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AGE AND GROWTH IN *PENAEUS MONODON* FABRICIUS OF PORTO NOVO COAST

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ABSTRACT

Length frequency distribution was not helpful in tracing the growth of this species. Months mode curves revealed 4 broods in an year. Based on these, it was traced that females can grow upto 185 and 265 mm and males upto 155 and 237 mm in the I and II years respectively. Growth assessed by probability plot was found to be 120,199, 273 and 296 mm for females and 120, 176, 224 and 253 mm for males in the 0, I, II and III year of life respectively. Employing von Bertalanffy's growth equation it was found that females can grow upto 118.79, 198.42, 262.13 and 287.56 mm and males 113.37, 173.04, 217.35 and 250.15 mm respectively in the 0, I, II and III year. The asymptotic length calculated by Ford-Walford method was 360 mm in females and 338 mm in males.

INTRODUCTION

THE TIGER PRAWN *Penaeus monodon* ranks foremost in importance. Information on the age and growth of this organism is important in understanding the nature of stock and the role played by various year classes in the fishery constituted by this animal, the conditions under which optimum growth is possible and the influence of various environmental factors on growth. It also forms the basis for calculations leading to our knowledge on mortality, survival rate, recruitment and dynamics of the population. It also helps to know about the effects of environmental parameters through comparison of the rates of growth in different bodies of water. The results of such studies go a long way in proper management of the fishery. Therefore in the present study age and growth of this most commercially important organism occurring in Porto Novo waters were undertaken.

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MATERIAL AND METHODS

Specimens were collected from the local fish landing centre where the catches from the local waters are auctioned. The total length of the animal was measured and used in the analysis. The two sexes were dealt with separately. Monthly length measurements were classified into different size groups with a class interval of 10 mm and the percentage frequencies have been calculated separately for males and females. Age evaluation was done by length frequency analysis (Petersen, 1891), months mode curve (Devaraj, 1977) and probability technique (Harding, 1949 ; Cassie, 1954 ; Ricker, 1968) and growth evaluation by von Bertalanffy's growth equation (von Bertalanffy, 1957) and Ford—Walford graph (Ford, 1933 ; Walford, 1946).

RESULTS

Length frequency method

The size frequency histogram of both the sexes for the period August 1973-July 1974 is given in Fig. 1. Due to extended breeding habit of this species a number of modes were seen. Among these the earliest modes at size attained by females was 185 and 265 mm and males 155 and 237 mm respectively in the I and II years.

Probability plot

By using this method (Fig. 3 a, b) the life span of *P. monodon* was found to be 3 years. The females were found to attain a size of

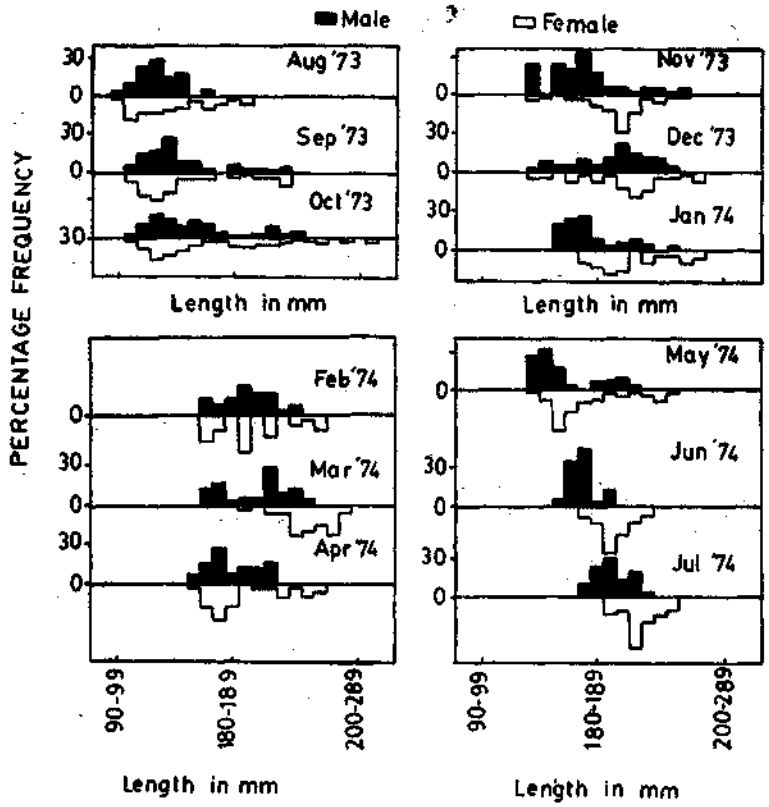

FIG. 1. Length frequency histogram of *Penaeus monodon* (Females and males).

