EVALUATION OF BIOCHEMICAL PARAMETERS OF SEWAGE AFFECTED SARISWA RIVER AT RAXAUL IN RELATION TO FISH MORTALITY

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ABSTRACT

Bihar, especially the north Bihar has rich potential of lentic water bodies but the problem prevailing in these water boolies suffered a lot due to pollution hazards which affect the fish production. Sariswa river is a polluted water body of Himalayan origin. The soil of the river at the selected effluent point (Patoka) is sandy loam. The pH was slightly alkaline with moderate phosphate concentration calcium magnesium, sodium and pottassium were in good amount. The microbes were dominated by bacteria followed by the fungi and actinomycetes. The mortality data of fish found to be related to the concentration of materials in water and the exposure period.

Key Words :- Patoka, Raxaul, Sewage, Fish, Mortality Sariswa river.

INTRODUCTION

The freshwater fishes are key and economy source of protein. The nutritive value of fishes are depends on the amount and quality of protein present in muscles of fishes. The amount and quality of nutritive substances

gradually degrading due to pollutants present in water bodies. The quality and quantity of nutritive substance in fish tissue is directly depending upon quantity of pollutants present in water. The major fresh water bodies of world are getting polluted due to addition of different polluting effluents.

In the past century the problem of pollution is increased due to pace of the industrialization, use of advanced technologies and modern life style products. The aquatic environment is badly polluted by the waste released from industries or factories constructed near the water bodies which deteriorate not only the quality of water boat also harm the aquatic animals. (Javed and Usmani 2013). Most fresh water ecosystem are becoming unbalanced by factors due to human activities (Mona zaki ex. at. 2015).

About 75% of aquatic pollution is caused by sewage and domestic wastes. It sewage or partially treated sewage is directly discharged into aquatic bodies, the water and soil of such region becomes polluted or contaminated sewage containing oxidzable and fermentable matters causes depletion of do in the receiving water bodies affecting the aquatic flora and fauna severely. Accumulation of sewage and domestic wastes in water bodies retards the self regulatory capabilities of aquatic organisms including fishes. The industrial residues are drained to nearby lands and decrease the soil Fertility.

Though, almost all lentic and to lotic water bodies of the Terai region, particularly the champaran area are free from the industrial pollution and have unique capacity of purification through self regulatory me mechanism, yet there is one river called sariswa river flowing from Nepal across India is a highly polluted river. This river is an original riverine system of Terai region of

Himalayan border, Which enter the Indo-Nepal border at Pantoka village in the city of Raxaul. This river receives effluents from sugar mills, Paper mills, tannery, distillery and other chemical effluents along with the agricultural run off. These effluents lead to high degree of pollution in river water as well as soil.

Soil is one of the most important ecological factors. It plays an important role with regard to the fertility of fish ponds because it is the storage medium of the nutrients. The vegetation depends upon it right from the germination. Types, characteristic & chemical conditions of soil Influence the productivity.

The present paper deals with the characteristics of the soil of the sariswa river at polluted points and fish mortality.

MATERIALS AND METHODS

The dried soil was lightly crushed and foreign materials such as plant residues gravel, stone and bricks pieces were discarded. Then it was sieved through 2mm size for further treatment Estimation of various components of soil was carried out following the methods of piper (1950) and Welch (1945) . Fish mortality was studied following the race threads of Doudoroff at. el. (1951), APHA (1995) and swingle (1957).

RESULTS AND DISCUSSION

The pH of the soil was studied and it was in slightly alkaline range. Sodium and Potassium were moderately rich in soil but low in available phosphorus. The area under, both right and left embankments of the river , covers the soils which are sandy and loamy, but at some places they are silty loamy, sand. Soil may be inferred as calcareous soil tending towards neutrality.

The organic matter and nitrogen of the soil usually increase with rainfall. Soil moisten also exerts a very positive control upon the accumulation of organic matter. The monthly variations in the physical and chemical properties of the river soils are given in Table 1 and 2.

Study of microbial parameters of the river at pantoka effluent point indicated that 50.6% were bacteria with fungi and actinomycetes to be 18.0% and 17.83% (Table 3). Further the mortality data of the fish were studied under various concentrations of the polluted water of pantoka effluent point of sariswa river and it was found that the rate of mortality was proportional to the concentration of materials and exposure periods (Table-4). This finding was found to be in conformity of the fine tings of Shukla and Pandey (1984). Industrial discharges impart colour, foul odour and turbidity to the receiving waters. Several species of fish like Channa gachua, C.Punctauatus C.marulius and cat fishes etc. and other fishes which are dependent on oxygen were fighting for their survival. The fishes exhibited some Jerky movements, mucus on their skin, erratic swimming, abnormal behaviour and finally found dead at the bottom. In dead fishes opercula region becomes blackish, haemorrhaging occurs of gills filaments along the belly, at the base of pectoral, and pelvic fins. The body was slimy due to mucus secretion from epithelium of gills. The fishes were surfacing frequently. Small to large nercotic lesions were also observed on the entire body surface of different fishes.

