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OBSERVATIONS ON THE GROWTH OF *METAPENAEUS DOBSONI* (MIERS) IN THE POLYETHYLENE FILM-LINED PONDS AT CALICUT BEACH

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ABSTRACT

The growth of *Metapenaeus dobsoni* in the polyethylene film-lined ponds is studied and growth parameters estimated. In the first two months the prawn attained a size of about 64 mm and in the next five months it added only 14 mm to its size, reaching a size of 78 mm by seven months.

INTRODUCTION

The availability of suitable species in the locality at the appropriate time is an important factor for success in commercial prawn culture. It is reported that *Metapenaeus dobsoni* breed in shallow waters within about 20 m depth (Suseelan, 1983). The availability of eggs and larvae of this species at the surface and near the bottom from places ranging in depth from 2 to 13 fathoms have been reported by Menon (1951). During the course of mariculture experiments conducted at Calicut the presence of plenty of *M. dobsoni* in the culture ponds were observed during the years 1983 and '84. So regular observations were made on the growth of this species and the results are presented here.

MATERIAL AND METHODS

Eggs of *M. dobsoni* which got accidently pumped into the culture ponds while pumping sea water for the routine fish and prawn culture experiments were utilised as the study material. The ponds were prepared as described by Lazarus and Nandakumaran (1987). Sea water was pumped from the sea at a distance of 60 m from the surf at a depth of about 1 m during May and June, 1983 and June, 1984 by using a 5HP diesel pump. A nylon conical net with 1.5 mm mesh size fitted to an aluminium frame was kept at the delivery end of the pipe so as to filter the sea water. Pumping was done mainly during day time from 0900- 1700 hrs. In order to compensate for the water loss due to evaporation and to maintain the salinity, fresh water was pumped from a well by a 5 HP electrical pump. Due to practical difficulties exact number of eggs pumped into the ponds could not be estimated. However, attempts were made to estimate the number of prawns present in the ponds when they reached about 60 mm size by operating a cast net following the random sampling method and the number thus obtained is given in Table 1 along with other details. Observations, mainly on the growth of *M. dobsoni* were made in two ponds (A and B) in the year 1983 and three ponds (C-E) in the year 1984. No special attempts were made to study the survival

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TABLE - 1. *Details about M. dobsoni present in the different ponds and the environmental data collected during the period of observation*

Particulars	Ponds				
	A	B	C	D	E
Area of the pond (m^2)	1,000	135	750	135	300
Companion species and its stocking density (no/m^2) in parenthesis	*C. chanos* (1.0)	*P. indicus* (10.0)	*M. cephalus* (0.5)	*C. chanos* (0.5)	*M. cephalus* (1.0)
Date of pumping sea water	4-6-83	21-5-83	2-6-84	7-6-84	2-6-84
First measurement on	25-7-83	25-7-83	1-10-84	5-9-84	1-10-84
Mean length (mm) at first measurement	63.7	66.7	73.8	71.6	74..3
Mean weight (g) at first measurement	1.5	2.0	2.8	2.5	2.9
Mean length (mm) at final measurement	79.3	76.7	78.1	76.5	78.8
Mean weight (g) at final measurement	3.4	3.4	3.6	3.2	3.7
Date of taking final measurement	12-12-83	30-9-83	15-12-84	5-12-84	15-12-84
Period from date of pumping sea water to first measurement (days)	51	65	121	90	121
Period from first measurement to final measurement days	140	67	75	91	75
Estimated number in the ponds	20,000	2,025	15,600	1,750	7,500
Temperature (range in° C)	31.0-32.5	30.0-31.0	30.0-31.5	30.0-31.5	30.5-31.5
Salinity (range in ppt)	9.1-30.0	7.1-26.5	14.1-30.5	16.2-26.9	19.3-30.0
Oxygen (range in ml/l)	2.8-4.4	3.7-4.3	3.8-4.5	3.1-4.6	3.8-4.5
pH (range)	8.3-8.7	8.3-8.5	8.3-8.7	8.3-8.8	8.4-8.7

and production of *M. dobsoni* in this study since the main aims of the experiments were to study the growth, survival and production of other forms like *Chanos chanos, Mugil cephalus* and *Penaeus indicus* in this culture system.

