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Bangladesh J. Sci. Ind. Res. **43(3)**, 411-418, 2008

Short Communication

BANGLADESH JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

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Seasonal Prevalence and Intensity of Infestation by the Ectoparasites in Carps Relating to Physico-Chemical Parameters in Some Ponds of Mymensingh and Bogra Districts of Bangladesh

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Abstract

The research work was conducted to find out the seasonal prevalence and intensity of infestation of the ectoparasites of carps in some ponds of Mymensingh and Bogra districts of Bangladesh. Seven species of parasites viz. *Trichodina domerguei*, *Trichodina reticulata*, *Chilodonella cyprini*, *Myxobohts koi*, *Dactylogiroides tripathi*, *D. extenswi* and *D. catlarius* were found from 640 fry-fingerlings of silver carp, *Hypophthalmicthys mohtrix* (Valenciennes), grass carp, *Ctenopharyngodon idella* (Valenciennes), European carp, *Cyprinns carpio* (Linnaeus), small carp, *Puntius gonionotus* (Bleeker), katla, *Catla catla* (Hamilton), rui, *Labeo rohita* (Hamilton-Buchanan) and mrigal, *Cirrhina mrigala* (Hamilton-Buchanan) from different nurseries and rearing ponds of Mymensingh and Bogra districts of Bangladesh during June, 2004 to October, 2005. The overall percentage of infestations in two study areas was the highest (95%) in winter, moderate (48%) in summer and the lowest (34.8%) in the rainy season. The physicochemical parameters of water exerted more or less significant combined effect on the occurrence of parasites.

Key words: Ectoparasites infestation, Carps, seasonal prevalence, Physicochemical parameters.

Introduction

The most important prerequisites of fish production is the availability of healthy fish fry and fingerlings. One of the reasons often quoted, as constraints for aquaculture developments in Bangladesh is the shortage of fish seeds. One of the ways to meet this demand is to maximize production of fingerlings from available nursery and rearing ponds.

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High stocking density is maintained during carp fry nursery operations, and this density induces bio-ecological stress to fry and make the fry more susceptible to the parasitic infestation (Snieszko, 1974). The parasites cause significant damage in nursery systems of carps, catfish and shellfishes of Sri Lanka (Subashinghe, 1992), Malaysia (Leong, 1992), Taiwan (Song *et al.*, 1980) and India (Gopal 1961). The parasite community of fish shows considerable variation with the environmental conditions in which the fishes live.

Ahmed *et al*. (1991) observed that the prevalence of diseases was more in the winter season every year. Various physicochemical factors such as water and atmospheric temperature, pH, hardness of water, dissolved oxygen, biological oxygen demand (BOD) have strong impacts on fish health and their resistance to attack by the causative agents (Welch, 1941; Snieszko, 1974; Plumb *et al*., 1988; Shresta, 1990). Dogiel (1961) suggested 15 factors, which directly influence the parasitic fauna of fish. These factors include age, diet and abundance of fish, independence of the numbers of parasitic fauna within the fish and season. Wisheiwski (1958) stated that the character of water body influences and determines the parasitic fauna of its community. Therefore, the parasitic fauna of any particular habitat was determined by a combination of various ecological factors.

The present study was designed to investigate the prevalence, host specificity, relationship of water quality and bio-ecological parameters of infestation of the ectoparasites in carp fry and fingerlings of Mymensingh and Bogra districts in Bangladesh.

Materials and Methods

The fry and fingerlings of silver carp, grass carp, mirror carp, catla, rui, mrigel and Thai punti were used as host fishes for the collection of the ectoparasites and their identification. The waterbodies from the different nursery ponds were collected and the physico-chemical parameters were studied once a month from June, 2004 to October, 2005 in Mymensingh and Bogra districts. In order to observe the seasonal changes of occurrence, infected fishes were collected seasonally. Collected live fishes were immersed in 5% formalin for preservation. The parasites were fixed according to the method suggested by Cable (1958). Monogenean parasites were identified following the descriptions and figures of Yamaguti (1963). For protozoan parasites, identification methods adopted by Lom (1960), Lucky (1971) and Kabata (1985) were followed. Nursery pond water quality data viz. temperature, pH, unionized ammonia and alkalinity, dissolved oxygen, free carbon-di-oxide, total hardness (as calcium carbonate) were recorded on the spot during sampling using a portable HACH Kit (FF-2).

Most samplings of water collection were done between 8 a.m. to 11 a.m. from the surface layer. The recorded data were analyzed

to calculate the prevalence of the ectoparasites and to detect the relationship of physicochemical parameters, and the incidence of ectoparasitic infestation. The effect of locality and seasons were analyzed in terms of the percentage of parasites present.

A centigrade pocket thermometer was used to record the temperature of water. In the field condition, DO was measured by using HACH kit box (portable water test kit). Free CO_2 was determined by titration procedure using standard base solution with phenolphthalein as end point indicator. The pH of sample water was recorded by a pH meter, the total hardness test, the water sample was buffered to a pH of 10.1 where the test functioned best. An organic dye was added which reacted with calcium and magnesium ions to give a red coloured complex. The solution was then titrated with standard (EDTAS) to blue end point. The amount of EDTA titrant added was directly proportional to the concentration to total hardness (as $CaCO_3$).

