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STUDIES ON THE RELATIONSHIP BETWEEN CHEMICAL AND BIOLOGICAL ASPECTS OF A COMMERCIAL FISH FARM

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A study of chemical and biological aspects (dry weight of planktonic biomass) was carried out for a period of one year. The chemical study aimed at determination of carbonates, bicarbonates, chlorides, total alkalinity, total hardness, calcium, magnesium, nitrates and phosphates. Under biological study, the estimation of dry weight of planktonic biomass was made. The data obtained from chemical analysis and estimation of dry weight of planktonic biomass were computerised for studying the correlation between these two factors. The correlation between these two factors was variable. The contribution of chemical factors towards dry weight of planktonic biomass was 64.2%.

INTRODUCTION

The production potential of inland water resources of the Punjab Province has not been exploited fully due to lack of incentives in terms of scientific and/or technical facilities for development. Fish production from these resources is of great significance because it makes substantial contribution to the supplies of low cost but nutritionally high quality animal protein for ever increasing human population. Fish production is closely correlated with the biological production which in turn depends on the ecological and physico-chemical conditions of water body. Vasisht and Jindal (1980) reported that phytoplankton showed a direct relationship with penetration of light, total alkalinity dissolved oxygen and hardness of water.

In view of their great importance, the chemical and biological aspects (dry weight of planktonic biomass) of the water of a pond were studied and the data obtained therefrom were computerised to determine correlatoin between them.

MATERIALS AND METHODS

The studies on chemical and biological aspects of a commercial fish farm were carried out for a period of one year. The biological aspect included the estimation of dry weight of planktonic biomass present in the water samples, while for chemical study, carbonates, bicarbonates, chlorides, total alkalinity, total hardness, calcium and magnesium were determined by using the techniques published by United States Salinity Laboratory Staff (1954). The analysis of nitrates and phosphates was carried out by applying the methodology used by anonymous (1979).

RESULTS AND DISCUSSION

The results of correlation between chemical factors (carbonates, bicarbonates, chlorides, total alkalinity, total hardness, calcium, magnesium, nitrates and phosphates) and dry weight of planktonic biomass were found to be variable (Table 1). The correlation between carbonates, bicarbonates, chlorides, magnesium, phosphates and dry weight of planktonic was non-significant. This, indicated that the above mentioned chemical factors and dry weight of planktonic biomass were independent of each other. This pattern of observation was in agreement with that of Murad (1980) and Gopinathan *et al.* (1918). On the contrary, Khatri (1984), Patil and Gouder (1985) reported a positive correlation between biomass and phosphate. Other chemical factors i.e., total alkalinity, calcium, total hardness and nitrates revealed a significant correlation dry weight of planktonic biomas Jhe results ndicated a definite interdependence ofjchemical parameters and dry weight of biomass. The observationsa ppeared with to support the findings reported by Vasisht and Jindal (1980). The results of regression equation of chemical factors on dry weight of planktonic biomass revealed that percentage coefficient of determination was 64.2, meaning thereby that the contribution of chemical factors towards dry weight of planktonic biomass was 64.2% (Table 2).

aspect of the study was the correlation within chemical parameters A significant correlation within the chemical parameters was Another

Table 1. *Simple correlation between chemical factors and dry weight of biomass*

Variables	Carbonates	Bicarbonates	Chlorides	Total alkalinity	Total hardness	Calcium	Magnesium	Nitrates	Phosphates	Dry weight
Carbonates		0.515*	NS -0.196	NS 0.214	NS 0.136	0.428*	NS -0.382	NS 0.151	NS 0.390	NS 0.317
Bicarbonates			NS 0.396	NS 0.382	NS 0.106	NS -0.044	NS 0.242	NS 0 042	NS -0.034	NS 0.210
Chlorides				* 0.438	NS 0.362	NS -0.024	NS 0.243	NS 0.296	NS 0 126	NS 0.276
Total alkalinity					0.901**	0.711**	NS -0.369	0.885**	NS 0.275	0.650**
Total hardness						** 0.644	NS -0.263	** 0.962	NS -0.025	** 0.601
Calcium							0.839**	** 0.708	NS 0.074	* 0.475
Magnesium								-0,439*	NS -0.071	NS -0.116
Nitrates									* 0.616	* 0.516
phosphates										NS 0.072

Table 2. *Regression equation of chemical factors on dry weight of biomass*

Variables	Regression equation	Standard error	Student 't' value
Corbonates	0.141	0.105	1.345
Bicarbonates	-0.000	0.000	-0.622
Chlorides	0.078	0.130	0.604
Total alkalinity	0.024	0.099	0.242
Total hardness	-0.379	0.420	-0.904
Calcium	1.185	1.154	1.027
Magnesium	1.160	0.770	1.505
Nitrates	-0.000	0.000	-0.228
Phosphates	0.000	0.000	0.725
Intercept =	2.225997		

found between carbonates and bicarbonates, carbonates and calcium, chlorides and total alkalinity and total hardness. total alkalinity andc alcium, total alkalinity and nitrates, total hardness and calcium, total hardness and nitrates, and calcium and magnesium, calcium and nitrates, magnesium and nitrates, nitrates and phosphates.

Chaughtai (1979) observed a direct correlation between total hardness and total alkalinity. Latif (1983 also reported a direct correlation between total hardness and total alkalinity. The findings of these workers agreed with the results of the present study regarding correlation with chemical parameters.

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