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Physico-chemical seasonal analysis and Fish Culture, Pond of Shahdol, Madhya Pradesh

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Abstract: ***The present paper deals with the seasonal variations in some important Physico-chemical parameters and Biological analysis of the fish Pond of Shahdol Madhya Pradesh using selected standard classical methods with an objective to investigate present condition for its better utilization. The data collected in various seasons (summer, winter and rainy) study revealed that those analyzed parameters were within permissible limit for fish culture and the stocking should be done as per the productivity of the water. There is good scope to increase the production by increasing the carrying capacity of the water bodies.***
Keywords: ***Fish Culture, Shahdol, Physico-chemical analysis.***

I. INTRODUCTION

Physico-chemical analysis of fresh water resources are scatted throughout the district and are under fish culture on extensive or semi intensive way giving some income to the growers. The number of dams, reservoirs, tanks, etc. has significantly increased in last few years. The development of fisheries in these fresh water resources is the present need using scientific techniques. The abiotic and biotic factors of the water influence the quality and quantity of aquatic life surviving there. The role of water in nature is unique not only for human; but, also for the numerous organisms living in the water. The physical and chemical properties of fresh water bodies are characterized by the climatic, geochemical, geo morphological and pollution condition. In order to utilize fresh water bodies successfully for fish production, it is very important to study the Physico-Chemical factors influencing the biological productivity in the water bodies The quality of aquatic life surviving in the pond is totally dependent on the water quality of the pond. In the recent years several studies have been made in this field but not much information is available on Physico-Chemical and Biological parameters of the present water bodies. Hence the present work is an attempt to study the detailed information on some important Physico-chemical and Biological parameters of the fish pond so that necessary measures could be suggested for the best fish culture practices in the Pond of Shahdol Madhya Pradesh.

II. MATERIALS AND METHODS

Shahdol District is north eastern part of Madhya Pradesh state. It is lying between $23^0$17'47" N latitude and $81^0$21'21" E longitude. Total geographical area sums up to 5671 sq.km. and has a population of 908148. Shahdol is riched in vast resources of forest and minerals. It is bounded in the north by Satna and Sidhi district, in the east by Korea district, in the south by Anuppur district, in the west by Umaria district. The area is full of water springs which come out on the top hill slopes. The Shahdol division is average rainfall is 85.11% and above temperature 13.6 ^{0}C. District Shahdol practice a various range of occupation such as hunting, gathering, fishing, plough agriculture and shift agriculture is the main stay of the tribes. Regardless of their principal mode of subsistence they collect and consume major and minor forest product.

The fish pond has been selected on random basis for the study which are under fish culture practices. Monthly sampling was done from June 2013 to May 2014 in all the ponds for finding out the various abiotic (Temperature, Transparency, pH, Dissolve Oxygen, free CO_2, total Alkalinity, Biological Oxygen Demand (BOD) and biotic parameters. The Physico-chemical analysis of the water samples were done according to APHA (1998). The estimation of planktonic population, samples were collected with the aid of a mug of one litre capacity. 50 litres of water was collected through the Plankton net made of bolting silk no. 25 (0.064 mm mesh size) to obtain the plankton sample and was preserved by adding 24% of formalin for further study. The data collected was grouped in three categories i.e. summer (February-May), Rainy (June-September) and winter (October–January) for comparison of seasonal variations. Ecosystem. (Dwivedi and Pandey 2002).

Present study the water temperature range. 23.90 °C to 31.55 °C. It was maximum during summer comparatively less during monsoon and minimum during winter. Kannan and Job (1980) also found similar results as observed in the present study The temperature rages indicate the suitability for fish culture (Jhingran, 1982)

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III. RESULTS AND DISCUSSION

The fish Pond of Shahdol is perennial, non-drainable, utilized for bathing, washing clothes and utensils. The physicochemical analysis made in various seasons in this pond have been shown in the Table 1.

Table 1: Physico-chemical and Biological Parameters of Pond of Shahdol, Madhya Pradesh.