The Nessler Method for ammonia nitrogen testing was a sensitive single test and interference of hardness was eliminated with the addition of Rochelle Salt to the sample. Alkalinity was expressed as total alkalinity and included all carbonate, bicarbonate and hydroxide alkalinity. The total alkalinity was determined by titration to a pH of 5.1, 4.8 or 3.7 depending on the various compositions and alkalinity of the water sample.

Results and Discussion

Seasonal dominance of the ectoparasites in carps of Mymensingh and Bogra districts is shown in Table I and II. The monthly and seasonal variations of physicochemical parameters of water of the two sampling ponds in the two districts recorded are shown in Table III-IV and Table V-VII respectively. Water temperature showed variations in different months of the year in different study areas. The highest water temperature was $30.2^{O}C$ (May, 2005) in Shambhuganj of Mymensingh and that was $28.5^{O}C$ (June, 2004) at Santahar of Bogra districts (Table III, IV).

The presence of bicarbonate in water was responsible for the presence of alkalinity. The alkalinity of water observed was minimum (70 ppm) in November, 2004 and maximum (150 ppm) in July and October, 2005 in the pond of Mymensingh (Table III). In Santahar pond, the value of total alkalinity of water was found to fluctuate from the minimum of 80 ppm in September, 2005 to the maximum of 174 ppm in February, 2005 (Table IV). The ammonia of water were observed to be minimum in December, 2004 (0.2 ppm) and September, 2004 (0.03 ppm) and maximum were in the month of July, 2004 (3.5 ppm) and November, 2004 (3.2 ppm) in the ponds of Shambhuganj and Santahar locations respectively (Table III-IV).

Table I. Seasonal percentage prevalence of the ectoparasites of carps in some ponds of Shambhuganj, Mymensingh district

Seasons	*T. domerguei*	*T. reticulata*	*C. cyprini*	*M. koi*	*D. catla*	*D. extenswi*	*D. tripathi*
Rainy 2004	44.67	1.34	3.34	6.0	10.0	9.34	0.67
Winter 2004-05	70.0	10.84	2.0	10.0	11.34	32.5	2.0
Summer 2005	66.67	5.34	2.67	3.34	6.67	10.0	0
Rainy 2005	58.34	6.67	1.67	6.67	3.34	12.5	4.17

N.B: June-September = Rainy season, October-January = Winter season, February-May = Summer season

Table II. Seasonal percentage prevalence of the ectoparasites of carps in ponds of Santahar, Bogra district

Seasons	*T. domerguei*	*T. reticulata*	*C. cyprini*	*M. koi*	*D. catla*	*D. extenswi*	*D. tripathi*
Rainy 2004	62.0	0	0	2.0	0	0	0
Winter 2004-05	95.0	17.5	0	32.5	0	32.5	0
Summer 2005	90.0	0	0	6.67	0	0	0
Rainy 2005	45.5	0	5.0	15.0	0	0	0

N.B: June-September = Rainy season, October-January = Winter season, February-May = Summer season

The maximum carbon-di-oxide recorded were 8.5 ppm (December, 2004, January, 2005 and August, 2005), 10.5 ppm (September, 2005) and the minimum were 4.5 ppm (June, 2004) and 4.0 ppm (September, 2004) in the ponds of Shambhuganj and Santahar respectively (Table III, IV). In Shambhuganj pond, the highest and lowest concentration of DO of water were 9.0 ppm and 5.5 ppm in the month of July, 2004 (also October, 2005) and June, 2004, respectively (Table III). The highest and lowest DO concentration of Santahar ponds were 9.5 ppm and 1.5 ppm in the month of July, 2005 and September, 2005 respectively (Table IV).

The average pH value of water of the pond of Shambhuganj was found to vary from a minimum of 6.5 (November, 2004) to a maximum of 8.0 (August, 2004, February, 2005, July, 2005 and September, 2005) (Table III) and that of Santahar pond was a minimum of 6.5 (October, 2005) to maximum of 8.4 (June, 2004) (Table IV). The highest and lowest values of hardness were in the month

Table III. Monthly variations of physicochemical parameters in some ponds of Shambhuganj, Mymensingh during June, 2004 to October, 2005

