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Quantitative abundance of amphipods around Andaman-Nicobar Islands

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ABSTRACT

The present study deals with the quantitative distribution and abundance of amphipods of the Andaman Sea in time and space, based on the zooplankton samples collected during the cruises 46- 73 of *FORV Sagar Sampada* during 1988-1990. Mean number of amphipods (no/1000 m^3) reached the maximum of 1763 in January and the minimum of 315 in July. The seasonal density was maximum during the northeast monsoon and minimum for the southwest monsoon and their mean numbers were estimated as 812 and 463/1000 m^3 respectively. In general, they were abundant in the region where the station depths ranged between 50 and 100 m with the mean estimated as 800/1000 m^3 of water. Analysis of day and night samples did not show any remarkable variation. The distribution and abundance of amphipods in relation to time and space are discussed in the paper.

INTRODUCTION

The amphipods enjoy a worldwide distribution and they form an important food item for fishes (Nair,1972). Nair *et al.*(1973) while studying the Amphipoda in the Indian Ocean, have mentioned very little about the abundance of this group in the Andaman Sea. Revikala *et al.*(1990) have made a general study of the amphipods of the Indian EEZ based on random sampling and indicated higher density of amphipods in Andaman Sea also. However, the information about the quantitative abundance of this important group of crustaceans in space and time in the Andaman Sea is less investigated. Hence, an attempt was made to study the distribution and quantitative abundance of amphipods in space and time, around Andaman-Nicobar Islands, making use of the samples collected over a period of two years on board *FORV Sagar Sampada* during cruises 46-73 during 1988-90.

MATERIALS AND METHODS

The material for the study was obtained from the zooplankton collections of *FORV Sagar Sampada* (12 cruises) to the seas around Andaman-Nicobar groups of islands during April 1988 - May 1990. The zooplankton was collected by oblique hauls from an average depth of 150 m to the surface using a Bongo 60 net (mesh aperture 0.50 mm) fitted with a calibrated flow meter. Aliquots of minimum 5 ml of zooplankton were analysed whenever the biomass determined by displacement volume exceeded this quantity. Out of this the average number of amphipods present in 1000 m^3 of water per half a degree square area was estimated.

Studies on latitudewise, depthwise, seasonal, monthly and day and night variations were made. For the requirement of the study, the total area was conveniently divided into 4 latitudes such as: 1) 6°30'N-8°30'N, 2) 8°30'N-10°30'N, 3)10°30'N - 12°30'N and 4)12°30'N - 14°30'N, and the number of specimens obtained in each zone was compared. Studies pertaining to the quantitative distribution of amphipods were done for the depth zones such as < 50m; 51-100m; 101-200m and >200m. The period of study was divided into 3 seasons such as - premonsoon (February-May), southwest monsoon (June-September) and northeast monsoon (October-January) and the numerical abundance during each season was also studied.

RESULTS AND DISCUSSION

Frequency of sampling and geographical distribution - Out of the 249 stations covered, 101 stations were located in the west and 148 in the east of Andaman-Nicobar islands. The frequency of sampling in each half degree square is shown in Fig.1. Of the 249 zooplankton samples, 248 contained amphipod population. The mean number of amphipods for the entire area estimated as 629 per 1000 m^3 of water, which is only 0.70% of the total zooplankton. Jossi (1972) also stated that percentage contribution by numbers of the amphipods to the total zooplankton averaged less than 1% while studying amphipods in the Arabian Sea, Java Sea, and the Indian Ocean. The distribution pattern of amphipods around the island is depicted in Fig.1. Higher concentration was noticed in the northwestern part of north Andaman, near Port Blair, southern and eastern parts of Car Nicobar and southwestern portion of Great Nicobar, where, the population density was between 1001 and 5000 numbers per 1000 m^3 of water. Areas of poor concentration were observed between Little Andamans and Car Nicobar, and between Little Andamans and the main groups of Andaman islands slightly towards the west, where, the density was <100/1000 m^3.

Variations in shelf and oceanic regions - Since the continental shelf area is very narrow, only 55 samples were collected from there and the rest 194 were from the adjacent oceanic region and the average numbers present in the 2 regions were 672 and 622 respectively, showing a slightly higher density in the shelf area (52%) than in oceanic waters (48%). Similar observation was made by Revikala *et al.* (1990) in the EEZ of India and adjoining seas.

