

STUDIES ON THE GROWTH OF PENAEID PRAWNS :
II. GROWTH OF *PENAEUS INDICUS* UNDER DIFFERENT LEVELS OF FEEDING

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ABSTRACT

Penaeus indicus was subjected to four different levels of feeding with live earthworm. The growth increments irrespective of the feeding levels did not show any decreasing trend throughout the experimental period. This is probably because the growing prawns were getting more or less constant proportion of food to body-weight although it varied with the frequency of feeding. Even under this condition if the growth pattern of the species was that of von Bertalanffy, the growth increments would have decreased constantly with time.

This study also confirmed the high growth potential of this species of prawn which could well be exploited to produce fast growing individuals. Quality and quantity of food plays a decisive role in penaeid prawns in view of their voracious feeding habit and thus form the main basis for high density prawn culture.

Key-words : Penaeid prawns, growth, feeding levels.

INTRODUCTION

Studies on the dynamics of growth of the commercially important species of prawn in the Cochin backwater was taken up to collect information on their growth useful for large scale culture. Observations on length-weight relation and condition factor on *Metapenaeus dobsoni* and *Penaeus indicus* under different levels of feeding has been published earlier. (Sreekumaran Nair, Krishna Iyer, Lalithambika Devi and Krishnan Kutty, 1982). The present paper deals with growth data of *P. indicus* and its comparison with that of *M. dobsoni*.

MATERIAL AND METHODS

Experimental prawns were collected from tidal ponds in Ramanthurth Island near the Cochin harbour entrance. From the large samples of juveniles collected, the most active ones of the same size were first selected by eye. They were then measured and weighed to make the final selection. In all, 20 specimens each of 32 mm length were selected for the experiment. They were maintained in four tanks, each one in individual containers to make separate growth measurements.

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The prawns in the four tanks, A to D were fed daily 2, 3, 4 and 5 times respectively with live earthworm. Food was supplied in excess each time and they were allowed to feed for one hour, after which the remaining food was removed.

The tanks were well aerated and were provided with a biological filter. Since the salinity in natural conditions when the prawns were caught was 20‰, the same salinity was maintained in the tanks by making frequent dilutions with distilled water to compensate the increase in salinity caused by evaporation.

Further details have been given in the earlier paper (Sreekumaran Nair, Krishna Iyer, Lalithambika Devi and Krishnan Kutty, 1982).

RESULTS AND DISCUSSION

General considerations

The growth in length and weight of *P. indicus* under different levels of feeding are given in Figs. 1 & 2 and the average fortnightly growth increment in Table I. While the growth in weight was exponential, the growth in length was

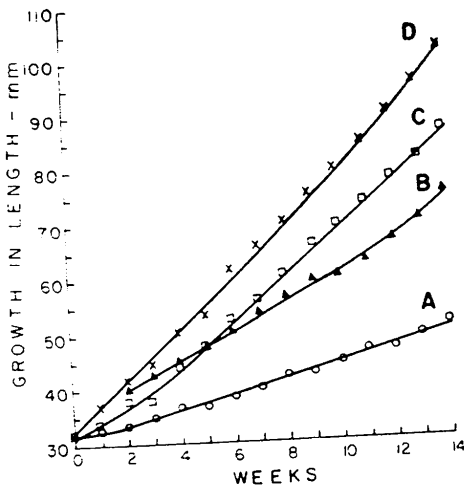


Fig. 1

Fig. 1. Growth in length of *P. indicus* under different levels of feeding in tanks A, B, C and D.

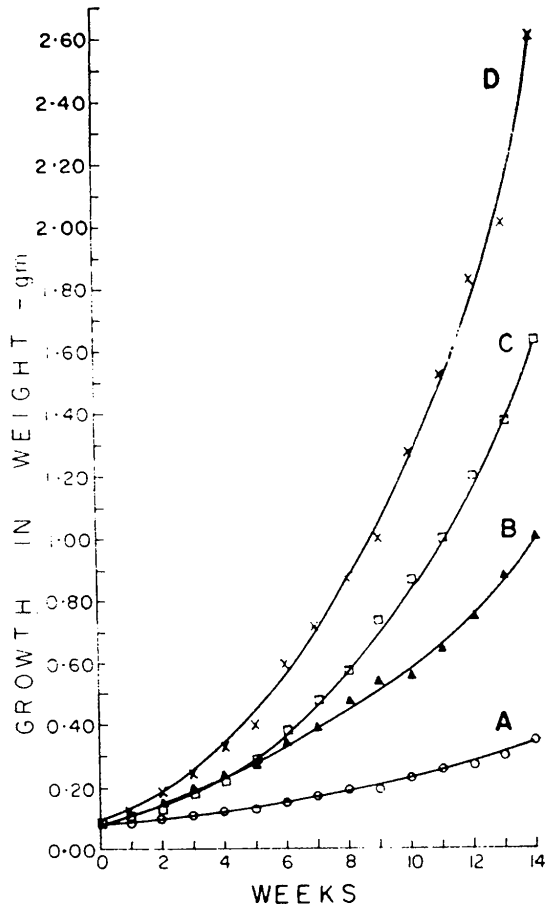


Fig. 2

Fig. 2. Growth in weight of *P. indicus* under different levels of feeding in tanks A, B, C and D.

