

Biomass, Organic Carbon & Calorific Content of Zooplankton from the Arabian Sea Off Central West Coast of India

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Organic carbon content and calorific values of zooplankton varied from 18.35 to 32.49% (av. 27.8%) and from 2.56 to 4.71 k cal. g⁻¹ dry wt (av. 3.99) respectively. Areawise off Gujarat sustained higher standing stock of zooplankton (77.18 mg. m⁻³) than off Goa and Maharashtra. Zooplankton production in terms of dry weight and carbon equivalent suggested comparable pattern of distribution.

In marine ecosystem zooplankton plays an important role in the transfer of energy at secondary trophic level. Organic carbon (OC) content and calorific value of zooplankton are reliable indices of the energy equivalent for any season. Even though this aspect for tropical zooplankton has been reported¹⁻⁸, no information is available for the oceanic realm beyond 200 m contour.

During one of the cruises of *R V Sagar Kanya* (Sept. 1983) zooplankton samples were collected from the Arabian Sea along a few transects for estimation of biomass, organic carbon and calorific content for use in the calculation of zooplankton productivity.

Sampling was done from 18 stations (Fig. 1), grouped into 2 sets—one located between 63°-68°E (Zone A) and the other between 68°-72°E (Zone B). Zooplankton samples were collected by vertical hauls from 200 m depth to the surface using Indian Ocean standard net⁹. Immediately after collection the samples were cleaned of debris, washed with distilled water and defrosted at -20°C. On reaching the laboratory a 25% of the sample was kept aside for the evaluation of biomass and major constituents of zooplankton. The remaining samples were immediately dried at 70°C till constant weight. Biomass was estimated in terms of dry weight per m³. OC was estimated by wet oxidation method¹⁰. Calorific values of the zooplankton were calculated from the percentage carbon value of zooplankton¹¹.

Biomass (mg. m⁻³ dry wt) of zooplankton ranged from 10.49 to 125.41 with a mean value of 44.36 (Fig 2a). Zooplankton standing stock was

maximum off Gujarat area. The lowest biomass was observed towards the southern part of the surveyed area. An average value of 58.8 was obtained from Zone A and 21.6 from Zone B. Mean biomass values calculated for off Goa (sts 1-3), Maharashtra (sts 4-10, 17, 18) and Gujarat (sts 11-16) were respectively 20.78, 30.34 and 77.18.

OC content ranged from 18.35 to 32.49% of zooplankton dry wt (mean 27.8%). Higher OC values were observed for Zone A (av. 30.54%) than Zone B (av. 27.07%). Moderate values (25 to 29.9%) were observed covering a major part of the northern part of Zone B (Fig 2b). OC for off Goa, Maharashtra and Gujarat was 27.63, 26.8 and 29.09% respectively. When the biomass values in terms of dry wt were converted to carbon equivalents it fluctuated from 1.92 to 38.51 mg C. m⁻³. Major part of the surveyed area was covered