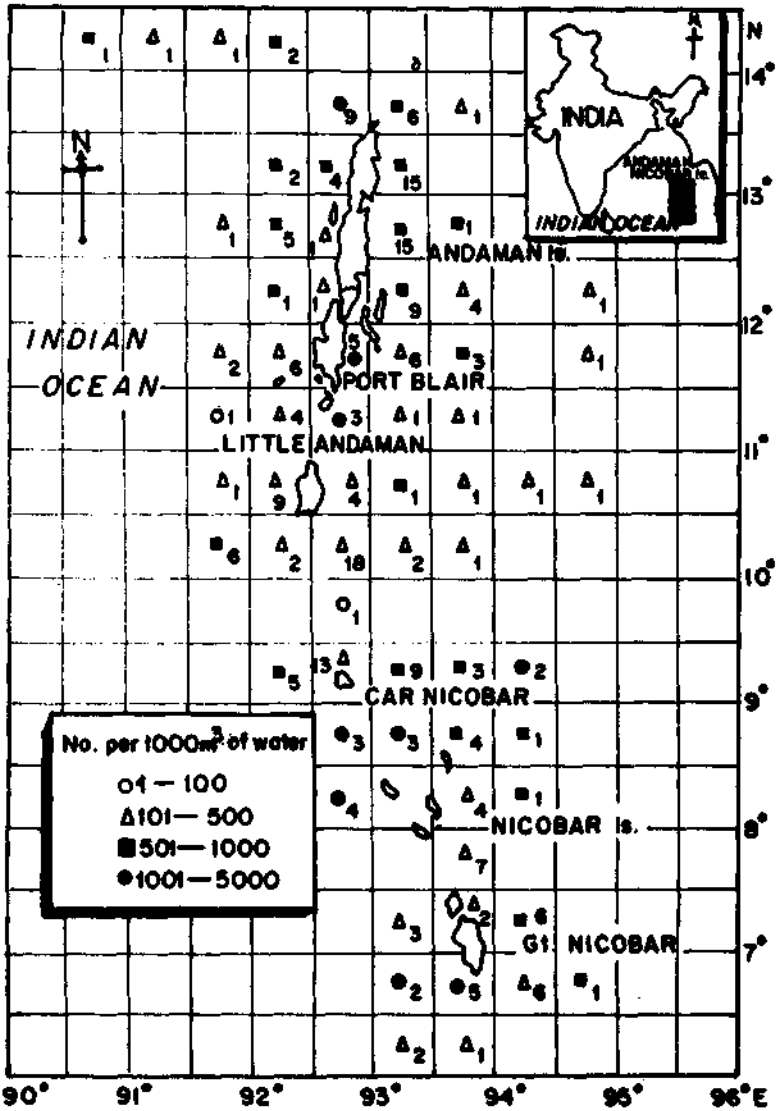

Fig.1 - Sampling frequency (in each half degree square) and geographical distribution of amphipods (no/1000 m^3) around Andaman-Nicobar islands

Latitudewise distribution - There was a gradual increase in the density of amphipod population from south to north i.e. from 6°30'N to 14°30'N except the region between 10°30'N and 12°30'N, where the least concentration was observed(Fig.2). However, the entire area was rich in amphipod population with more than 500 specimens present in each region, with a minimum of 513 in the 3rd region and maximum of 732 in the 4th region. The maximum density of amphipods recorded in

the 4th region i.e. between 12°30'N and 14°30'N can be due to a low saline cold water condition prevailed in these latitudes (Mathew *et al.* 1994).

Seasonal distribution in different latitudinal sectors - The distribution in different latitudinal regions became more clear from the seasonal study in these 4 areas(Fig.3). Compared to other two seasons, the mean numbers were low during the