nearly linear. Average fortnightly growth increments in Table I showed some scatter but they were found to increase with the feeding level. No decreasing trend in growth increments was noticed in any of the tanks during the experimental period of 14 weeks. The data were even suggestive of a mild increase in the increments with time even in the tanks fed twice or thrice a day.

George (1975) reported mean monthly growth of about 15 mm in the Cochin backwater and pointed out that the earlier estimates were much low. George (1974) however reported specimens as large as 165 mm in the backwater which indicate a faster growth rate at least in certain areas. Aravindakshan, Paulinose, Balasubramanian, Gopala Menon and Krishnan Kutty (1982) and Paulinose, Balasubramanian, Aravindakshan, Gopala Menon and Krishnan Kutty (1981) observed a growth rate of 28-30 mm in the first month of their experimental studies conducted in cages in the Cochin backwater. Suseelan (1975a & b) observed growth rates higher than 30 mm per month in Manakkudy estuary near Cape Comorin with a maximum growth rate of 37.5 mm. Growth rate of *P. indicus* in favourable conditions can thus be quite high and the present experiment has also shown that it can be maintained at a higher level for a few months. Sreekumaran Nair, Krishna Iyer, Lalithambika Devi and Krishnan Kutty (1982) pointed out that when *P. indicus* and *M. dobsoni* were fed on live earthworm alone, the condition factor was quite low even of prawns fed 4 to 5 times a day.

Penaeus indicus thus appears to have a high growth potential which could well be exploited by ensuring adequate supply of natural food especially since these prawns are voracious feeders as shown by Balasubramanian, Lalithambika Devi and Krishnan Kutty (1979) and Lalithambika Devi, Balasubramanian, Krishna Iyer and Krishnan Kutty (1980). Frequency of feeding, rather than the abundance of food, independent of its quality also plays an important role in controlling the growth of penaeid prawns. Lalithambika Devi, Chandrasekharan Nair, Balasubramanian, Gopalakrishnan, Aravindakshan and Krishnan Kutty (1981) showed that in nature the condition factor is much higher indicating a more balanced diet while the high growth rate whenever recorded in natural conditions was also an indication of adequate supply of food. From these biological considerations and experimental findings, one important factor to be looked into regarding the culture of penaeid prawns is the quality and quantity of food available to the growing juveniles.

Table I. Average fortnightly growth increment (mm) of *Penaeus indicus* under different levels of feeding

Experimental Tank	Fortnight						
	1	2	3	4	5	6	7
A	1.30	3.10	2.10	3.54	2.44	2.38	4.38
B	—	4.90	5.54	6.16	3.16	6.66	8.38
C	6.14	6.22	8.16	8.04	9.14	8.48	8.42
D	9.54	8.78	11.20	8.52	9.48	7.30	14.40

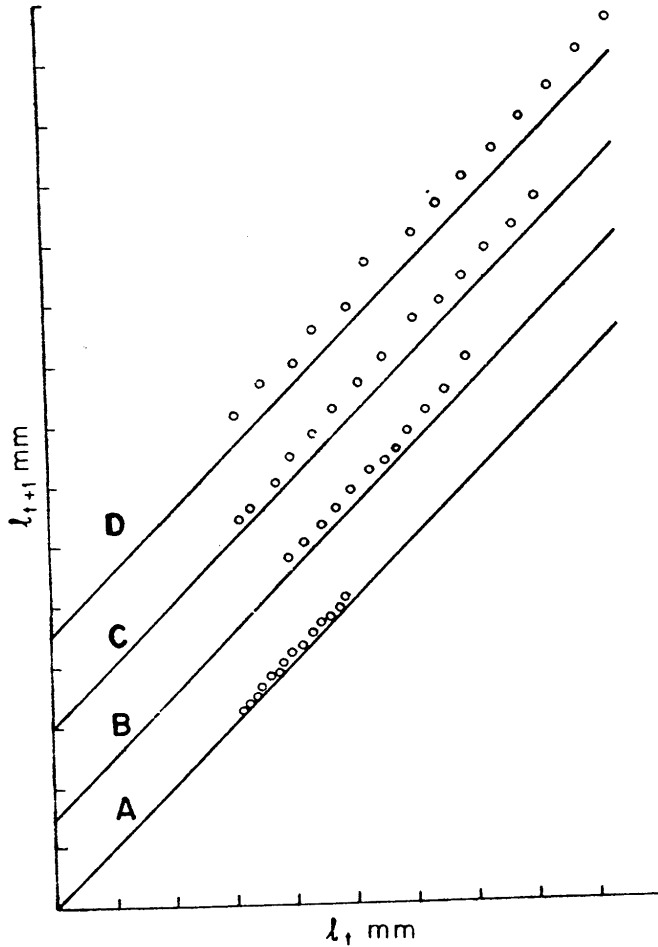


Fig. 3. Walford plot of the growth data of *P. indicus* obtained in tanks A, B, C and D under different levels of feeding.