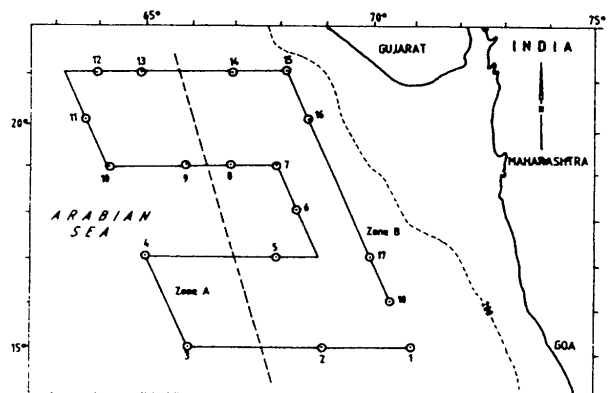


Fig. 1—Station locations

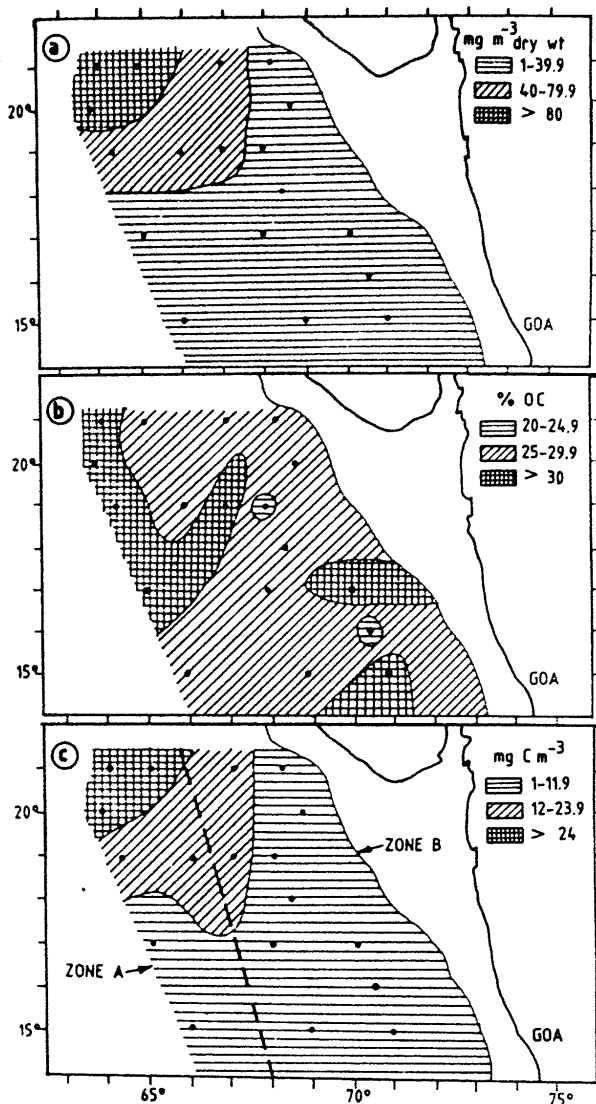


Fig. 2—Biomass of zooplankton (a), percentage of OC (b) and biomass in terms of carbon equivalent (c) at different stations

by the lowest range of carbon values and the trend of distribution was similar (Fig. 2c) to that of biomass (Fig. 2a). An average value of 17.09 and 6 mg C. m^{-3} was recorded for Zone A and Zone B respectively.

Percentage contribution of different groups of zooplankton in the samples was studied to check whether the OC values were related to zooplankton composition. Copepods were the most dominant group in the collection. Its contribution at different stations ranged from 62.5 to 95.89% of the total population. Chaetognaths were the next (1.86-18.06%) followed by decapods (0.66-13.89%), ostracods (0.03-3.3%), gelatinous organisms-medusae (0.08-4.81%), doliolids and salps

(0.04-3.5%). Other groups were < 1% of the total population.

Calorific content (kcal. g^{-1} dry wt) of zooplankton ranged from 2.56 to 4.71 with a mean value of 3.99. Average value of 4.07 and 3.88 was recorded respectively for Zone A and B.

A relatively low value of OC (5.1%) was reported for gelatinous species¹². In general, the recorded average value of OC in the present study was lower than that reported earlier^{1,3,6}. However, calorific value was higher as compared to the previously reported^{2,5,6}. The variation in OC content in zooplankton has been attributed to the composition of zooplankton. A slightly low percentage of OC value (18.35%) has been noticed in samples having gelatinous organisms such as medusae, salps and doliolids. In all the methods of estimation of zooplankton standing stock, Zone A invariably showed higher value than Zone B with marginal difference in calorific value.

Areawise, off Gujarat sustained higher standing stock of zooplankton than off Maharashtra and off Goa. The ratios in terms of biomass (dry wt) and percentage of OC were 1 : 1.46 : 3.71 and 1 : 0.96 : 1.04 respectively for off Goa, Maharashtra and Gujarat. The same ratio at Zone A and B was respectively 1 : 0.37 and 1 : 0.96. As the estimate of zooplankton standing stock is directly correlated to the pelagic fishery potential^{13,14}, the present study would suggest the richness of Zone A in terms of fishery resources.

Expression of zooplankton productivity by carbon equivalent is considered to be a more reliable expression than that given³ in terms of dry wt. But the present study does not support this contention as the pattern of distribution of zooplankton standing stock is comparable when given either in terms of dry wt (Fig. 2a) or carbon equivalent (Fig. 2c). The zooplankton standing stock of Zone A and B was compared in terms of dry wt and carbon equivalent. Zone A was respectively 2.72 and 2.85 times more productive than Zone B. This again supports the limited variation between the 2 types of representation of zooplankton productivity. Evidently, the study suggests that representation of zooplankton standing stock in terms of dry weight is a reliable approach.

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