ROLE OF INORGANIC PHOSPHATE IN PHYTOPLANKTON CYCLE IN BEEL ECOSYSTEM

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AMONG the chemical factors, and in particular the major nutrients, the importance of phosphorus in lakes is well documented[1,2]. It is often considered to be the most critical single factor in the maintenance of biogeochemical cycles. This importance stems from the fact that phosphorus is essential for the energy transfer system of the cell and that it normally occurs in very small amounts[3]. The total phosphorus in natural waters varies from less than 1 mg/ml to a very high value as in few saline lakes[4]. In aquasystem the dissolved inorganic phosphorus is the form available for algal growth[5]. The present communication deals with the relation of phosphate with total plankton in general and with phytoplankton in particular, in a beel ecosystem. Altogether, 72 samples for plankton and water were collected from Dighali, an ox-bow beel near Guwahati, fortnightly, from three randomly chosen stations. Phosphate was analysed following standard methods[6], and plankton was analysed through direct census method[7]. Figure 1 presents the pooled data on monthly basis.

In the present study phosphates ranged between 0.013 and 0.613 ppm. A gradual increase in the phosphate contents of the beel water was observed during monsoon months and then a sharp fall noticeable from September onwards. An increasing trend was again observed after November, reaching its peak during February. The seasonal variations in the phosphate contents of the beel are largely dependent on the allochthonous sources such as rain from catchment area. Seshappa[8] also observed increase in the inorganic nitrogen and phosphate in pond water during July–August, the causative factors were evidently rain washings.

The phytoplankton and total plankton ranged between 77 and 1740 units/l respectively. In the present investigation the low values of phosphates in certain months were inversely related with the peak periods of phytoplankton, as observed by some workers[9,10]. The lowering phosphate levels with

