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Effect Of Transparency And Primary Production On Fish Growth

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Abstract: ***Transparency is one of the most important factor which affect the primary production of any pond. Primary production is depend on the organic carbon, the significance of organic carbon lies in the carbohydrate content.***

Bacterial activity depends not only the carbon contents but also on the C/N ratio. Factors which affect the general environment may also influence the propagation of aquatic life.Silt clay and other suspended material may significantly decrease the penetration of light into the water there by decreasing or stopping photosynthetic activity. This may have important effect on the availability of food for organisms, as a result primary production decrease with the time. Comparison of rates of gross and net primary production in an ecosystem provide interesting data on the utilization of plant food by plant themselves. For the present study 4 stations were selected in littoral and limnetic zone in Bhawania talab of Bijuri District Anuppur(m.p.). The period of sampling was 1 year from January 2009 to December 2009 in monthy bases. In Bhawania Talab of Bijuri transparency varies between 15.46 to 34.40 cm. The minimum transparency was recorded in rainy months and maximum in summer and winter seasons. In the present study the range of organic Carbon was found 0.524 to 1.5 and the average value 0.916%, and range of nitrogen was 0.81 to 0.85 recorded and the average value was 0.825 and C/N ratio (Table 3) was recorded 0.603to 1.8 and average value of C/N was found 1.60, which is average quantity for the productivity of water body. Water with less transparency are undesirable for fish ponds, but productive ponds generally have slightly turbid water probably in exchange process between adsorbed nutrients on the surface of the clay particles and soluble nutrient in water help to maintain higher nutrient concentration in water (water research 2002) . Thus water of the Bhawania Talab is suitable for fish production for most of the period except during rains when it become more turbid due to inflowing turbid water from the catchment area. Aspects of primary production Talab is found in average condition.

Keywords: Transparency, primary production, organic carbon, C/N ratio, littoral and limnetic, fish production.

I. INTRODUCTION

Physico-chemical condition of water play an important role in the productivity of a fish pond. The water used for the cultivation of fish will not give maximum production if the physico - chemical conditions are not optimal for the fish and for the other aquatic organisms. Among the most important physico-chemical features the transparency is one of them because transparency controls the photosynthetic activity, which is directly related to the primary production of water body. Transparency in water is caused by the substances not present in the true solutions. It is an important limiting factor in the productivity of a pond. Transparency in natural water caused by clay, silt, organic matter, phytoplankton and other microscopic organisms. It varies greatly with the nature of the basin, degree of exposure and nature of inflowing sediments etc. It is also affected by rains, floods etc. Transparency affected due to profusion of planktons in an indications of ponds high fertility , but due to silt or mud is harmful to fish and fish food organisms. Transparency is responsible for the penetration of sunlight and hence controls the photosynthetic activity which in turn, is related to the productivity of a water body. Suspended particles affecting transparency adsorb considerable amount of nutrient elements like phosphates, potassium, and nitrogen in their ionic forms making them unavailable for plankton production. Similarly colloidal particles of different thermal properties influence the temperature condition of the water body by restricting the

penetration of sunlight and scattering it. Plant substance produced per unit of time and space is defined as rate of gross primary production and the rate of net primary production represents the rate at which organic matter is stored, both the rate of primary production are measured on the basis of organic carbon present in the unit volume or beneath unit area of the pond surface and are expressed in unit mg.c/m3/day. If the rate of organic carbon is sufficient then the primary production of pond will be high and total fish production increase with the time. The significance of organic carbon lies in the carbohydrate content. Bacterial activity depends not only the carbon contents but also the C/N ratio.

II. MATERIAL AND METHODS

For the present study four stations of littoral and limnetic zone of Bhawania Talab of Bijuri Distt. Anuppur were selected. The different stations were covered with the help of local boat (DONGI). Transparency was measured by a Secchi-disc. The Secchi-disc is a metallic plate of 20 cm diameter with four alternate black and white quadrants on the uppers surface and a hook in the centre to tie a graduated rope. The disk was lowered down with the help of graduated rope till it disappeared from the view on shaded side of boat and then lifted till it reappeared. The depth of disappearance and reappearance secchi-disc was noted and average of two depth was calculated as secchi-disc transparency .Organic matter and organic Carbon and nitrogen was determined as a titrimetric method given by APHA.