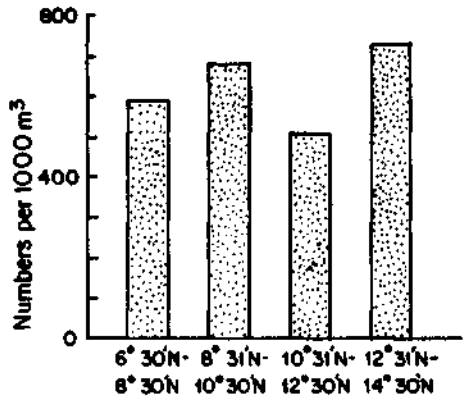

Fig.2 - Regionwise variation in the abundance of amphipods

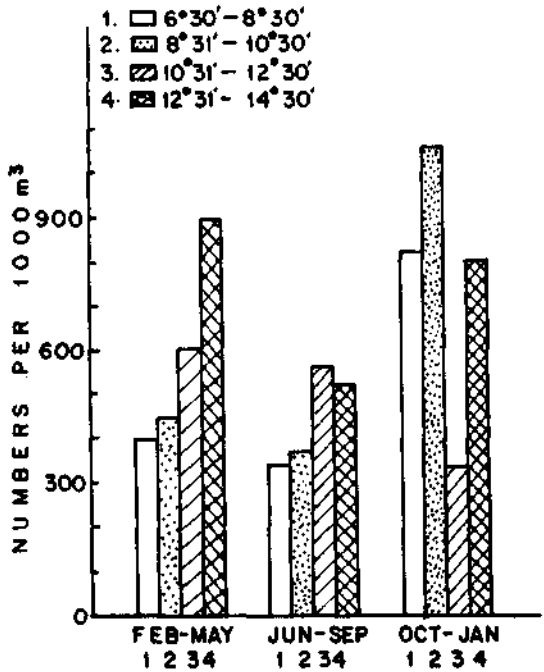

Fig.3 - Seasonal variations in the abundance of amphipods in different latitudinal regions

southwest monsoon season in the 1st, 2nd and 4th latitudinal regions, and the density steadily increased from 1st to 4th region, during premonsoon period. The low value in the 3rd region was distinct during the northeast monsoon season and the concentration was found to decrease gradually from February-May to October-January period in this region. Monthwise studies (Fig.4) revealed that the density was at its peak during January in the region between 6°30'N and 10°30'N while, the peak in the region between 10°30'N and 12°30'N was in November and in the 4th region between latitudes 12°30'N and 14°30'N the maximum concentration was noticed in February. The population density was minimum in the regions 6°30'N-8°30'N and 8°30'N-10°30'N in November and July respectively while during October the numbers were least in the region between 10°30'N and 14°30'N.

Depthwise distribution - The depth at different stations ranged from 40 to 3538 m and to understand the longitudinal distribution of amphipods from the shore the area has been divided into different depth zones and the concentration of amphipods in these zones were studied. They were found to prefer the area having a depth ranged between 51 and 100 m, where the maximum of 800 numbers per 1000 m^3 (35%) of the total population was observed(Fig.5). The least 15% (339 specimens) was noticed