100-109 mm for females and 120-129 mm for males in August, shifted to 200-209 mm and 190-199 mm in December indicating a growth of 100 mm and 70 mm in four months respectively for both the sexes. Further modes could not however be traced.

Months mode curve

As per the findings of this method, there were 4 broods in an year (Fig. 2 a-d). The 120 mm in 0 year, 199 mm in I year, 273 mm in II year and 296 mm in III year. The males reached a size of 120, 176, 224 and 253 mm respectively in 0, I, II and III year of life.

von Bertalanffy's growth equation

The equations arrived at for both the sexes are given below :

Females $-Lt=360.31\ (1-e^{-.4466\ (t+0.8439)}$

Males $-Lt=343.85\ (1-e^{-.3859\ (t+1.5872)}$

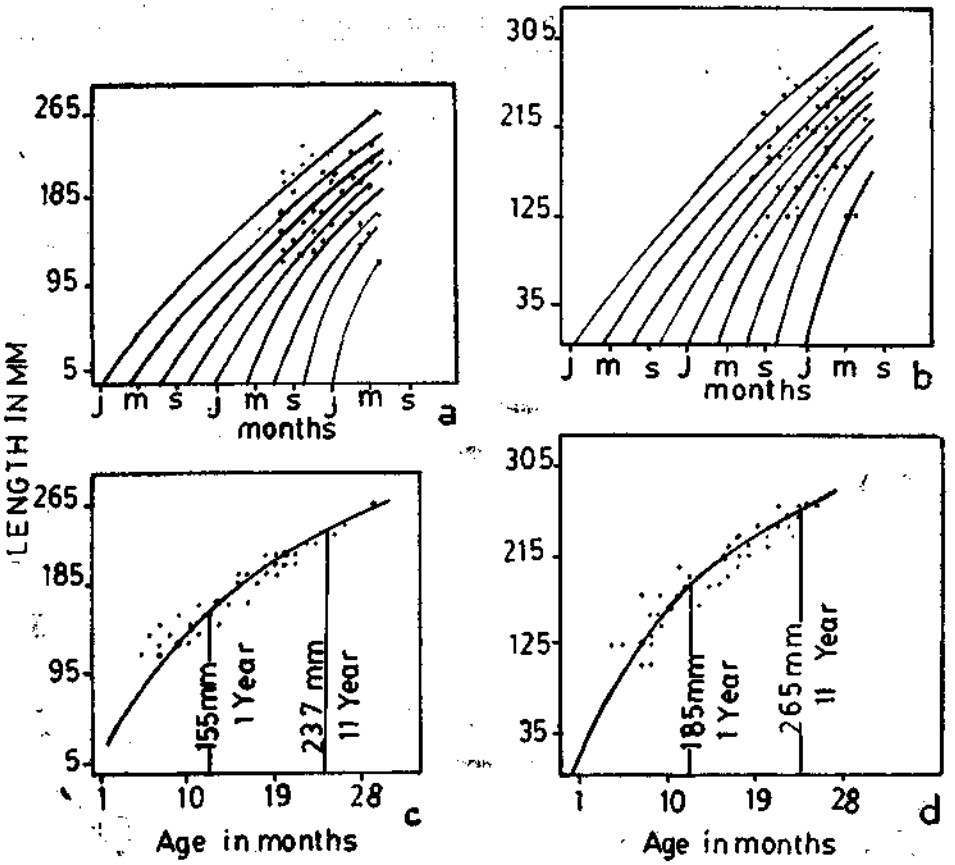

FIG. 2. a. Scatter diagram of months mode for males of *P. monodon*, b. females, c. Growth of males of *P. monodon* based on scatter diagram of months mode and d. growth of females.

