PRELIMINARY STUDIES ON NANNOPLANKTON PRODUCTIVITY

ABSTRACT

The contribution of the nannoplankton to the total productivity was studied for nine months in coastal waters of Cochin. On an average, nannoplankton accounted for 66.40% of the observed productivity. The mean assimilation ratios between the total algal and nannoplankton fraction were very low (1.29 and 0.94 respectively).

The importance of the nannoplankton to the total phytoplankton in marine environments has been well documented by the works of Teixeira (1963), Gilmartin (1964), Malone (1971 *a* & *b*) and McCarthy *et al* (1974). Except for the recent studies on the contribution of microplankton and nannoplankton in the Cochin Backwater (Qasim *et al.*, 1974), no other data pertaining to nannoplankton productivity of the inshore or offshore waters in this area are available. The present communication gives the contribution of nannoplankton in the total algal production of the coastal waters of Cochin.

Water samples from the surface were collected at monthly intervals from September 1972 to June 1973 from a fixed station (Mannacherry). About five litres of water were filtered through No. 25 bolting silk. The water that passed through No. 25 bolting net (representing the nannoplankton fraction) was taken for the measurement of photosynthesis, chlorophyll -*a* content and cell numbers. In addition, unfiltered water sample (representing the total algae) was also taken for the above three measurements. The rate of photosynthesis of the total and nannoplankton fraction was measured by ^{14}C technique. For the measurement of chlorophyll and phytoplankton counts, techniques used earlier were employed (Qasim *et al.*, 1974).

Values of photosynthesis, chlorophyll -*a* and cell counts for both total and nannoplankton have been shown in Figure 1. It is seen that during the first few months of the year (January to March), the contribution of the netplankton photosynthesis was greater, while during the rest of the year (April to December), the contribution of nannoplankton photosynthesis was more than 60% of the total. This indicates that there is seasonal variation in the photosynthesis of nannoplankton. Seasonal variation in the contribution of nannoplankton to the total photosynthesis in an eutrophic temperate lake has been reported by Kalff (1972).

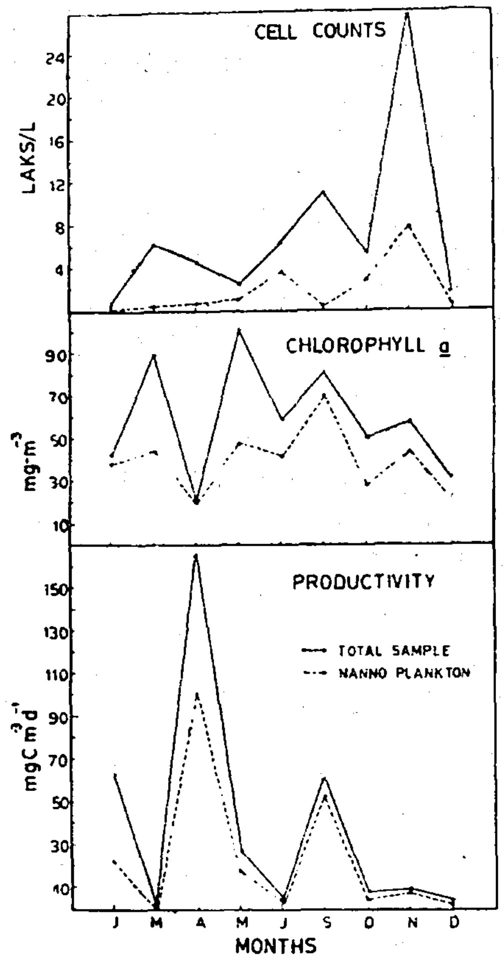

Fig. 1 Seasonal variation in photosynthesis, chlorophyll-*a* content and cell counts.

However, Anderson (1965), Subramanyan and Sharma (1965), Gilmartin (1964), Malone (1971 *a*) and McCarthy *et al* (1974) reported no seasonal cycle in the contribution of nannoplankton to the total photosynthesis.

The trends in the two sets of values of photosynthesis were more or less similar (Fig. 1). The rate of photosynthesis of total algae ranged from 0.93 mgC m^{-3} d^{-1} in March to 167.62 mgC m^{-3} d^{-1} in April and that of nannoplankton fraction was from 0.35 mgC m^{-3} d^{-1} to 107.23 mgC m^{-3} d^{-1}. The maximum value obtained appears to be nearer (100 mgC m^{-3} d^{-1}) to that reported by Ramachandran Nair *et al* (1973) for the coastal waters. High values of chlorophyll -*a* were obtained during March, May and September which were rather independant of similar rises in the rate of photosynthesis. The peak values of photosynthesis both for the total algae and nannoplankton were recorded during the month of April, which was associated with very low levels of chlorophyll. This may probably be due to the presence of detrital or degraded chlorophyll which was physiologically inactive. Such a situation has been reported by Yentsch and Ryther (1959) in Vineyard sound and Qasim *et al* (1974) from Cochin Backwater. In the present study, the cell counts of the nannoplankton fraction was lower than that of the net fraction in most of the months. This is in agreement with the findings of Digby (1953) and Subramanyan and Sharma (1965).

Table 1 gives the range in photosynthesis, chlorophyll-*a* and cell counts of both net and nannofractions to the total. The annual percentage contribution of the nannoplankton to the total photosynthesis was about 66·40%. This is close to the value 74.47 % reported for the Cochin Backwater (Qasim *et al.*, 1974). Steemann-Nielsen and Jensen (1957), Holmes (1958), Malone (1971 *a* & *b*) have shown that 80 to 100% of the total phytoplankton

TABLE 1

Photosynthesis, chlorophyll–a and cell numbers of net and nannoplankton expressed as percent of the two combined.

	Photosyn-thesis	Chloro-phyll –*a*	Cell counts
Netplankton	5.88–64.42	6.18–50.00	42.19–96.02
Nannoplankton	35.58–94.12	50.00–93.82	3.98–57.81

productivity is contributed by nannoplankton.

The assimilation ratio of the total sample ranged from 0.11 to 7.85 (1.29 mean) and that of the nannoplankton 0.01 to 5.35 (0.94 mean). Malone (1971 *a*) obtained a mean nannoplankton assimilation ratio of 9.4 for the inshore waters and 8.3 for the offshore waters. Anderson (1964) reported a range from 1.6 to 9.8. As compared with these values, the assimilation ratio obtained in the present study seems to be very low. According to Curl and Small (1965) a ratio below 3 is indicative of nutrient deficiency, while those above 5 indicates abundance of nutrients. In the present case, while calculating the assimilation ratios, light saturation intensity was not taken into account. This may partly be responsible for the low assimilation values. However, the mean nannoplankton assimilation ratio was almost thrice as great as that of the netplankton ratio. Malone (1971 *a*) reported a mean assimilation ratio of the nannoplankton which was nearly double than that of the netplankton.

The importance of nannoplankton as food for the fish larvae along the West coast of India has been pointed out by Subramanyan and Sharma (1965). Detailed investigations on these lines would provide useful information regarding the possibilities of exploitation of commercially important fishes.

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Central Marine Fisheries Research Institute,
Cochin – 18

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