

STUDIES ON THE GROWTH OF FISHES IN A BRACKISHWATER PEN

R. SANTHANAM, P. NATARAJAN, AND M. D. K. KUTHALINGAM
Fisheries College, Tamil Nadu Agricultural University, Tuticorin - 628 008.

ABSTRACT

The growth characteristics of fishes stocked in a pen of 100 sq. m. installed in the Pullavali brackishwater area were studied. The euryhaline species of fish namely **Chanos chanos**, **Mugil sp.**, **Siganus canaliculatus**, **Etroplus suratensis** and **Caranx sp.** were stocked at the rate of 50 Nos. per sq. m. taking advantage of the free flow of water, rich in oxygen and plankton. The average growth rate calculated for the different species showed that **E. suratensis** had the highest monthly growth rate (52.5 g) followed by **Mugil sp.** (36.5 g), **Caranx sp.** (34.0 g), **S. canaliculatus** (33.0 g) and **C. chanos** (31.0 g).

The possible reasons for the good growth of **E. suratensis** and the unusually low growth of **C. chanos** in relation to the fertility of this biotope are pointed out. The hydrobiological features influencing the growth of different species of fishes in the pen are also discussed.

INTRODUCTION

Fish protein is not only the cheapest but also is known to be one of the vital constituents required for human health. In order to combat malnutrition, 'aquaculture', the culture of fish and shellfish has played a key role in recent times. Though aquaculture is nowadays practised in freshwater ecosystems to a greater extent and in marine systems to a lesser extent, the brackishwater fish culture has not been paid much attention. In India though 1.7 million ha. of brackishwater area is available, only about 30,000 ha. is being utilised for fish culture operations. Hence it is evident that a major portion

of brackishwater area which is productive and free from pollution is lying unutilised. Among the various culture practices which can be employed in the brackishwater area, the pen culture is not only unique but latest also. As there is no major investment towards the construction of pens and there is absolutely no expenditure towards fish seeds and fertilisers, pen culture practice could always be a lucrative venture. Though pen culture practices are already in vogue in many countries like Ceylon, Philippines and Singapore (Anon, 1979; Anon, 1981; Pullin, 1981) India has very recently taken up this line of work. However, studies on brackishwater pen culture are scanty.

Narasimhan (1980) attempted the pen culture of clams. Shanmugam and Bensam (1980), studied the growth of fishes and prawns in pens at Tuticorin.

The pullavali brackishwater area which is located near Tuticorin (Lat. $8^{\circ}50'N$; Long. $78^{\circ}8'E$) forms an ideal ecosystem for pen culture practices. The present paper deals with the growth of euryhaline species of fish in the pen installed in the Pullavali brackishwater area.

MATERIAL AND METHODS

Description of the pens

A single layered pen of 100 sq. m. area was made of split bamboo poles of 2.5m length and 10 cm width. The split bamboo poles were arranged as a mat keeping an interspace of 1 cm between the 2 poles. The mats were strengthened with horizontal bamboo reapers. The four walls ie bamboo mats were installed in the pullavali brackishwater site with supporting casuarina poles at the corners and at the centre of every mat. The lower most 0.5m portion of the bamboo mats was pushed in to the sediment, while 0.5 m of the top portion of the mat was above the water level. The remaining portion of the mat was within the water column.

The hydrobiological parameters such as surface temperatures, salinity, pH, dissolved oxygen, light penetration, and the composition and density of phyto and zooplankton species were estimated using standard methods as followed by Santhanam (1976) and Ramadhas (1979).

The fingerlings for growth studies in the above mentioned pen were collected from the adjoining area using a drag net. They were then transferred to the experimental pen after taking the initial weight. The species experimented were *Etroplus suratensis*, *Mugil* sp., *Siganus canaliculatus*, *Chanos chanos* and *Caranx* sp., The stocking rate was 50 nos./per sq. m. Monthly sampling was made and the individuals of the different species were weighed. After the experimental period of 3 months (June/July - Sept./Oct. '82) the individuals of the different species were weighed for recording their final weight. During the rearing period, considering the rich zooplankton and detrital content of the area, no supplementary feeding was made.