III. RESULT AND DISCUSSION

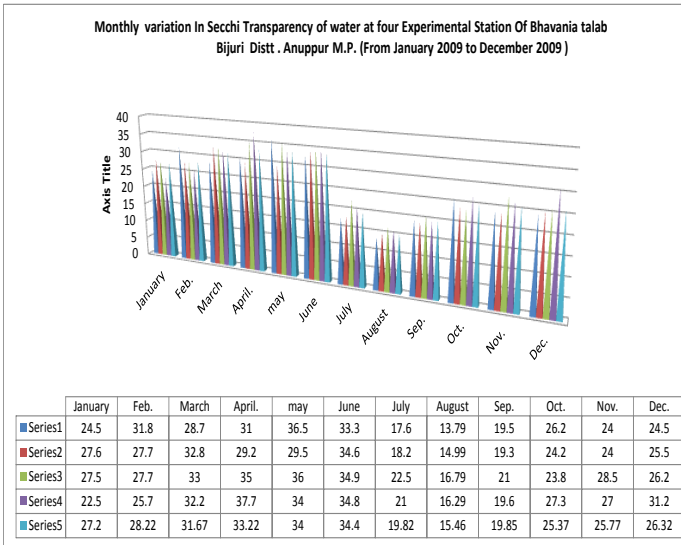
For the present study 4 stations were selected in littoral and limnetic zone in Bhawania talab of Bijuri District Anuppur (m.p.). The period of sampling was 1 year from January 2009 to December 2009 in monthy bases. In the present study the average transparency of the tank varied between 15.46 to 34.40cm (Table 1) the maximum transparency was noted in the month of June and minimum in the month of August. Transparency values were more or less constant in winter, higher during summer and it showed decreasing trend in the rainy season .In the June light penetration was maximum according to Harrison (2001). Transparency decrease due to the presence of cloudiness resulting from the precipitation of ferric hydroxide produced by oxidation of ferrous ion at the mud surface. According to Smith (1939) excessive turbidity i.e. low transparency has a pronounced in confining daily heat gain to the surface layer of water. In general all fish ponds attaint a highest turbidity during rains in July and August due to turbid rain water entering the ponds from the catchment area which decrease the transparency of water. This however represents a temporary phase. Transparency regains its normal value during the pre winter months. Minimum value for transparency in rainy season were also reported by Singh and Sharma (1999). Srivastava (1987) and Stewart David (2002). Primary production is depend on the organic carbon, the significance of organic carbon lies in the carbohydrate content.

Bacterial activity depends not only the carbon contents but also on the C/N ratio .In the present study the range of organic Carbon was found 0.524 to 1.5 and the average value 0.916%, and range of nitrogen was 0.81 to 0.85 recorded and the average value was 0.825 and C/N ratio (Table 3) was recorded 0.603to 1.8 and average value of C/N was found 1.60, which is average quantity for the productivity of water body. Primary production is directly related with amount of organic Carbon, so it is found the primary production of the Talab is in average condition.

Water with less transparency are undesirable for fish ponds, but productive ponds generally have slightly turbid water, probably in exchange process between the adsorbed nutrients on the surface if the clay particles soluble nutrient in water help to maintain higher nutrient concentration in water (Water Research, 2002).

Zone	Littoral		Limnetic		Average
Stations	A	C	B	D	
January	24.50	27.60	27.50	22.50	27.20
Feb.	31.80	27.70	27.70	25.70	28.22
March	28.70	32.80	33.00	32.20	31.67
April.	31.00	29.20	35.00	37.70	33.22
may	36.50	29.50	36.00	34.00	34.00
June	33.3	34.60	34.90	34.80	34.40
July	17.60	18.20	22.50	21.00	19.82
August	13.79	14.99	16.79	16.29	15.46
Sep.	19.50	19.30	21.00	19.60	19.85
Oct.	26.20	24.20	23.80	27.30	25.37
Nov.	24.00	24.00	28.50	27.00	25.77
Dec.	24.50	25.50	26.20	31.20	26.32
Range	13.79 to 36.50	14.99 to 34.60	16.79 to 34.90	16.29 to 37.70	15.46 to 34.40

Table 1: Monthly variation In Secchi Transparency of water at four Experimental Station Of Bhavania talab Bijuri Distt. Anuppur M.P. (From January 2009 to December 2009)



