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Assessment of Chemical Water Parameters in Abohar City, Punjab for Shrimp Production

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Abstract

Survey of different shrimp ponds of Abohar city in Punjab was carried out which revealed that the mean of salinity (ppt), carbonate (ppm), bicarbonate (ppm), Total alkalinity (ppm), Total hardness (ppm), Calcium Hardness (ppm), Calcium (ppm), Magnesium (ppm), Potassium (ppm), pH (ppm) was 16, 17.80, 139.60, 157.40, 4222, 1316, 526.40, 705.80, 45.27, 8.16 respectively. The data was analysed by one factorial analysis under Completely Randomized Design.

Keywords: Water, Chemical, CRD, Pond, Shrimp, Parameters

Introduction

Shrimps are decaped crustaceans and a group of organisms with approximately 233 families and 725 genera (De Grave *et al.*, 2009). It is one of the most popular types of seafood consumed all over the world (FAO, 2019). With the rising population, there is a huge demand for food products based on shrimps (Kobayashi *et al.*, 2015). Shrimp aquaculture has also helped to alleviate the problems connected with overfishing in marine habitats (Pradhan and Flaherty 2007). The infrastructure for allied processing is spread across the maritime states. About 12 lakh families rely on this sector for employment and income to support their families, both directly and indirectly. Intrastate and interstate movement of feed, inputs, seed and produce for export and processing is critical to the sustainability of shrimp aquaculture in India (CIBA, 2020).

Materials and Methods

The physico-chemical properties of the water collected from different shrimp pond locations (Fig. 1) in Abohar, Punjab was calculated on a monthly basis during the study period (March to July, 2021) and the data was gathered to establish the mean value of each parameter. pH, salinity, carbonate, bicarbonate, total alkalinity, hardness, calcium hardness, calcium, magnesium, and potassium and were measured using the guidelines supplied by APHA (1998). (Fig. 2). The data were analysed using OPSTAT software, and one factorial analysis with a Completely Randomized Design (CRD) was employed.

TEST PARTICULARS	OPTIMUM RANGE	S1	S2	S 3	S4	S 5	S 6	S 7	S8	S9	S10
Salinity (ppt)	(5-25)	16	16	13	15	13	17	16	18	18	18
Carbonate (ppm)	(10-40)	14	32	0	0	20	20	12	10	36	34
Bicarbonate (ppm)	(80-100)	158	120	216	146	182	112	146	120	108	88
T. Alkalinity (ppm)	(100-200)	172	152	216	146	202	132	158	130	144	122
T. Hardness (ppm)	(2000-5000)	4620	4260	3220	3980	3200	4620	4300	4860	4740	4420
Ca Hardness (ppm)	(400-2000)	1400	1260	980	1220	1020	1500	1360	1580	1460	1380
Calcium (ppm)		560	504	392	488	408	600	544	632	584	552
Magnesium (ppm)	(1:3-1:4)	782	729	544	670	529	758	714	797	797	738
Potasium (ppm)	(Salinity X 6)	38.4	39.6	31.3	56.6	39.4	43.9	42.1	49.2	57.1	55.1
pH	(7.5-8.5)	8.2	8.2	7.8	8.2	8.2	8.2	8.2	8.2	8.2	8.2

Table 1: Water parameters at different survey sites

Results and Discussion

Water parameters of different ponds in Abohar, Punjab are presented in table 1. The S1, S2 and so on represents the survey site 1, 2 and so on. The optimum range of salinity should lie between 5 to 25 ppt for proper shrimp farming. The salinity of different ponds surveyed lied between 13 to 18 ppt. Kasnir and Harlina (2014) recorded that the salinity in the coastal waters and river was 30.90 ± 4.01 and 17.95 ± 3.79 ppt. respectively. Others recommended that salinity of 5-35 ppt is suitable for shrimp farming and the salinity of 15-25ppt. is optimum for shrimp growth (Poernomo, 1992; Soewardi, 2007).

Carbonate and bicarbonate were found in range of 0-36 ppm and 88-158 ppm. Total alkalinity of the ponds ranged between 122 to 172 ppm which is in the optimum range of 100-200 ppm. Total hardness of the surveyed ponds was 3200-4620 ppm. Calcium harness for proper shrimp growth should be 400-2000 ppm.





Fig.1: Survey at sampling site

Fig. 2: Chemical water testing

The content of different minerals like Calcium, Magnesium, Potassium was also calculated in water samples. The results revealed that the Calcium content ranged between 392-600 ppm while the Magnesium content was estimated between 529 to 797 ppm. The ratio of Calcium to Magnesium content should lie between 1:3 to 1:4 which was found deviated in many ponds. The potassium content in various sampling sites ranged from 31.3 to 57.1 ppm. The pH in different ponds was in optimum range of 7.5 to 8.5 The pH measurement of river and coastal waters was 7.77• \pm 0.42 and 8.06 \pm 0.40, respectively whereas pH of shrimp pond water ranged between 8.06-8.17 with the highest pH obtained at 12:00 noon and lowest at 3: 30 pm (Kasnir and Harlina, 2014).

Table 2: Mean and standard error of different water parameter measurements

Water parameters	Mean	S.E.		
Salinity (ppt)	16.00	0.60		
Carbonate (ppm)	17.80	4.15		
Bicarbonate (ppm)	139.60	12.13		
T. Alkalinity (ppm)	157.40	9.79		
T. Hardness (ppm)	4,222.00	186.96		
Ca Hardness (ppm)	1,316.00	62.38		
Calcium (ppm)	526.40	24.95		
Magnesium (ppm)	705.80	30.83		
Potasium (ppm)	45.27	2.79		
рН	8.16	0.04		
C.D.	179.52			
SE(m)	63.79			
SE(d)	90.21			
C.V.	28.19			

Table 2 revealed that the mean of salinity (ppt), carbonate (ppm), bicarbonate (ppm), Total alkalinity (ppm), Total hardness (ppm), Calcium Hardness (ppm), Calcium (ppm), Magnesium (ppm), Potassium (ppm), pH (ppm) was 16, 17.80, 139.60, 157.40, 4222, 1316, 526.40, 705.80, 45.27, 8.16 respectively and the standard error recorded for these values was 0.60, 4.15, 12.13, 9.79, 186.96, 62.38, 24.95, 30.83, 2.79, 0.04 respectively. The critical difference found was 179.52.

Conclusion

Most of the water parameters of different ponds at survey sites were in adequate range which indicates a healthy shrimp production.

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