Sample measurements on the growing stock could be taken from around the second month of storing water in ponds A and B, third month in pond D and fourth month in ponds C and E. From then onwards measurements were taken once in a fortnight by operating cast net. About 100 prawns were measured per sampling day irrespective of their sexes. In order to study the age of prawns, the day of storing water in the ponds

was taken as 0 age and that point was connected to the rest of the growth modes. Environmental parameters such as temperature, salinity, oxygen and PH were monitored regularly and the values recorded are given in Fig. 1. An artificial feed in the dough form made out of groundnut oil cake (30%), tapioca waste (30%), prawn head powder (25%) and rice bran (15%) was supplied to the ponds considering the number of fish/prawns stocked. No special attempt was made to feed *M. dobsoni* separately.

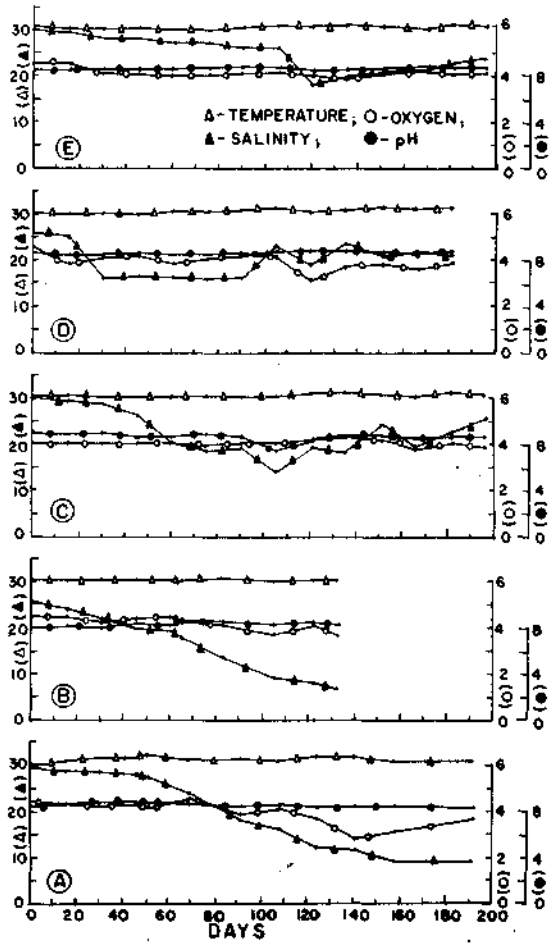

FIG. 1. Environmental parameter values recorded in the ponds.

To compare the growth parameters of *M. dobsoni* in the wild with the present culture system, the Bertalanffy's equation was worked out based on the average size of prawns in different ponds during different months. For this purpose the mean size of prawns in different ponds during different months were pooled and the averages were used.

Environmental characters of the culture system

The overall temperature range in the ponds was from 30.0 to 32.5°C (Table-I). The maximum was found in pond A at the end of July and the minimum in ponds B,C and D in May and June. However, the temperature was at 30.0°C in ponds, A, B and C, 30.5°C in pond D and 31.5°C in pond E on the day of pumping water into the ponds. Salinity range was very high in the ponds due to rain which started soon after storing sea water in the ponds. It was 30.0 ppt in ponds A and E, 26.5 ppt in pond B, 30.5 ppt in Pond C and 26.9 ppt in pond D. By July/August the values started declining and reached the lowest values by December in ponds A (9.1 ppt) and B (7.1 ppt). But in ponds C, D and E almost a steady salinity was maintained up to the end; the lowest being 14.1 ppt for pond C, 16.2 ppt for pond D and 19.3 ppt for pond E. Oxygen values showed a range of 2.8-4.6 ml/l in general. The lowest value was recorded in pond A in the month of October and the highest in pond D in the month of June. Like temperature and oxygen the P^H also had a very narrow range and it varied from 8.3 to 8.8. The lowest value was same for all the ponds except pond E in which it was 8.4. The highest value was observed in pond D (8.8) and it was 8.7 in pond A, C and E and 8.5 in pond B.

Growth

The mean sizes of *M. dobsoni* in differ-

ent ponds in different months are given in Fig. 2. From the figure it can be seen that there is no appreciable difference in the rate of growth of *M. dobsoni* in different ponds except pond B in which a slightly faster growth rate is observed. In this pond *M. dobsoni* was reared along with *Penaeus indicus* whereas in all the other ponds it was reared along with fish, either *C. chanos* or *M. cephalus*. The mean sizes during different months in different ponds are pooled to obtain a common growth pattern and to estimate growth parameters of Bertalanffy's growth equation.