S.No.	Parameters	Summer	Rainy	Winter
1.	Temperature (°C)	31.55	29.68	23.90
2.	pH	7.35	7.42	7.38
3.	Transparency (cm.)	31.93	26.10	34.85
4.	Dissolve Oxygen (ppm.)	5.68	6.38	7.78
5.	Carbon Dioxide (ppm.)	5.34	5.08	4.39
6.	Alkalinity (ppm.)	137.3	95.0	147.3
7.	Hardness (ppm.)	185.3	102.3	189.3
8.	Electrical Conductivity	308.0	190.0	253.8
9.	Total Dissolve Solids (ppm)	521.0	564.5	467.5
10.	Biological Oxygen Demand (at 25°C)	2.825	2.350	2.300
11.	Plankton (ml.)	0.1	0.4	0.3

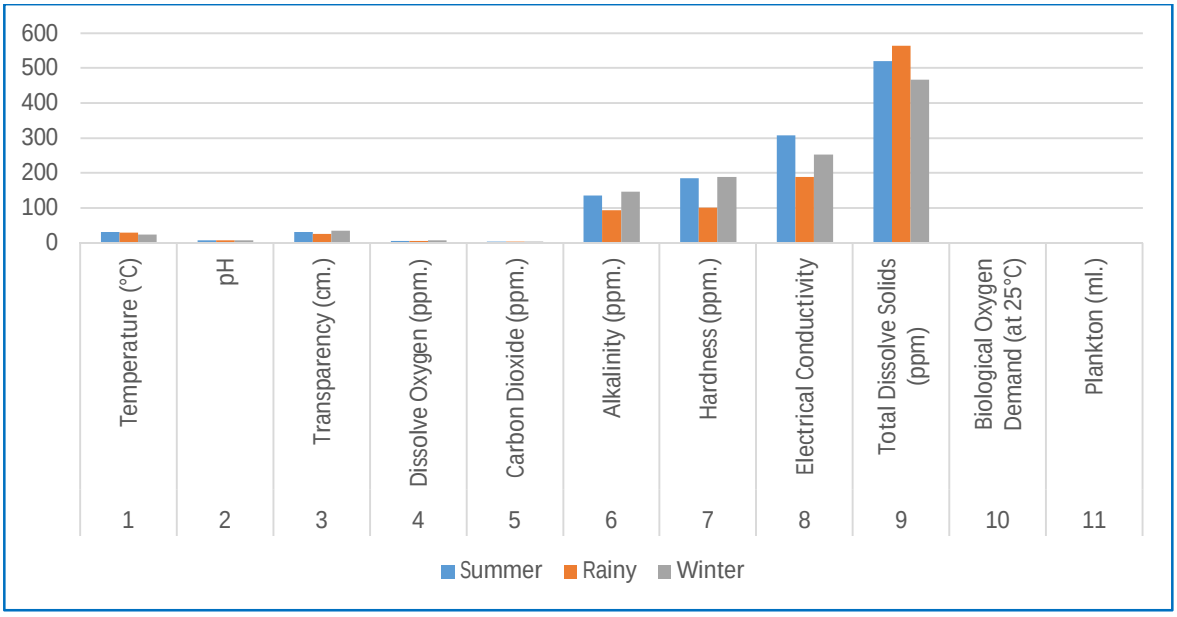

Figure 1: Physico-chemical and Biological Parameters of Pond of Shahdol, Madhya Pradesh.

IV. TEMPERATURE

Temperature is very important role in aquatic environment and considered as an important factor in controlling the functioning of aquatic.

V. pH

pH is a limiting factor and works as an index of general environmental condition. The pH value of the pond showed alkaline trend. The maximum pH value were in the month of April i.e.7.42 and minimum in the month of October i.e. 7.35. It is evident from the data that the pH declines during the rainy season and increases during summer. pH status in the aquatic environment on important chemical parameters which predicts about the suitability for the fish culture. The alkaline pH is suitable for fish culture (Jhingran, 1982). The pH was more in where there is washing of the cloths and less where the cattle waste are disposed, but overall the pH was same and was little alkaline which is most suitable for the fish culture.