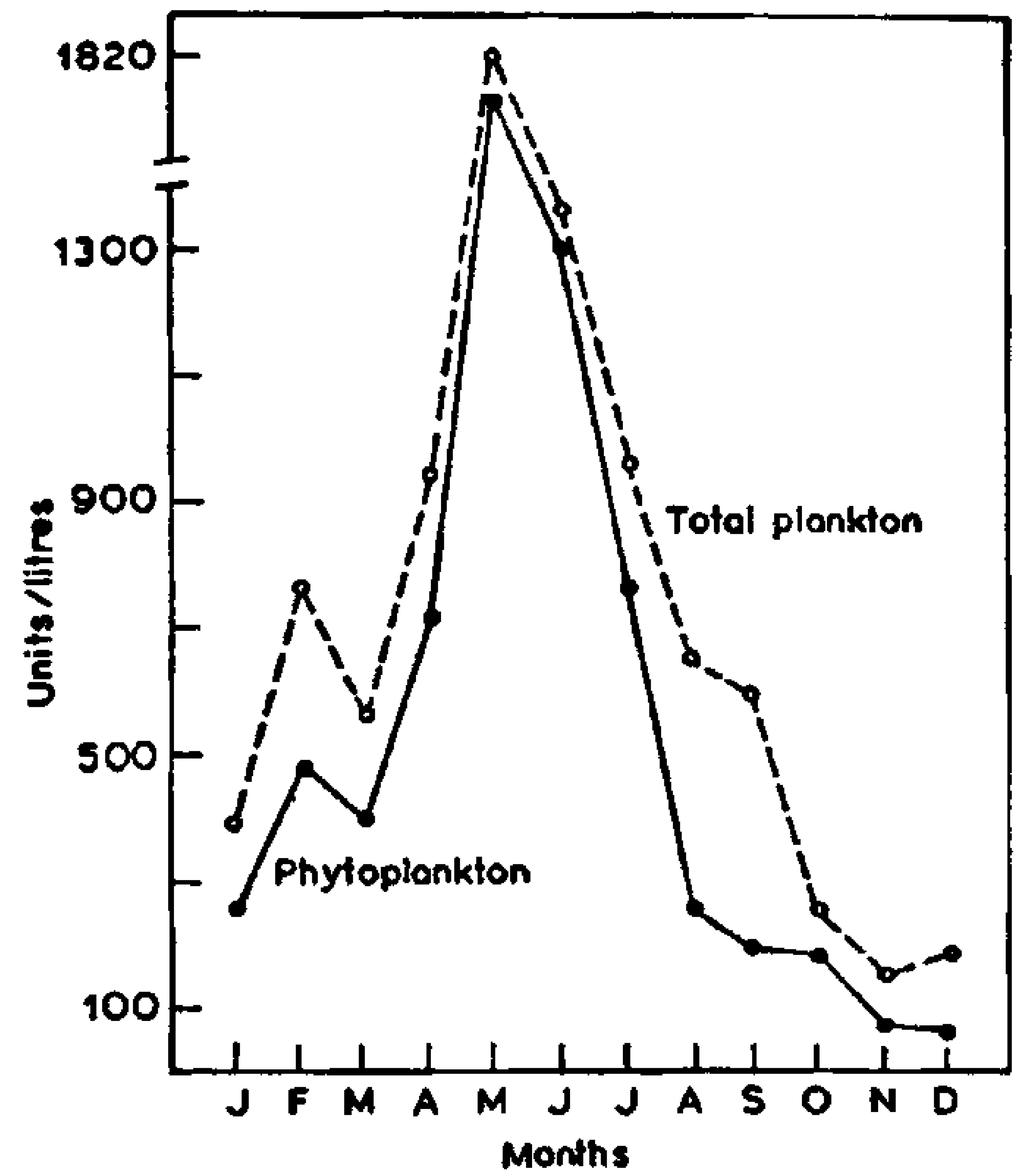

Figure 1. Monthly variations of phytoplankton and total plankton.

