

## GROWTH OF THE HATCHERY-PRODUCED JUVENILE PEARL OYSTER, *PINCTADA MAXIMA* (JAMESON) IN THE GULF OF THAILAND

Tipaporn Traithong, Tanate Poomtong & Cha-um Sookchuay  
Prachuap Khiri Khan Coastal Aquaculture Development Center, Klong Wan,  
Prachuap Khiri Khan, 77000 Thailand

### ABSTRACT

Hatchery-produced juveniles of *Pinctada maxima*, one year old, with 5.3 cm mean shell length, were grown in Prachuap Khiri Khan Bay in metal frame trays covered with one inch mesh size nylon net. The trays were hung from bamboo raft to about 1.5 m below the surface. In the culture area, sea water temperature ranged from 26-34 °C and salinity from 30-35 ‰. The mean length increments were 6.5, 2.3, and 1.7 cm per year in the first, second, and third year of culture. Survival rates were 75.0, 44.9, and 51.6 % respectively. The pearl oysters attained a shell length of 15.8 cm after four years. Growth of the pearl oysters obtained in culture was rather poor compared to natural growth. Problems due to heavy fouling and unsatisfactory environmental conditions are discussed.

### INTRODUCTION

The gold-lip pearl oyster *Pinctada maxima* (Jameson, 1901) is the biggest pearl oyster species. They are commercially used in pearl culture industry, and well-known for producing big and beautiful pearls. Prachuap Khiri Khan Coastal Aquaculture Development Center succeeded in hatchery breeding of this species in 1991 (Nugranad *et al.* 1991). Hatchery-produced juveniles transferred from nursery to nature showed better growth than the ones kept in the hatchery. Natural sea water contained better food supply, but the survival was lower in nature than in hatchery due to fouling and predation problems (Nugranad *et al.* 1992). To obtain more information needed to further develop pearl oyster culture, growth of the hatchery-produced juvenile pearl oysters was examined in Prachuap Khiri Khan Bay. This paper shows the results on growth and survival rate of juvenile pearl oysters from April 1992 to April 1995.

### MATERIALS AND METHODS

Prachuap Khiri Khan Bay (11°47'42" N, 99°48'58" E) is located on the south east coast in the Gulf of Thailand (Fig. 1). The bay has muddy sand bottom. Tidal amplitude is 0.6-1.7 m. Water turbidity is high, especially during the rainy monsoon. The

area where the culture raft was placed, is surrounded by small islands sheltering the raft from wind and waves.

The raft, supporting the culture trays, was about 10 x 20 m, made of bamboo poles lashed with nylon ropes, floated by Styrofoam or plastic buoys, and moored by anchors. During lowest low tide, the raft was about 50 m from shore, at 1.5-2 m depth of water.

Juvenile pearl oysters were produced in Prachuap Khiri Khan Coastal Aquaculture Development Center. They were nursed in

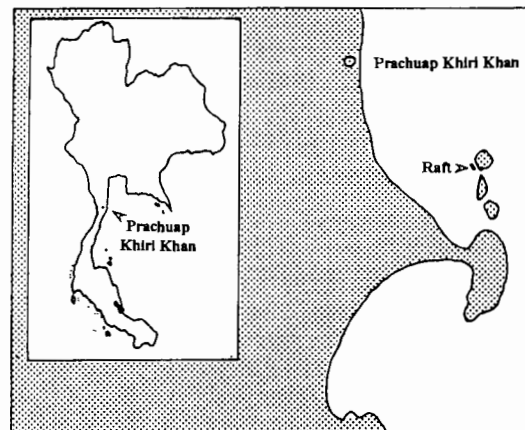


Figure 1. The study area in Prachuap Khiri Khan Bay.

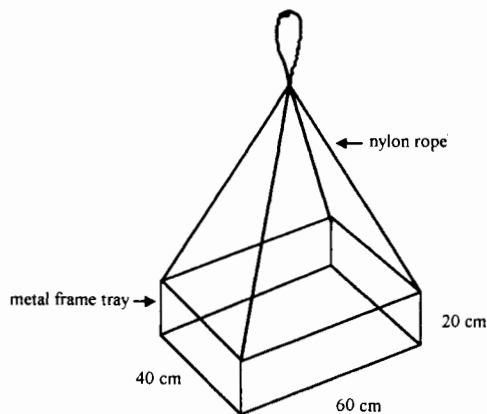
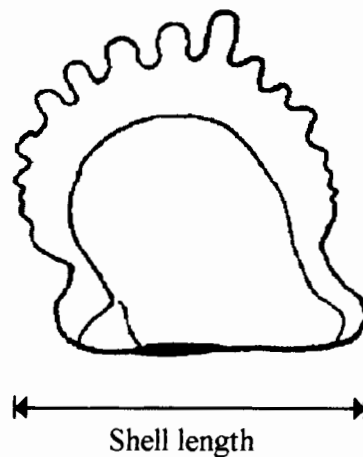


Figure 2. Diagram of culture tray.

the hatchery to a length of about 2 cm. Subsequently, they were transferred to the culture area at Chan Island, Prachuap Khiri Khan Bay. Juveniles (mean shell length 5.31 cm) were put in metal frame trays covered with 2 cm mesh size nylon net (Fig. 2). Culture trays were hung from the raft to about 1.5 m below the sea surface. The trays and the pearl oysters were cleaned regularly to get rid of fouling organisms.

Anterior-posterior lengths of juveniles were measured monthly to the nearest mm (Fig. 3) using Vernier callipers. Survival rate was determined every two or three months by the number of dead and live specimens found.

Figure 3. Diagram showing anterior-posterior shell length of *Pinctada maxima*.