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VI. TRANSPARENCY

Water transparency is an important factor that controls the energy relationship at different trophic levels. The results of transparency ranged between 34.85 cm to 26.10 cm, during the study period. It was low during the summer and higher during the winter season. The transparency was lower in the summer season due to high planktonic population, while it was low in the rainy season because of increase in the suspended matter brought in through surface run off. The maximum transparency was recorded in winter season attributed to the sedimentation of suspended matter (Chaurasia and Adoni, 1985). Transparency plays vital role in nutrient transformation and also gives an indication of productivity of the water. The Availability of the plankton influences the transparency of the water. The water was more transparent in the rainy season in comparison to the winter and summer season may be due to poor diluted plankton in the rainy season.

VII. DISSOLVE OXYGEN

Oxygen content is important for direct needs of many organisms and affects the solubility of many nutrients and therefore the periodicity of aquatic ecosystem (Wetzel, 1983), Jhingran (1982) stated that the oxygen contents in tropical water would be low considering their high temperature. The results of the present study showed that highest peak value of dissolved oxygen was recorded during the winter season i.e. 7.78 ppm least in rainy season i.e. 5.68 ppm. The minimum dissolved oxygen has been noticed in summer may be due to excessive temperature which reduces the solubility of oxygen. The higher temperature also increases the decomposition rate and the lowers the oxygen Results of the present study are similar to other workers (Prasad *et al.*, 1985).

VIII. CARBON DIOXIDE

The normal water receive carbon dioxide from various sources i.e. (1) The atmosphere. (2) Respiration of plants and animals. (3) Bacterial decomposition of organic matter. (4) Inflowing ground water. The carbon dioxide bears a correlation with pH. The increase in carbon dioxide decreases pH (acidic). The CO_2 varied from 5.34 to 4.39 ppm. Maximum free CO_2 in was observed in summer season and minimum in the rainy season. The free carbon dioxide concentration depends on the respiration of organism (plants and animals) and photosynthesis rate. In case of more photosynthesis more carbon dioxide will be utilized.

IX. ALKALINITY

Alkalinity is a function of bicarbonate and carbonates. These salts get hydrolyzed in solution and produced hydroxyl ion. It is also used as a measure of productivity of water (Jhingran, 1982; Hulyal and Kaliwal, 2011). Natural water bodies in tropics usually show wide range of fluctuations in their total alkalinity value depending upon the geography and season. In the present study the total alkalinity ranged between 147.3 ppm to 95.0 ppm. It is gradually decreased from July to September and then increased in the month of October. Seasonally highest value was recorded during rainy and lowest during the summer season. Increases in total alkalinity during rainy season were due to input of water and dissolution of calcium carbonate ion in the water column (Padma and Periakali, 1999). The degradation of plants and other organism and organic waste might also be one of the reason for the increase in carbonate and bicarbonate thereby the alkalinity (Jain *et al.* 1997).

X. HARDNESS

Hardness in water is due to salts of Ca^{++} and Mg^{++} mainly in the form of carbonates and sulphates. In the present study the total hardness of water ranged from 140228 ppm seasonally, highest value was recorded during summer and lowest during the rainy season. Similar observations were found by various workers (Kumar, 1995; Naik and Purohit, 1996). Hulyal and Kaliwal (2011) found that higher value in summer and lower in winter season. They attributed is to decreases in water volume and increases in rate of evaporation at high temperature. The water can be categorized according to degree of hardness as soft (0-75 mgl^{-1}) moderately (75-150 mgl^{-1}) hard, (189.3-102.3 mgl^{-1}) and above 300 mgl^{-1}as very hard. On the basis of the observation, the water of the present pond appears to be hard.

XI. ELECTRICAL CONDUCTIVITY

Electrical conductivity of the water depends on the nature and concentration of salts in high ionic concentration, pollution status, trophic levels, some domestic effluents and other organic matter in water (Ahluwalia, 1999). The range of electrical conductivity in the present study was between 308 -190. The values of electrical conductivity showed marked seasonal variation being maximum during rainy and minimum during winter season. Similar results were observed by various workers (Hulyal and Kaliwal, 2011; Ramulu and Benarjee, 2013).