The estimated growth parameters are given below:-

L_∞ = 82.3154 mm

K = 0.28887

t_o = -3.1 months

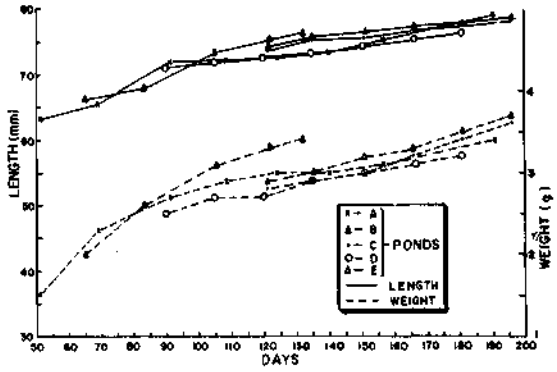

Fig. 2. Growth of *M. dobsoni* in the different ponds.

The growth curve is given in Fig. 3. The observed mean sizes in different ponds are also plotted. It can be seen that a perfect fit is obtained. The large value of t_o indicates a comparatively faster growth rate during the first month which is not explained by Bertalanffy equation.

In the first two months it attains a size of about 64 mm. In the next five months it

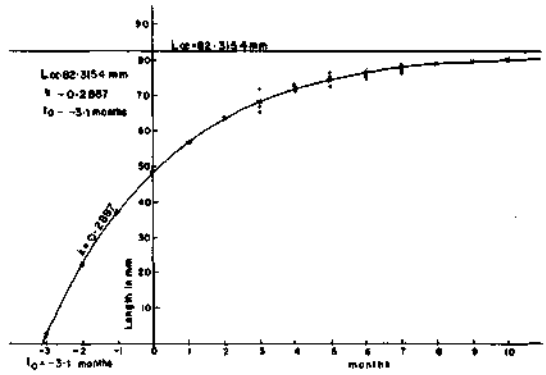

Fig. 3. Fitted growth curve plotted against the observed mean sizes in the different ponds.

adds only 14 mm to its size reaching a size of 78 mm by seven months.

Discussion

According to Muthu *et al.*, (1981) *M. dobsoni* recruited into the marine fishery at a modal size of about 61-65 mm (George, 1961) is only four months old at the time of recruitment. They came to the above conclusion because the 38 days old prawns measuring 10 mm at the time of stocking in culture ponds had attained a size of 63 mm in 3 months. But in the present study the prawns had taken only 60 to 124 days to reach a size of 63 to 74 mm. In other words, the above modal size (61-65 mm) is reached around 60 to 65 days as per the growth observed in ponds A and B.

The growth of *M. dobsoni* in this culture system is very fast upto about 50 to 65 days when they reach about 65 mm size. Afterwards only a slow progression was noticed. According to George (1969) this species spends its juvenile stages in the estuaries and backwaters along the coast line and the adults in inshore areas upto 20 fathoms depth with muddy bottom. The minimum period of stay in the backwater and the size when *M. dobsoni* leaves this ecosystem are estimated by

Mohamed and Rao (1971) as 5 months and 50 mm respectively. That means these prawns want to go back to their marine environment after reaching a certain size to continue their life cycle. These authors believe that *M. dobsoni* undertakes a sea-ward migration from the estuaries when it reaches the minimum size at maturity; which according to Rao (1968) is 64.1 mm. The poor growth rate observed for *M. dobsoni* after reaching 64 mm size in this culture systems which is mostly brackish, lend support to this view.

According to the present observation *M. dobsoni* reaches 64 mm in two months in this culture system. So perhaps the estuarine phase may be shorter than that observed by Mohamed and Rao (1971). And the further growth takes place in the marine environment. Hence the growth rate observed in the pond after two months may be comparatively lower and this has resulted in the lower $L\infty$ value (82.3154 mm) since Banerji and George (1967) have observed that the species reach a size of about 95 mm at the end of the year and about 115 mm at the end of second year of its life.

The faster growth rate observed for *M. dobsoni* in pond B may be attributed to the companion species it had in the pond as well as the availability of more food when compared to the other ponds. In pond B it was reared along with prawn, *P. indicus*. In all other ponds it was reared with fish, either *C. chanos or M. cephalus*. Fishes have the tendency to consume the feed more quickly than prawns. Since no special attention was paid to feed the prawns seperately the prawns would have got only insufficient quantity of feed which has been left over by the fishes. In pond B, since *M. dobsoni* was living with prawn, *P.indicus*, it would have got an equal share of feed. However, more trails on these lines are necessary to explain the reason for this faster growth rate convincingly.

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