	January	Feb.	March	April.	may	June	July	August	Sep.	Oct.	Nov.	Dec.
Series1	24.5	31.8	28.7	31	36.5	33.3	17.6	13.79	19.5	26.2	24	24.5
Series2	27.6	27.7	32.8	29.2	29.5	34.6	18.2	14.99	19.3	24.2	24	25.5
Series3	27.5	27.7	33	35	36	34.9	22.5	16.79	21	23.8	28.5	26.2
Series4	22.5	25.7	32.2	37.7	34	34.8	21	16.29	19.6	27.3	27	31.2
Series5	27.2	28.22	31.67	33.22	34	34.4	19.82	15.46	19.85	25.37	25.77	26.32

Series 1 = station – A , Series 2 = station - C , Series 3 = station – B , Series 4 =station – D , Series5 = Average

Figure 1

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Zone	Littoral		Limnetic		Average
Station	A	C	B	D	
Summer	32.38	31.53	34.73	34.68	33.32
Rainy	19.27	19.17	21.02	21.05	20.13
Winter	26.20	26.20	27.48	26.60	26.88

Table 2: Seasonal variation In Secchi Transparency of water at four Experimental Station Of Bhavania talab Bijuri Distt. Anuppur M.P. (From January 2009 to December 2009)

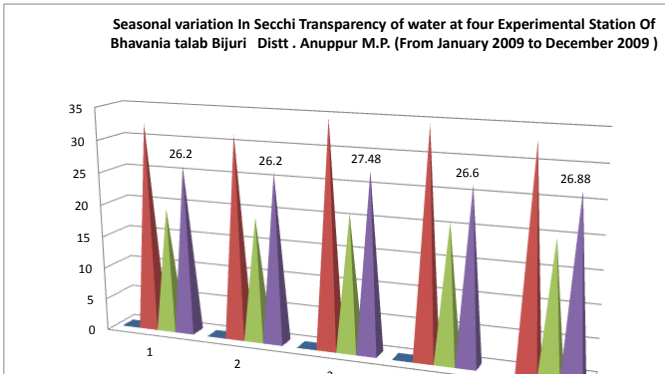
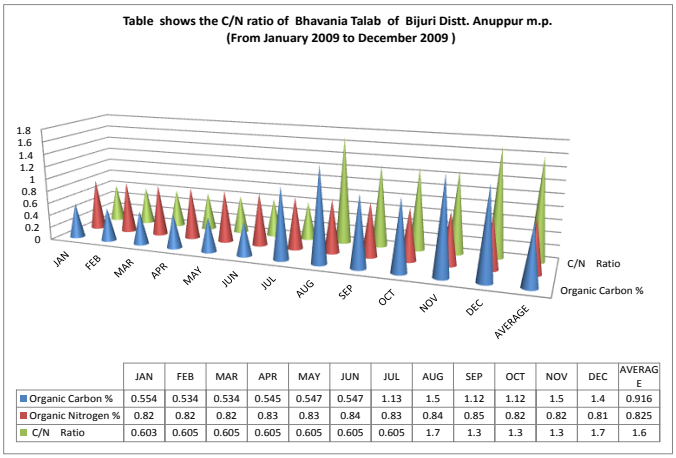


Figure 2

Month	Organic Carbon %	Organic Nitrogen %	C/N Ratio
JAN	0.554	0.82	0.603
FEB	0.534	0.82	0.605
MAR	0.534	0.82	0.605
APR	0.545	0.83	0.605
MAY	0.547	0.83	0.605
JUN	0.547	0.84	0.605
JUL	1.13	0.83	0.605
AUG	1.50	0.84	1.70
SEP	1.12	0.85	1.30
OCT	1.12	0.82	1.30
NOV	1.50	0.82	1.30
DEC	1.40	0.81	1.70
AVERAGE	0.916	0.825	1.60
RANGE	0.524 to 1.5	0.81 to 0.85	0.603 to 1.8

Table 3

Table shows the C/N ratio of Bhavania Talab of Bijuri Distt. Anuppur m.p. (From January 2009 to December 2009).



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
Organic Carbon %	0.554	0.534	0.534	0.545	0.547	0.547	1.13	1.5	1.12	1.12	1.5	1.4	0.916
Organic Nitrogen %	0.82	0.82	0.82	0.83	0.83	0.84	0.83	0.84	0.85	0.82	0.82	0.81	0.825
C/N Ratio	0.603	0.605	0.605	0.605	0.605	0.605	0.605	1.7	1.3	1.3	1.3	1.7	1.6

Figure 3

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