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XII. TOTAL DISSOLVE SOLIDS

Water is a universal solvent and have a large number of salts dissolved in it which largely govern the physico-chemical properties. The maximum value of total dissolved solids was recorded in rainy season 564.5 ppm and minimum were recorded in winter season 467.5 ppm. The high value of TDS during rainy may be due to addition of domestic waste water, garbage and sewage etc. in the natural surface water body.

XIII. BIOLOGICAL OXYGEN DEMAND

BOD is dissolved oxygen required by microorganism for aerobic decomposition of organic matter present in water. BOD has considered as an important parameter in aquatic ecosystem to establish the status of pollution. The observation of present study showed that highest value of BOD value during rainy season 2.825 ppm and lowers during winter season 2.300 ppm. Seasonally, the BOD was highest during late summer /early rainy season. High BOD during late summer / early rainy season may be due to the presence of several microbes in water bodies which accelerate their metabolic activities with the increase in concentration of organic matter in the form of municipal and domestic waste pouring into the pond with run off. It is also stated that the higher values of BOD during rainy was also due to input of organic wastes and enhanced bacterial activity. High temperatures do play an important role by increasing rate of oxidation. The BOD of unpolluted water is less than 1.00 ppm moderately polluted water 2.00-9.00 ppm while heavily polluted water have BOD more than 10.00 ppm. The BOD in different season in the present study indicates pond as moderately polluted.

XIV. PLANKTON

The plankton concentration varied from 0.1 to 0.3 ml/25 *l* of water. It was more in winter season and low in summer season. The concentration is low for commercial fish culture (Jhingran, 1982)

XV. CONCLUSION

Present observation of the different parameters revealed that the physico-chemical and biological parameters are within the permissible limit for fish culture except the concentration of plankton. It may be due to over stocking or more organisms feeding on plankton. It may be recommended that the stocking of the pond should be done on the basis of the natural productivity of the water or supplementary feeding (if possible) to have better production. Our study gives emphasis of involvement and educate the local people for safe disposal of effluents is essential. Our analysis for BOD of the ponds falls under moderately polluted category which should be solved in future for better productivity.

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REFERENCES

[1] Ahluwalia AA. Limnological Study of wetlands under Sardar Sarovar command area. Doctoral diss., Gujarat University, Ahmedabad, 1999.
[2] APHA. Standard Methods for the Examination of water and wastewater. American Public Health Association, Washington D.C, 1998, 1000.
[3] Chaurasia SK, Adoni AD. Zooplankton dynamics in a shallow eutrophic lake. Proc. Nat. Symp. Pure Appl. Limnology Bot. Soc. Sagar. 1985; 32:30-39.
[4] Dwivedi BK, Pandey GC. Physico-chemical factors and algal diversity of two ponds in Faizabad, India. Poll. Res 2002; 21(3):361-370.
[5] Hulyal SB, Kaliwal BB. Seasonal Variations in Physico Chemical Characteristics of Almatti Reservoir of Bijapur district, Karnataka State. Int. J Env Prot. 2011; 1(1):58-67.
[6] Jain CK, Bhatica KKS, Vijay T. Ground water quality in coastal region of Andra pradesh. Indian J Environ Health. 1997; 39(3):182-190.
[7] Jhingran VG. Fish and fisheries of India.2nd Edn., Hindustan Publishing Corporation, India, 1982.
[8] Kannan V, Job SV. Diurnal depth wise and seasonal changes of physicochemical factors in Sathio reservoir. Hydrobiol 1980; 70:103-117.
[9] Kumar A. Observation on the diel variations in abiotic and biotic components of the river Mayurrakshi (Santal Pargana). Bihar. Indian. J Ecol. 1995; 22(1):39-43.
[10] Kashyap, Vinita R. Physico-chemical analysis of various water samples of Rewa district (M.P.) India, International Journal of Applied Research. 2016; 2(1):311-313.
[11] Naik S, Purohit KM. Physico-chemical analysis of some community ponds of Rourkela. I.J.E.P. 1996; 16(9):679684.
[12] Prasad BN, Jaitly YC, Singh Y. Periodicity and interrelationships of physicchemical factors in pond. Proc. Nat. Symp. Pure and Applied Limnology (ed Adoni AD) Bull. Bot. Soc. Sagar. 1985; 32:1-11.
[13] Padma S, Periakali. Physicochemical and geochemical studies in Pulicat Lake, east coast of India, Indian J Mar Sci. 1999; 28:434-437.

