 32.61% hatchery operators had no training while 67.39% hatchery operators received short term training from different GOs and NGOs like Department of Fisheries (DoF), Bangladesh Fisheries Research Institute (BFRI), DANIDA (Danish International Development Agency), Youth Development, WorldFish Center and CARE. According to Rahman *et al.* (2013) about 31.63% FSF (Fish Seed Farm) owners had no training while 52.51% FSF owners received short-term training from Department of Fisheries and/or from Bangladesh Fisheries Research Institute (BFRI). Only 15.17% FSF owners gained their knowledge on fish seed farm operation through personal contact with Upazilla Fisheries Officer (UFO). It is remarkable that only 1.26% FSF managers are professional and all of them are fisheries graduate. In present study it found that hatchery operators of both districts received knowledge about use and function chemicals from Technical Service Officer (TSO) of different pharmaceutical companies. Training status of hatchery operators is shown in Figure 2.

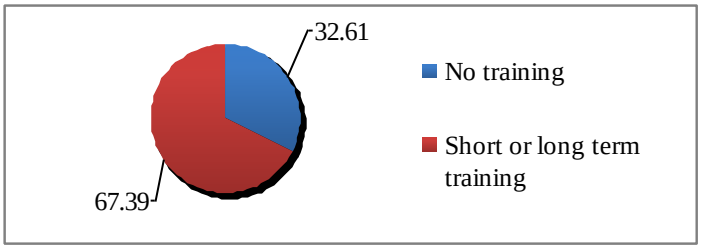

Fig. 2. Percentage showing training status of hatchery operators

CONCLUSION

The research was conducted to know the status and impact of aqua drugs and chemicals on fish hatcheries of Bangladesh. It was observed that seven categories of aqua drugs and chemicals were used for different purposes in fish hatcheries. From disinfection of hatchery equipment to fish seeds and broods transportation different aqua drugs and chemicals were used by the hatchery operators. Hatchery operators used more drugs in disinfection, growth promotion and induced breeding than other areas of hatchery operation like disease treatment and transportation of fish seeds. Different types of diseases like parasitic, bacterial, fungal were observed in the present study and Argulosis was reported by the maximum hatchery operators of both districts. Hatchery operators used different kinds of aqua drugs and chemicals to overcome such kind of situations. Aqua drugs yield good success in each step of hatchery operation. Aqua drugs and chemicals help to produce good quality fish seeds. The present study pointed out some problems on use of aqua drugs and chemicals in fish hatcheries. Unfortunately there are lack of knowledge among fish hatchery operators on the appropriate use and function of aqua drugs and chemicals. However, respective authority, policy makers, scientists and researchers should work together to reduce the negative infect of aqua drugs and chemicals in aquaculture especially in fish hatcheries.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the cooperation of Bangladesh Fisheries Research Institute (BFRI) for granting financial support to carry out the present research. The authors also acknowledge the cooperation of fish hatchery operators around the study area.

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