RESULTS AND DISCUSSION

The results (average values) of the hydrobiological features analysed showed the following values: The depth ranged from 1.1 m. to 1.3 and the tidal amplitude was about 0.2 m. The water speed was 3 to 4.5 m/min. The surface temperature ranged from 27.5 to $30.5^{\circ}C$, salinity from 24.5 to 30.8‰, pH from 7.9 to 8.1, light penetration from 40 to 60 cm, dissolved O_2 from 4.4 to 5.3 ml/l, the net primary production from 134 to 155 mg C/m³/hr, phytoplankton density from 120 to 550 cells/l. and zooplankton from 25 to 78 organisms/l.

The growth rate (g/month) calculated for the different species showed that *E. suratensis* had the highest growth rate followed by *Mugil* sp. *Caranx* sp., *S. canaliculatus* and *C. chanos* in that order.

E. suratensis (52.5 g) → *Mugil* sp. → (36.5 g) → *Caranx* sp. (34.0g) → *S. canaliculatus* (33.0 g) → *C. chanos* (31.0 g) .

The survival rate of the different species calculated however had a different trend. Though *E. suratensis*, *Mugil* sp and *C. chanos* showed fairly good

survival rates (55%, 48% and 41% respectively), *Caranx* sp. and *S. canaliculatus* had poor survival rates (15% and 26% respectively). The overall survival rate was 37%. The initial and final weight, monthly growth increment and the survival rate of the different species recorded are shown in Table 1.

TABLE 1:- Growth characteristics of fishes reared in pens for a period of 3 months

Species	Stocking density per sq- m.	Initial wt. (g)	Final wt. (g)	Monthly growth rate (g)	Survival (%)
<i>Etroplus suratensis</i>	10	22.0	179.5	52.5	55
<i>Mugil</i> sp	10	21.5	131.0	36.5	48
<i>Caranx</i> sp.	10	39.0	141.5	34.0	15
<i>Siganus canaliculatus</i>	10	62.0	161.5	33.0	26
<i>Chanos chanos</i>	10	20.9	114.5	31.0	41
Overall survival					37

The maximum growth rate of *E. suratensis* observed during the present investigation could be due to its herbivorous feeding habit (Kutty, unpublished, MS). It is also worth mentioning here as noted during sampling that the individuals of this species were invariably found associated with the algal settlement of the pens. The macroscopic algae particularly species of *Polysiphonia*, *Ectocarpus* and *Enteromorpha* which settled on the bamboo mats might have formed a good food source for *E. suratensis*. The association of *E. suratensis* with macroscopic algae further suggests that it may help in the easy harvesting of *E. suratensis* inside

the pen or the collection of its seeds outside the pen for culture.

The species *Mugil* sp. which ranked next to *E. suratensis* is known to feed mainly on detritus. The pullavali brackishwater area being a shallow environment invariably has a high load of detritus which may mainly be due to the decomposition of *Enteromorpha* and the adjoining luxuriant mangrove plant species, *Avicennia officinalis*. The frequent long stretch mat formation of *Enteromorpha* sp. in this environment is very interesting and it indicates the high productive nature of this biotope. The poor growth of *C. chanos* compared to

other species may be due to the poor net phytoplankton content of this environment.

The poor survival rate of *Caranx* sp. and *S. canaliculatus* compared to *E. suratensis* and *Mugil* sp. could possibly be related to their stenohaline nature,

feeding habits and high stocking density. Based on the salinity tolerance and feeding habits of the different species experimented and the hydrobiological features of the Pullavali brackishwater area, it is concluded that *E. suratensis* is an ideal species for profitable fish culture in pens of brackishwater areas.

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