

## M.S.113. JOSEPH K.J.—Studies on some aspects of Phytoplankton—1989—Dr. P.V. Ramachandran Nair.

The thesis deals with the results of investigations, on various aspects of algal plankton such as size spectrum of some estuarine and neritic species, spatial composition of planktonic algae in the nearshore waters and temporal and spatial ariation of microplankton, chlorophyll and primary production in the Cochin estuary. Besides, the productivity in a polluted ecosystem and growth characteristics of a few cultivated algal species have also been studied.

The study of floristic size spectrum of the estuarine and inshore algal plankton with their specific contribution to the production in terms of cell numbers, chlorophyll and primary food is a useful tool in the estimation of fishery resources. Since the various size fractions of the algal flora forming the food of different varieties of consumers, many of them being selective feeders, the type of fishery can also be assessed provided the selectivity of diet of the concerned consumers are known.

The planktonic algae in a selected site each in Cochin estuary and inshore waters have been isolated by fractional filtration and classified into four size groups ie.  $< 60 \mu$  (SG.1),  $60-75 \mu$  (SG.2)  $76-99 \mu$  (SG.3) and  $> 99 \mu$  (SG.4). The first size group forms the nanoplankton and the remaining size groups form the microplankters. The estuarine nanoplankters form an annual average of 70.7% of the total floristic composition and they contribute 69.5% of the total chlorophyll *a* and 73.0% of the total organic production. In the inshore waters the nanoplankton contribution in terms of chlorophyll *a* and carbon assimilation is 63.0%. The observed nanoplankton contribution in terms of population density of 14.9% is exclusive of picoplankton and hence is infact an under estimation.

Studied the impact of industrial effluents an bio-productivity near the industrial belt at Alwaye in the tributary of Periyar river and adjacent Cochin estuary. In the control site the primary organic productivity is 2113.2 mgC/m<sup>3</sup>/day and at the pollution hit area the primary production is reduced to 10%, the productivity potential cut (PPC) being 90%. PPC shows a gradual decreasing trend in the three down stream stations their values being 80%, 75% and 25% respectively depending on the distance from the source of pollution and consequent degree of dilution of pollutants. In the upstream station beyond the impact site the PPC is 80%. Thus the inhibition of organic production at the primary trophic level is due to the stress of industrial effluents on biota caused by ecophysiological factors.

The cultivated species of *Testraselmis gracilis* showed an increase in growth constant with increase of PO<sub>4</sub> concentration upto 5  $\mu$ g/l but with higher concentration of phosphate the metabolic activities leading to cell synthesis is not accelerated. The effect of four potentially toxic metal viz. Cu, Hg, Zn and Pb on the growth constant and generation time of the blue green alga *Synechocystis salina* has been studied at two different concentrations of each metal. With 0.05 ppm Cu the cells require more doubling time and 0.10 ppm Cu is foundd to be lethal to the alga. While mercury at both 0.05 ppm and 0.1 ppm concentration

is found to inhibit the metabolic processes Pb at both concentrations are found to be lethal to the alga. Zinc is found to prolong the doubling time with the increase of its concentration.

The bioproductivity of Cochin estuarine system at the primary trophic level as a whole being the order of 100,000 tonnes annually, can sustain a rich biota inclusive of several penaeid and non-penaeid prawns and estuarine fishes through an intricate food web and still leave surplus of organic matter for recycling. However the study also reveals that the impact of industrial pollutants can inhibit the bioproductivity in restricted areas.