The soil surface as usual in touch with the water. Chemical components of water and soil might get interchanged and, thus, altering the growth of the

vegetation and determining the kind of organisms that could live. pH was moderate with slightly alkaline in nature in the river. Calcium, magnesium, Sodium and potassium were also in good amounts. Joseph et al. (1977) correlated pH and phosphate of the soil but in the present case there was no clear-cut relationship between these factors. Swingle (1967) stated that acidic water reduces appetite and growth of fishes. Fishes are more prone to attack of parasites and diseases in acidic waters and soil. This finding was found to be in conformity to the findings of kumari. (1990) while working on the soil condition of an ox-bow lake of west Bengal.

On the basis of soil condition analysed in this investigation the sariswa river may be a good source of Pisciculture as per Banerjee (1967). Sinha (2000) and Singh (2002) reported pH between 7.0 to 8.6 in the different water bodies of North Bihar where fish production has been recorded maximum even in the heavy flood condition.

The total count of bacteria is supposed to be good for soil fertility. The present findings are in conformity with the findings of B.B. Prasad et al. (2005) and Chatterjee and Raziuddin (2001) while working on a polluted water body at Raniganj (Asansol, W.B) and Chaturvedi et al. (1999). Who worked on polluted waters of sanganur (Jaipur).

In this region of North Bihar, 80% of the soils are normally with pH from 6.5 to 8.0 and rest 20% are alkaline with pH ranging between 8.1 to 8.6 (Lal). The soils of champaran region are rich in Potassium but deficient in phosphate.

Table -1 Monthly variation in the physical parameters of soils of sariswa river at pantoka effluent point (Raxaul)

Month	Colour	Temp (0^0C)	pH	Bulk density	Pore space (%)	Field Capacity (%)	Water holding Capacity (%)	Conductivity (Mmho)
Jan	LB	30.6	7.1	1.25	52.1	50.5	24.1	4.1
Feb	LB	30.7	7.2	1.25	50.5	48.2	25.5	4.15
Mar	LB	34.0	7.1	1.28	52.8	39.2	22.8	3.12
Apr	LB	38.6	7.0	1.43	48.5	38.2	22.5	2.15
May	LB	37.5	7.1	1.41	49.6	28.2	24.6	2.65
Jun	LB	42.6	7.3	1.44	49.8	18.2	23.6	2.15
Jul	LB	28.7	7.5	1.19	51.8	47.2	21.5	0.38
Aug	LB	27.2	7.4	1.25	51.6	41.5	21.0	2.15
Sept	LB	30.2	7.5	1.27	52.4	47.0	20.0	0.71
Oct	LB	28.5	7.3	1.40	47.8	37.2	20.5	3.72
Nov	LB	26.5	7.2	1.39	48.2	43.2	22.5	3.12
Dec	LB	30.5	7.5	1.29	50.2	36.4	23.0	4.12

Table 2: Chemical parameters of sewage effluent related soil at Pantoka (Raxual).

Month	Alkalinity	Ca	$CaCo_3$	So_4	P	Mg	No_3	NH_3	K	Na	O.M.
Jan	0.16	36.2	52.5	11.5	0.29	4.55	0.25	1.76	31.0	294	8.4
Feb	0.15	24.6	43.0	7.5	1.5	4.9	0.22	0.78	11.0	351	7.8
Mar	0.4	23.8	52.5	8.3	1.8	4.8	0.75	0.25	31.0	323	5.0
Apr	0.5	18.5	29.5	6.6	0.40	5.26	0.30	0.6	32.0	311	6.1
May	0.9	17.5	32.2	10.3	0.30	8.1	0.27	1.29	27.0	306	6.4
Jun	0.14	25.2	51.5	8.3	0.12	7.1	0.50	0.68	22.8	203	6.3
Jul	0.12	14.2	61.5	11.0	0.22	12.5	0.20	0.35	23.8	293	5.7
Aug	0.15	13.5	63.5	11.5	0.12	5.1	0.19	0.68	21.0	163	6.3
Sep	0.10	4.5	58.0	9.1	0.29	4.2	0.18	0.25	17.0	29	5.1
Oct	0.17	46.5	46.0	6.4	0.52	2.3	0.20	0.38	17.0	33	4.8
Nov	0.15	27.5	46.5	3.5	0.58	18.5	0.22	0.28	18.0	45	3.5
Dec	0.3	25.5	47.3	16.5	0.66	13.5	0.18	1.2	20.0	212	7.2

Table 3 : Microbial Parameters of effluent related soil at Pantoka (Raxaul).

Month	Bacteria	Fungi	Actinomycetes
Jan	16	14	15
Feb	21	19	28
Mar	05	11	03
Apr	38	08	02
May	35	15	26
Jun	38	13	10
Jul	59	21	02
Aug	17	25	01
Sep	89	19	10
Oct	128	20	01
Nov	65	30	05
Dec	103	15	105
Mean	51.16	17.5	17.33

Table 4 : Mortality data of fish at Pantoka Point (Raxaul) Near Sariswa river.

Concentration	**No. of control fish**	**Exposure time**	**Mortality (%)**
Control	20	24 hr	00
0.5%	20	-	15
1.0%	20	-	40
1.5%	20	-	60
2.0%	20	-	75
Control	20	48 hr	00
0.5%	20	-	80
1.0%	20	-	90
1.5%	20	-	95
2.0%	20	-	100

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