Months	Physicochemical parameters						
	Temperature (^{O}C)	Alkalinity (ppm)	Ammonia (ppm)	Free CO_2 (ppm)	DO (ppm)	pH	Hardness (ppm)
June 2004	30.0	139	2.2	4.5	5.5	7.4	150
July 2004	26.5	90	3.5	6.0	9.0	7.2	70
Aug 2004	26.0	89	2.5	6.8	7.8	8.0	70
Sep. 2004	27.2	78	2.0	7.5	7.2	7.8	65
Oct. 2004	24.2	96	1.5	9.0	8.2	7.5	80
Nov. 2004	20.4	70	1.2	7.8	7.4	6.5	75
Dec.2004	21.5	100	0.2	8.5	6.5	6.9	80
Jan. 2005	19.5	115	1.0	8.5	6.8	7.5	80
Feb. 2005	27.0	105	0.5	7.5	8.0	8.0	90
Mar. 2005	24.5	75	2.0	8.0	7.8	7.1	64
Apr. 2005	24.2	105	1.8	8.2	8.0	7.5	100
May 2005	30.2	85	2.1	7.0	8.5	7.5	65
July 2005	27.2	150	2.0	8.0	7.8	8.0	120
Aug. 2005	30.0	135	2.0	8.5	7.0	7.5	120
Sep. 2005	27.5	125	1.8	8.2	7.0	8.0	120
Oct. 2005	28.0	150	2.0	6.5	9.0	7.5	130

N.B: June 2005 was out of sampling.

of June, 2004 (150 ppm), September, 2004 (175 ppm) and March, 2005 (64 ppm), July, 2004 (65 ppm) in the ponds of Shambhuganj and Santahar respectively (Table III, IV).

Physicochemical features such as water temperature, total alkalinity, CO_2, DO, pH, and total hardness of the monthly record showed fluctuations in different months. Rahman *et al.* (1975) and Murty *et al.* (1978) also found similar results in some ponds of India. The total alkalinity showed more or less direct relationships with pH and CO_2.

More or less inverse relationship was found between DO and CO_2; which had also been observed by Ali *et al.* (1982). The minimum concentration of CO_2 (4.0 ppm) in Santahar pond was recorded in September (1994) and maximum (10.5 ppm) in September (1995). Chawdhury et al. (1978) reported CO_2 fluctuating range between zero to 3.8 ppm. pH showed more or less inverse relationship with CO_2. Such observation was supported by Michael (1969). The total hardness was also observed. The amount of CO_2 always

Table IV. Monthly variations of physicochemtcal parameters in ponds of Santahar (Bogra) during June 2004 to October 2005

Months	Physicochemical parameters						
	Temperature (^{O}C)	Alkalinity (ppm)	Ammonia (ppm)	Free CO_2 (ppm)	DO (ppm)	pH	Hardness (ppm)
June 2004	28.5	100	3.0	5.6	7.0	8.4	82
July 2004	27.0	95	1.4	6.0	7.9	7.8	65
Aug. 2004	25.5	110	0.9	4.5	6.7	8.0	95
Sep. 2004	27.2	85	0.03	4.0	8.0	7.5	175
Oct. 2004	25.0	95	0.24	4.5	8.2	7.2	167
Nov. 2004	21.0	105	3.2	5,0	6.0	8.0	120
Dec. 2004	20.5	135	2.5	7.5	8.0	8.1	105
Jan.2005	18.0	160	3.0	7.2	8.0	7.5	140
Feb. 2005	19.2	174	3.0	7.0	8.5	8.2	140
Mar. 2005	22.5	170	3.0	6.5	8.2	7.8	150
Apr 2005	23.5	140	3.0	6.0	9.0	7.5	100
May 2005	25.2	115	2.8	8.2	6.5	8.0	85
July 2005	26.2	120	2.4	6.5	9.5	8.0	95
Aug. 2005	26.5	86	0.3	10.0	2.7	7.5	145
Sep. 2005	25.5	80	2.8	10.5	1.5	7.0	80
Oct. 2005	25.6	105	2.5	8.5	7.0	6.5	120

N.B: June 2005 was out of sampling.

Table V. Seasonal variations of physicochemical parameters in two ponds of Shambhuganj, Mymensingh district.

Seasons	Physicochemical parameters						
	Temperature (^{O}C)	Alkalinity (ppm)	Ammonia (ppm)	Free CO_2 (ppm)	DO (ppm)	pH	Hardness (ppm)
Rainy 2004	27.4	99	2.6	6.2	7.4	7.6	89
Winter 2004-05	21.4	95	0.9	8.4	7.2	7.1	84
Summer 2005	26.5	93	1.6	7.6	8.1	7.5	80
Rainy 2005	28.2	140	1.9	7.8	7.7	7.6	122

N.B: June-September = Rainy season, October-January = Winter season, February-May = Summer season

Table VI. Seasonal variations of physicochemical parameters in ponds of Santahar, Bogra district

Seasons	Physieochemical parameters						
	Temperature (^{O}C)	Alkalinity (ppm)	Ammonia (ppm)	Free CO_2 (ppm)	DO (ppm)	pH	Hardness (ppm)
Rainy 2004	27.0	78	1.3	5.0	7.4	7.9	104
Winter 2004-05	21.1	124	2.2	6.0	7.6	7.7	133
Summer 2005	22.6	150	2.9	6.9	8.1	7.8	119
Rainy 2005	26.0	98	2.0	6.3	5.2	7.3	110

N.B: June-September = Rainy season, October-January = Winter season, February-May = Summer season

fluctuated in the ponds. A close relationship between pH and carbonate content of water was also observed.

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Received :January, 24, 2008;
Accepted : April, 08, 2008.