Growth pattern: von Bertalanffy plot of the length data of *P. indicus* is given in Fig. 3. The points lie parallel to the 45° line instead of converging to it which clearly indicates that the growth pattern is not described by the Bertalanffy equation. The values of the slopes of the fitted lines ranged between 1.01 and 1.04. Since the length data were collected at weekly intervals Diaz's (1963) method of fitting the Bertalanffy equation was also tried. The Bertalanffy equation in this differential form as applied by Diaz is

$$dl/dt = k(L_{\infty} - l)$$

where k is the rate of attaining the asymptotic length (L_{∞}) and l is the length at time t . The fitted equations for prawns in the different tanks (A to D) in order are :

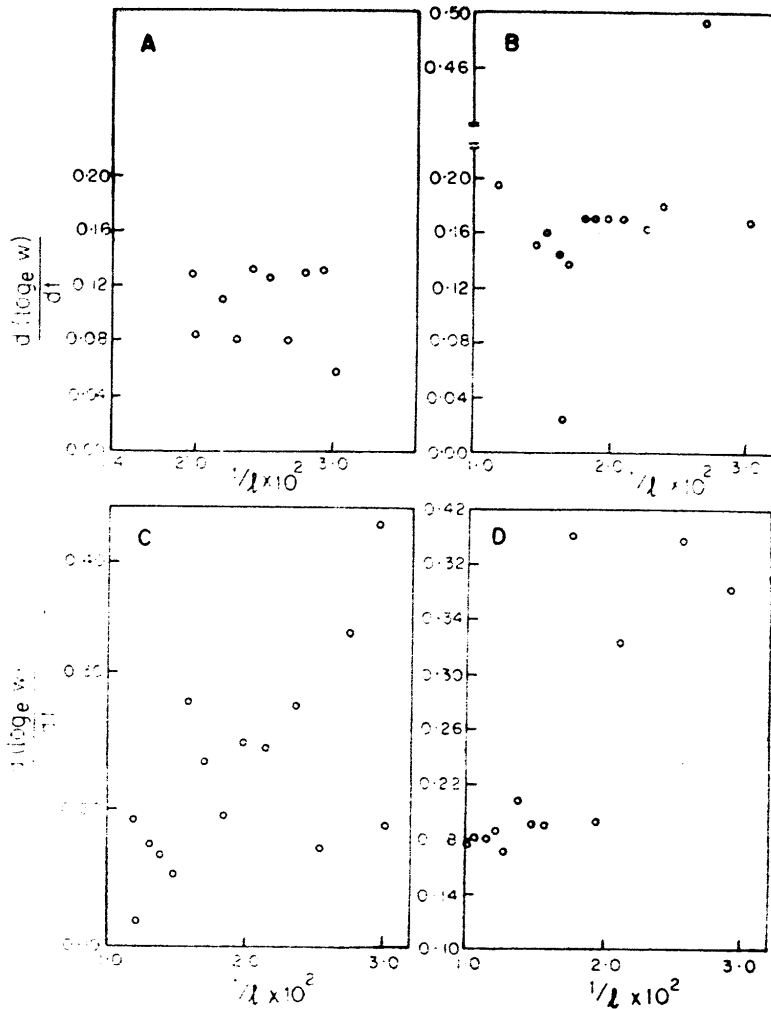


Fig. 4. Instantaneous growth rate of *P. indicus* plotted against $1/l$ for the different levels of feeding in tanks A, B, C and D.

$$\Delta l / \Delta t = 3.55 + 0.054 l$$

$$\Delta l / \Delta t = 5.84 + 0.052 l$$

$$\Delta l / \Delta t = 5.56 + 0.029 l \text{ and}$$

$$\Delta l / \Delta t = 11.85 + 0.106 l$$

The values of the slopes were all positive as also observed for *M. dobsoni*. Bayley's (1977) equation, when fitted to the data (Fig. 4) showed high scatter of points and little linearity which again substantiates the above conclusion that the growth pattern of *P. indicus* is not described by the Bertalanffy equation. It appears from these studies that the growth of penaeid prawns in general may be more complex and as generalised by Kurata (1962) for crustaceans as a whole, may involve one or two inflection points. Further studies on the growth pattern of these two species based on the available experimental data are in progress.

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