### RESULTS AND DISCUSSION

The pearl oysters grown in Prachuap Khiri Khan Bay attained mean shell lengths of 6.5, 11.8, 14.2, and 15.8 cm at the age of one, two, three, and four years, respectively. The survival rates were 75.0, 44.9 and 51.6 % in the first, second, and third year of culture, respectively (Tab. 1). Growth decreased in older oyster (Fig. 4).

In the first year, growth was lower in the first six months than the last six. This is because the juveniles had to adjust to environmental changes when transferred from hatchery, with clear water, to the bay at Chan Island with high turbidity. Monthly averages

Table 1. Growth and survival rates of pearl oyster cultured in Prachuap Khiri Khan Bay.

Age (months)	Anterior-posterior length (cm)			Growth rate		Survival rate (%)	
	max.	min.	mean	cm/month	cm/year	Over 6 months	Over one year
12	11.4	3.8	5.3				
18	11.8	5.6	8.2	0.5		77.2	
24	15.6	7.7	11.8	0.6	6.5	97.2	75.0
30	16.5	10.7	13.8	0.3		58.0	
36	16.6	11.0	14.2	0.1	2.3	77.5	44.9
42	18.0	11.1	15.0	0.1		64.5	
48	18.2	12.1	15.8	0.1	1.7	80.0	51.6

of environmental variables in the culture area are shown in Tab. 2. Temperature ranged from 26-34 °C, highest in April to May, 29-34 °C, lowest in November to January, 26-29 °C. Salinity ranged between 30-35 ‰.

High mortality occurred from April to July. In this period, oysters were exposed to high temperatures. Good growth rate was obtained in August to November during the rainy season at temperatures between 26-29 °C, and salinity 30-34 ‰. Survival rate was also high. Low growth rate was found in December to March of the monsoon season. Heavy fouling covered the oysters.

Food quantity was determined from chlorophyll concentration in the bay (Tab. 2). There was no obvious relation between growth and survival, and quantity of chlorophyll in the bay.

The low growth and survival rates obtained from this study were due to heavy fouling and unsatisfactory environmental conditions. The fouling organisms were barnacles, sponges, bryozoans, and coelenterates. Sediment covered the oysters and made them unable to open their valves properly for feeding. The oysters had to be cleaned to get rid of such fouling thus their growth was dis-

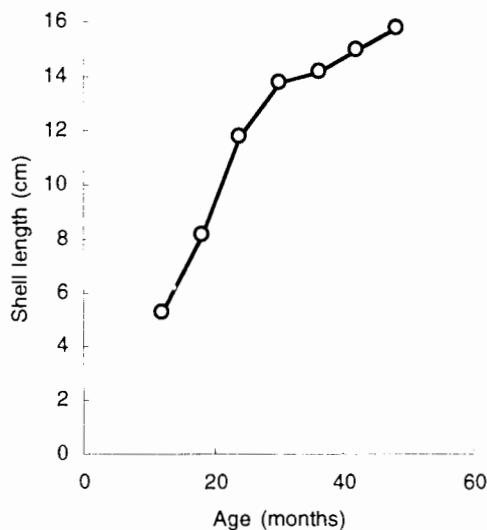


Figure 4. Growth of pearl oyster *Pinctada maxima* in Prachuap Khiri Khan Bay.

Table 2. Water quality in Prachuap Khiri Khan.

Month	Temperature (°C)	Salinity (‰)	Chlorophyll a (mg/m <sup>3</sup> )
January	26.0-29.0	31-35	0.17
February	26.0-31.0	31-34	0.17
March	27.5-32.5	33-35	0.09
April	29.0-34.0	34-35	0.16
May	29.0-34.0	34-35	0.19
June	29.5-30.5	33-35	0.18
July	27.0-29.8	32-35	0.24
August	27.0-29.8	32-35	0.13
September	27.5-28.5	30-34	0.39
October	27.5-29.5	30-34	0.08
November	26.0-29.0	30-34	0.14
December	26.0-29.0	31-35	0.11

turbed. The environmental conditions were unsatisfactory because the raft was located very near to the shore and the area was very shallow, that was not suitable for pearl oyster culture. The trays were hung only 1.5 m from the surface to avoid reaching the bottom during low tide. Therefore, during the summer month (March - May) the oysters might suffer from high temperature as well as temperature changing, besides suffering from very high turbidity during monsoon season (October - December). Growth of pearl oysters obtained from this study was rather poor comparing to natural growth which was to be 1 cm per month (Tun & Winanto 1988). They would grow continuously throughout the year if temperature and salinity were adequately constant and the surroundings provided ideal natural conditions. Pearl oyster are normally found in deep water at 20-60 m and salinities of 34-36 ‰.

#### ACKNOWLEDGEMENTS

The mollusc hatchery staff at Prachuap Khiri Khan Coastal Aquaculture Development Center are acknowledged for their contributions to this work. We thank Ms. Jintana Nugranad for providing her data collection, helpful suggestions and advice, and also for reading and editing the manuscript.

## REFERENCES

- Nugranad, J., S. Sahavacharin & T. Poomtong. 1991. Experiment of breeding the Gold-lipped pearl oyster, *Pinctada maxima* (Jameson). - Pages 125-131 in Proceeding of the Seminar on Fisheries 1991, Department of Fisheries, Thailand.
- Nugranad, J., S. Sahavacharin, T. Poomtong & K. Yhu-Eiad. 1992. Rearing and growth of the hatchery-produced juvenile pearl oyster, *Pinctada maxima* (Jameson). - Pages 677-683 in Proceeding of the Seminar on Fisheries 1992, Department of Fisheries, Thailand.
- Tun, M.T. & T. Winanto. 1988. Manual on pearl farming in Indonesia. FAO ins /8 1 /008/ manual/11. 65 pp.

ISSN 0858-3633