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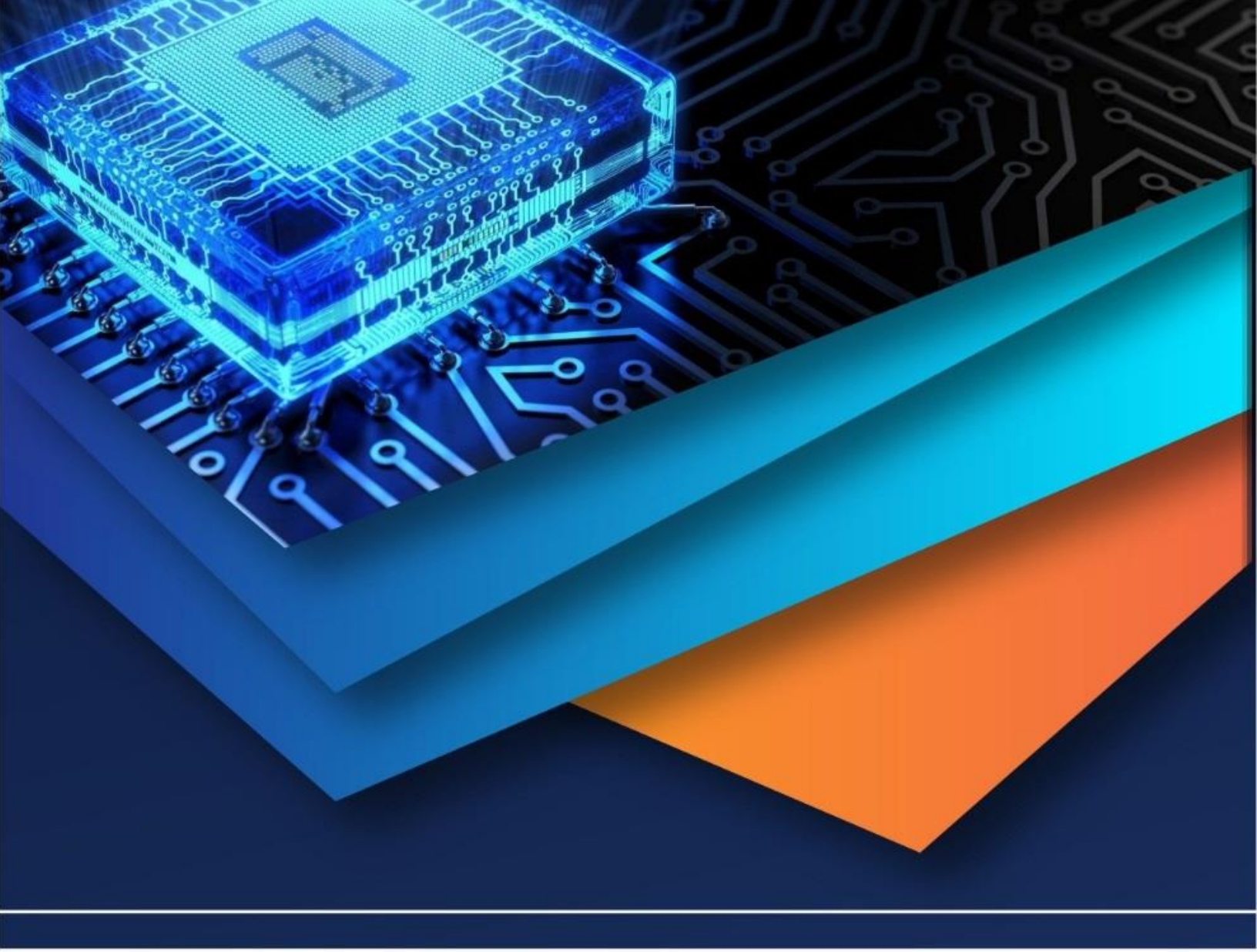

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