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55. ON THE GROWTH OF THE PEARL OYSTER, *PINCTADA FUCATA* IN COMMERCIAL FARM AT KRUSADAI ISLAND

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ABSTRACT

Growth on two different size groups of the pearl oyster *Pinctada fucata* reared in farm at Krusadai Island was studied for the period from October 1985 to October 1986. Good growth was observed from October '1985 to January 1986 and poor growth was recorded from March 1985 to May 1986 in both the size groups. The growth increment was correlated with rain fall and temperature parameters. Oysters cultured in permanent piling structures at a depth of 4 m, exhibited faster rate of growth compared to the oysters in raft culture at the same depth In velon screen stitched box cages the growth rate of oysters of 20 mm and above was less compared to those reared in cages without velon screen. The stocking density of oysters in a cage and the mortality were found to be directly proportional.

INTRODUCTION

In 1916 James Hornell acquired Krusadai Island for rearing pearl oysters and did some works on pearl oyster and pearl culture. Later in the year 1938 a pearl culture farm was established by Sundararaj and conducted experiments (Devanasan and Chacko 1958). Subsequently the pearl culture farm at Krusadai island was again revived on research scale by the Tamilnadu States Fisheries Department (Nalluchinnappan et al 198?)

A commercial pearl oyster farm belonging to Tamilnadu Pearls Limited came into existance from September 1983. In the farm, the Indian pearl oyster *Pinctada fucata* (Gould) were reared for the production of cultured pearls on commercial scale. The growth of pearl oyster was monitored with reference to different culture systems, size groups, rainfall and temperature and different stocking densitities.

MATERIAL AND METHODS

The pearl oyster *P. fucata* collected from natural grounds off Tuticorin during September 1985 and transported to Krusadai farm were taken for the study. The oysters were reared in box cages (40x40x10 cm) in the Kundugal channel near the shore of Krusadai island (Lat 90° 14 'N, Long 73° 13'E). The cages were suspended at a depth of 3-4 m from the wooden rafts (5x5 m) and permanent teak pole structures (30x15 m) 35 m away from the shore.

In all the experiments the cages contain 30 numbers of oysters except in the last experiments with different stocking densities. The growth measurements of oysters viz. dorso-ventral measurement (DVM), hinge line (HL) and thickness (T) were recorded every month. The above oysters and cages were cleaned monthly, oysters accounted and the dead oysters were removed. The growth recorded was correlated with the meteorological data. The observation was made for a period of one year from September 1985 to September 1986.

OBSERVATIONS

The smaller size group of 6.8 mm in DVM in average and the larger size group 30.1 mm in average exhibit good growth from October 1985 to January 1986 and in June-July 1986. Maximum growth (average) of 4.2 mm in DVM was recorded in December 1985 in the former group and 2.9 mm growth was recorded in the latter group. Both the size groups exhibted fairly faster rate of growth during June and July 1986 (Table-1.) Comparatively poor growth was observed during August and September 1986 in both the size groups.

Spats exhibited a total of 26.1 mm growth in DVM for the one year period and the bigger

TABLE 1. *Growth of* Pinctada fucata *in the box type cages (increment) in mm.*

Ex. No.	Dimensions	Initial Sep '85	Oct	Nov	Dec	Jan '86	Feb	Mar	Apr	May	June	July	Aug	Sept
	DVM	6.8	9.1	12.0	16.2	19.7	22.0	23.8	25.0	26.2	28.4	30.1	31.6	32.9
			(2.3)	(2.9)	(4.2)	(3.5)	(2.3)	(1.8)	(1.2)	(1.2)	(2.2)	(1.7)	(1 5)	(1.3)
1	HL	6.7	10.1	13.5	16.6	20.1	23.5	25.0	26.1	28.0	29.5	31.0	31.5	31.8
			(2.4)	(2.4)	(3.9)	(3.5)	(3.4)	(1.5)	(1.1)	(1.9)	(1.5)	(1.5)	(0 5)	(0.5)
	W	2.1	3.3	4.6	5.5	6.5	7.1	7.6	8.0	8.8	9.1	10.0	10.6	11.9
			(1.2)	(1.3)	(0.9)	(1.0)	(0.6)	(0.5)	(0.4)	(0.8)	(0.3)	(0.9)	(0.6)	(1.3)
	DVM	30.1	31.8	34.3	37.2	39.1	40.0	41.1	41.8	42.9	45.0	46.9	47.4	47.8
			(1.7)	(2.5)	(2.9)	(1.9)	(0.9)	(1.1)	(0.7)	(1.1)	(2.1)	(1.9)	(0.5)	(0.4)
2	HL	32'0	32.9	33.7	34.3	36.7	36.8	37 0	37.6	37.8	38.2	38.6	40.2	40.6
			(0.9)	(0.8)	(0.6)	(2.4)	(0.1)	(0.2)	(0.6)	(0.2)	(0.4)	(0.4)	(1.6)	(0.4)
	W	10.7	10 9	11.6	12.8	13.6	14.1	14.4	14.5	14.7	15.1	15.3	15.5	15.6
			(0.2)	(0.7)	(1.2)	(0.8)	(0.5)	(0.3)	(0.1)	(0.2)	(0.4)	(0.2)	(0.2)	(0.1)

TABLE 2. *Meterological data of the Kundungal Channel*

	Oct 85	Nov	Dec	Jan 86	Feb	Mar	Apr	May	June	July	Aug	Sept
Rainfall in mm	160.4	360.5	87.1	34.2	40.5	11.7	25.2	28.2	Nil	42.6	2.3	12.9
Temperature °C Average	29.0	27.4	26.1	26.0	26.5	28.1	31.0	31.3	30.6	28.6	29.0	28.8