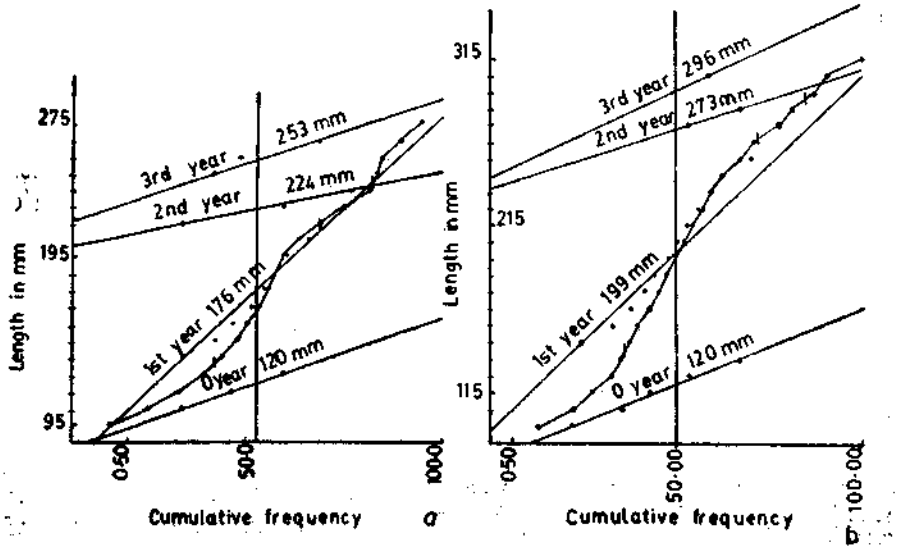

FIG. 3. Probability plot of *P. monodon*: a. males and b. females.

From the above equations it was observed that the females can grow upto 118.79, 198.42, 262.13 and 287.56 mm (Fig. 4 d) and males upto 113.37, 173.04, 217.35 and 250.15 mm (Fig. 4 b) respectively in 0, I, II and III year.

Ford—Walford graph

Through this method L∞ was determined as 360.3 mm for females (Fig. 4 c) and 338 mm for males (Fig. 4 a).

Discussion

Various factors as salinity, temperature, oxygen, food supply, disease and parasitisation, physiological stress like gonad maturation or incubation of eggs, density of population and consequent availability of space for individuals, competition for the same type of food play an important role on the growth of organisms. The growth rates observed for *P. monodon* in the coasts of Ambalapuzha, Colachel, Madras, Mannakudy Lake, Chilka Lake and Backwaters (Anon., 1975) agree with the present values with slight differences suggesting that the growth rate is more or less uniform along the peninsular waters of India.

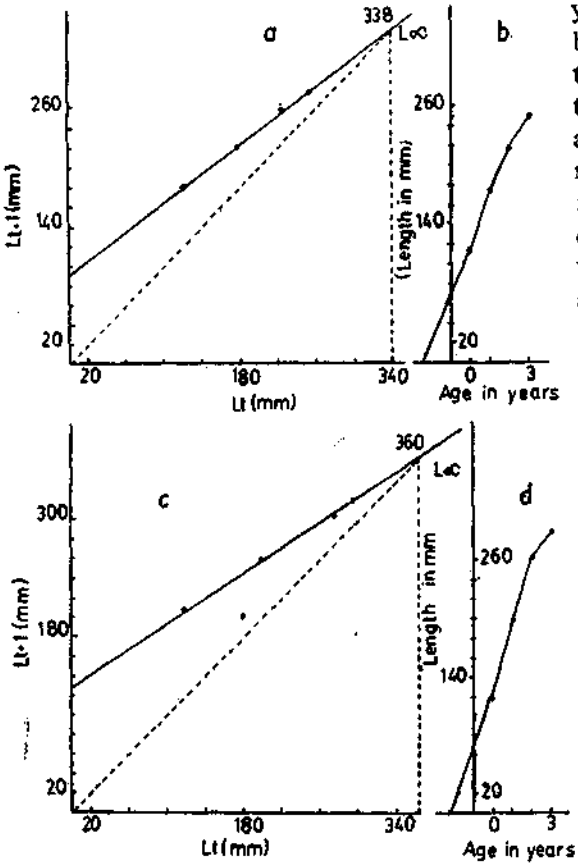

FIG. 4 a and c : Ford—Walford plot of *P. monodon*— a. males and c. females ; b and d. Theoretical growth of *P. monodon* — b. males and d. females.

Presently the life span of *P. monodon* was found to be 3 years and it has been documented well that tropical forms live for few years. Determination of age and growth based on a single method has its own limitation especially when the determination is through indirect methods or through statistical analysis as this. So presently age and growth study sex-wise in *P. monodon* was done through 5 statistical methods so that the outcome of one method will act as a check and control over the other and it could be seen that the results agree in 2 or more methods. The empirical length at different ages made by von Bertalanffy's growth equation shows some agreement with the estimates by other methods showing that in the length ranges studied, the theoretical growth equation adequately describes actual growth. When comparing the growth rate between the sexes, growth rate of females was more than males. The consequences of the presence of an exoskeleton in prawns is that in these forms growth proceeds in steps by a series of moults or ecdysis. This makes the study of prawn growth under natural conditions comparatively difficult. The number of moults a prawn undergoes before becoming full grown depends on the increment at each moult and the frequency of moulting. Presently age and growth have been studied in *P. monodon* through indirect statistical methods. Direct information regarding number of moults this prawn under-

goes in its life and the volume of increase in size due to moult will give a correct picture. The growth rate of *P. monodon* was also assessed in culture systems in Porto Novo. The growth rate was found to be rapid and prawns grown here attain a large size than in natural systems.

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