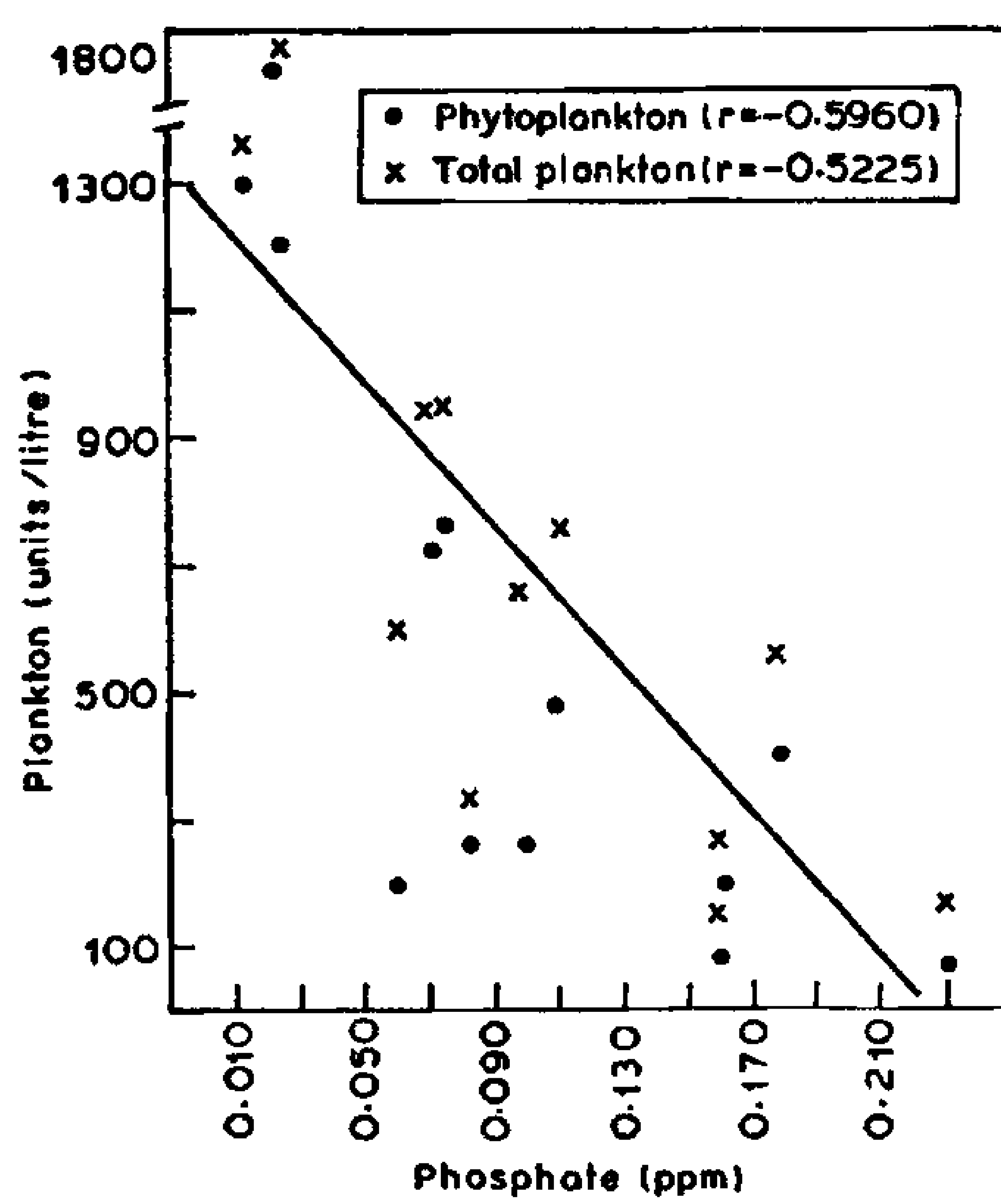

Figure 2. Correlation between phosphate with phytoplankton and total plankton.

higher biomass of autotrophs can be explained when one would assume the utilization of these elements for growth and reproduction by the phytoplankton community. The assumption is further evidenced by the lack of precipitation of phosphates which require higher pH, whereas beel water always remained in an acidic to near neutral range. The correlation between the phosphates and phytoplankton revealed a negative relationship ($r = -0.5960$) whereas with total plankton it was $r = -0.5225$, both of moderate degree, indicating its link in the life cycle of autotrophs (figure 2).

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PRODUCTIVITY AND BIOMASS TURNOVER RATES FOR SERAL GRASSLANDS OF CHERRAPUNJI IN NORTHEASTERN INDIA

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In tropical grasslands, where net primary productivity and litter decomposition rates are higher compared to those in their temperate counterparts, dry matter is recycled faster. Further, in the tropics, vegetation is the chief storage compartment of nutrient elements. Consequently, exchanges between compartments are faster. Turnover rate is a useful measure for comparing the exchange rates between different compartments[1]. Much work on these aspects of temperate grasslands has been carried out[2-5]. However, information for tropical grasslands is limited[6,7].

The secondary successional grasslands (representing an arrested stage during plant succession) at Cherrapunji (25° 15′ N, 91° 45′ E; 1300 m altitude), one of the wettest spots of the world (annual average rainfall of 1040 cm, could be as high as 2460 cm in an exceptional year such as 1974), are derived from the climax evergreen rain forests[8,9]. These grasslands are under stress because they occur under excessive rainfall conditions on highly leached nutrient-deficient soils on limestone formations with karst topography characterized by extensive underground tunnels. They are also subjected to frequent perturbations due to fire. This paper considers turnover rates for the biomass of grasslands that developed under these stress conditions.

Four grassland types were selected: (i) The *Osbeckia* type developed on a well-developed soil (with an average depth of 40 cm) and with dominant species such as *Osbeckia crinta*, *Arundinella bengalensis*, *Chrysopogon gryllus* and *Fimbristylis thomsonii*; this grassland was burnt six years prior to the initiation of this study. (ii) The *Arundinella* type which was similar to the *Osbeckia* type but had an additional burning, one month prior to the initiation of this study; the dominant species are *Arundinella bengalensis*, *Chrysopogon gryllus*, *Carex cruciata* and *Eulalia trispicata*. (iii) The *Ischaemum* type developed on a site subjected to burning at 2-year intervals and with species such as *Ischaemum goeb'i* and *Fimbristylis complanata* as the dominant ones. (iv) The *Eragrostiella* type developed on ill-weathered shallow (average depth of 30 cm) and nutrient-deficient soils