TABLE 3. *Variation of growth rate of* P. fucata *in raft and permanent teak pole structures (Value in mm).*

Month	Raft						Permanent teak pole structures					
	No of oysters	DVM	x	HL	x	W	No of oysters	DVM	x	HL	x	W
Sept 85	30	30.1	x	32.0	x	10.7	30	32.0	x	33.4		11.4
Sept 86		47.8	x	40.7	x	15.5		51.3	x	44.6		18.9
Annual increment		17.7	x	7.3	x	4.8		19.3	x	11.2		7.8

TABLE 4. *Differential growth rate observed with* P. fucata *in ordinary box cages and velon screen stitched box cages.*

Month	Box cages						Box cages in velon screen					
	No of oysters	DVM	x	HL	x	W	No of oysters	DVM	x	HL	x	W
Sept 85	30	30.1	x	32.0	x	10.7	30	29.3	x	29.5	x	9.4
Sept 86		47.8	x	40.7	x	15.5		39.7	x	38.4	x	13.9
Annual increment		17.7	x	7.3	x	4.8		10.4	x	8.9	x	4.5

TABLE 5. *Growth of* P. fucata *in different stocking densities.*

S. No.	Stocking density		% of Mortality	Growth in mm (DVM)		Annual increment in mm
	Initial (Sep '85)	Final (Sep '86)		Initial (Sep '85)	Final (Sep '86)	
1	200	134	33	28.4	40.2	11.8
2	150	112	25	27.8	39.4	11.6
3	100	88	12	28.0	42.3	14.3
4	75	64	12	27.4	44.2	16.8
5	50	42	16	29.2	45.8	16.6
6	30	28	6.7	28.4	46.4	18.0
7	20	20	Nil	26.9	47.2	20.3

oysters showed 17.7 mm annual growth rate (Table 1).

Maximum rainfall was recorded during the period October 1985 to December 1985 and July 1986 and the surface temperature was low during November 1985 to February 1986. The above periods of maximum rainfall and lower temperature coincided with the period of conspicuous growth (Table 2).

In the raft culture system the annual growth increment of oysters was 17.7 mm in DVM and it was 19.3 mm in the permanent teak pole structures (Table 3).

The oysters reared in ordinary box cages with nylon webbing showed an annual increase of 17.7 mm in DVM and the oysters cultured in the same box-cages stitched with Velon screen (P=32) exhibited 10.4 mm annual growth rate (Table 4).

A distinct trend of increase in the rate of oysters was observed at low densities. At the stocking density of 200 oysters (28.4 mm DVM) per cage, the average growth increase was 11.8 mm for the whole year and it was 20.3 mm at the density of 20 oysters (26.9 mm) per cage. The stocking density and the mortality of oysters were directly proportional. At the density of 200 oysters per cage the mortality was as high as 33% for the whole year. However it was nil and 6.7% in cages with stocking densities of 20 and 30 oysters respectively (Table 5).

DISCUSSION

In the spat of *P. fucata* the hinge line (HL) was more than the dorsoventral measurment (DVM). Alagarswami and Chellam (1977) related the morphometric correlates viz. DVM, HL and W of the pearl oysters collected from different pearl banks of Tuticorin. According to them the DVM increased faster than the HL when the oysters grow. In our present study the growth of the oysters in DVM was more pronounced than HL. On simultaneous comparison of annual growth, the spats of 6.8 mm reached 37.9mm in DVM while the bigger oysters attained 47.8 mm in DVM from 30.1 mm (Table 1).

Earlier works by Devanesan and Chidambaram (1956) in Krusadai pearl oyster farm, showed that the growth was inversely proportional to the age of the spats. Nalluchinnappan et al (1982) reported that in adult oysters (30 91 mm) increment was upto 18.2 mm within a period of seven months. The reduction in growth rate of adult oysters in Krusadai island in the present study may be due to crowding in a restricted area and the spats of 6.8 mm DVM, grow to the size of 40 mm only after 18 months period (Table 1).

In the Gulf of Kutch, the growth of Indian pearl oyster *P. fucata* was under the influence of extrinsic factors such as water temperature and salinity (Gokhale et al (1954). The growth of pearl oysters in the Gulf of Mannar was high

during the period when the water temparature is low (Jeyabaskaran et al 1983). The two growth peaks coincided with the north-east and south-west monsoon. Jeyabaskaran et al., (1983) also observed a peak period of growth from November 1977 to February 1978.

Water current movements from Pamban pass might have influenced the growth of the pearl oysters at the Kundugal channel. Drift water current and more flow of water during north-east monsoon with lower salinity level enhanced the growth of the pearl oysters at Tuticorin (Jeyabaskaran et al 1983).

The ever oscillating rafts and the cages seemed to cause poor growth of oysters than the oysters reared in the permanent teak pole structures where the conditions remained static and calm (Table 3).

Accumulation of silt and other organisms on the velon screened cages resulted with poor growth of pearl oysters than in the unscreened boxes (Table 4).

The stocking density at the rate of one oyster per 80 cubic cm showed mortality as high as 33% with an annual growth of 11.8 mm and at the rate of one oyster per 800 cubic cm the mortality was nill with a higher annual growth rate of 20.3 mm the optimum stocking density was found to be 100 oysters (28 mm in average) per box cage where the mortality was 12% and beyond which it was doubled (see Table 5.) Pollution free calm areas with periodical replenishment of water by reasonable flow of currents will help oysters to grow faster in such a commercial farm.

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