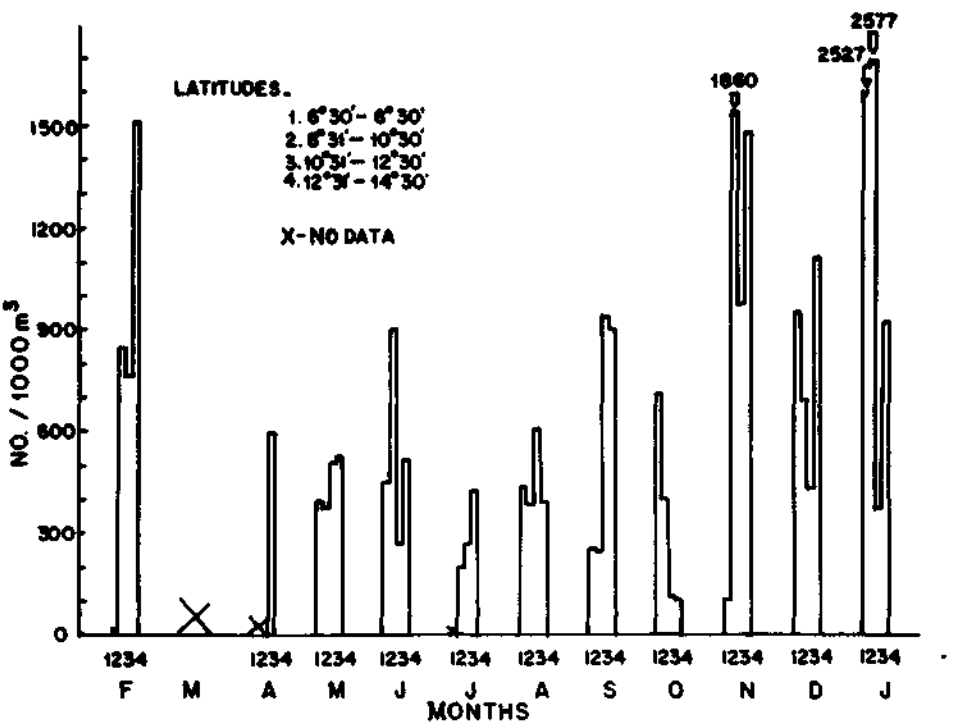

Fig.4 - The monthly variations in the distribution of amphipods in different latitudinal regions

in areas having less than 50 m depth. The density of the population was moderate in areas having more than 100 m depth. Depthwise study will be more meaningful when it is related to different seasons(Fig.6). At the second depth region where the overall maximum density was observed, the highest mean number of 1063 was observed

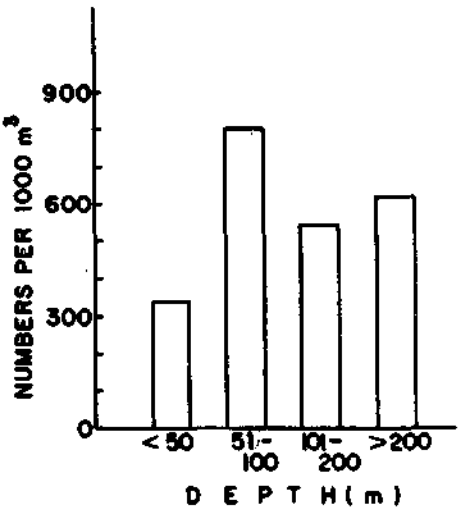

Fig.5 - Distribution of amphipods in areas having different depths

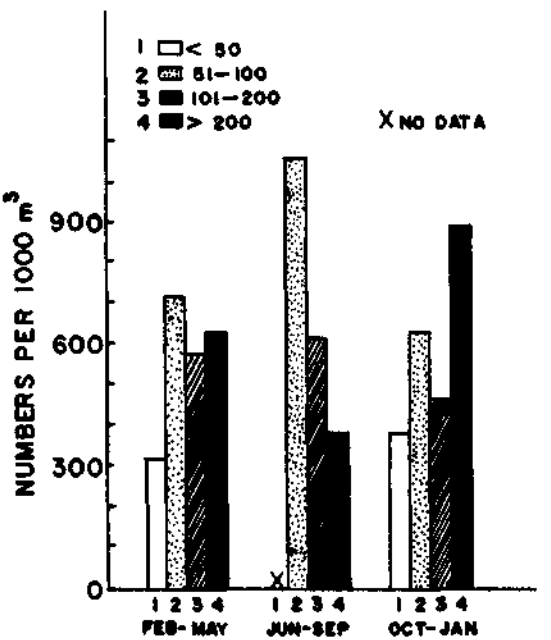

Fig.6 - Seasonwise abundance of amphipods in different depth areas

during the southwest monsoon season and the average numbers decreased as the depth at stations increased in the same season. In the premonsoon period also, the highest concentration was recorded at the 2nd depth region; while during the northeast monsoon, eventhough the mean number was higher at the 2nd depth area, the highest was observed in areas having more than 200 m depth.

Monthly and seasonal variations - Irrespective of depths or latitudes when the monthly variations were worked out it was found that higher concentrations were in February, November, December, and January (Fig.7). Similar to this, Nair *et al.*(1973) recorded high concentration in the Andaman Sea during the period October 16 to April 15. They also noticed a higher abundance of amphipods in areas of upwelling and or land drainage. Again, according to Bhattathiri & Devassy (1981) the primary productivity is at a higher level during January when compared to that of February in Andaman Sea. In the present study also, the highest of amphipods density was recorded during the northeast monsoon season (43%) with the maximum of 1763 numbers in January. Minimum concentration was observed during the southwest monsoon period (24%) with least abundance of 315 numbers in July. In view of the above findings, similar to other reports, combined with the observations during the

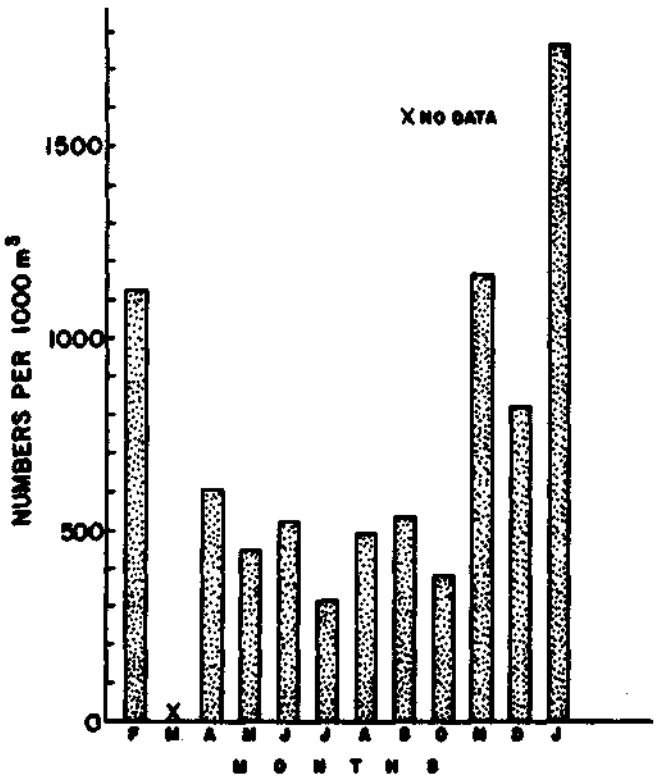

Fig.7 - Monthly abundance of amphipods

present study it may be concluded that there exists a positive relation between abundance of amphipods, and upwelling and primary productivity.

Day and night variations - During the study period, 180 samples collected were during daytime and the rest 69 at night; and their mean numbers were estimated as 640 and 615 respectively indicating slight daytime abundance. Monthly variations in day and night samples is shown in Fig.8. The higher mean numbers at daytime was due to the effect of one day collection which contained very high number of amphipods to the tune of 12276/1000 m^3 in January whereas all other values were below 3500. When a day/night estimate was made excluding this single high value of January, the average number for the day and at night were 575 and 615 respectively showing slightly higher concentration during nighttime. According to Revikala *et al.*(1990) there was not much variation in the concentrations of amphipods collected during day and at nighttime, in the Indian EEZ and adjoining seas. Nair (1977) noticed that one of the amphipods, *Paraphronima crassipes* dominated in the day collections in the Bay of Bengal during northeast monsoon. The day and night variations were found to be associated with months and seasons. It was interesting to note that the occurrence of amphipods remained the same in different months pertaining to the same season but the only exception was in November. The night collections represented more of amphipods during the southwest monsoon, while the reverse was true for the premonsoon and northeast monsoon seasons.

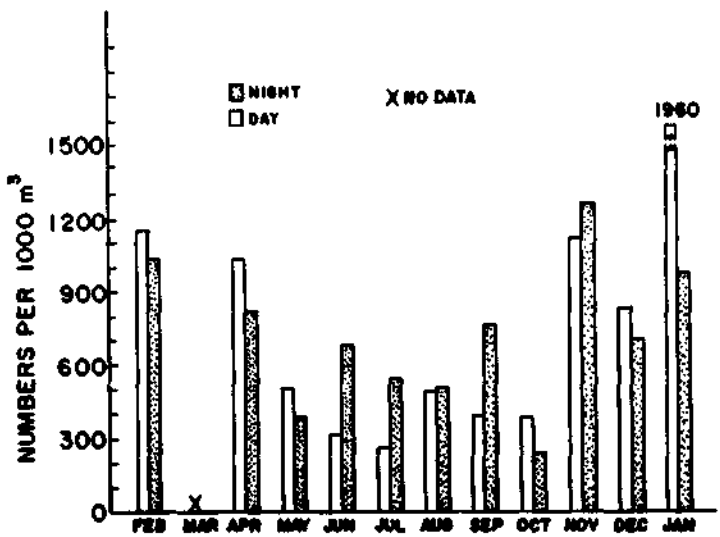

Fig.8 - Monthly day-night variations in the abundance of amphipods

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