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CULTURE OF BLOOD CLAM AT KAKINADA*

Many species of clams occur abundantly along Indian coast, particularly in the estuaries and backwaters, forming sustenance fisheries. The clams are rich in protein, glycogen and minerals and are easily digestible. They are sessile, feed low in the food chain and are admirably suited to 'on-bottom' farming. *Anadara granosa* (L) belongs to the family Arcidae and it is popularly known as blood clam owing to the red colour of its flesh which is due to the presence of haemoglobin in the blood. It is also called ark shell or cockle, the latter name due to its superficial resemblance to the European cockle, *Cardium*. The blood clams are regularly fished in the Kakinada Bay and about 1000 tonnes of clams are landed annually. This clam meat is eaten locally to a limited extent and the shells are used in producing lime. This species is traditionally cultured for its food value in Malaysia, Thailand, Vietnam, Taiwan and the Philippines.

The Central Marine Fisheries Research Institute has given priority for developing appropriate techniques for the culture of suitable marine animals and plants for augmenting the seafood production. As a part of this programme experiments on the culture of the blood clam were initiated at the Kakinada Research

Centre of the Institute in 1979. The results obtained during 1979-80 are given in this account.

The farm

The farm site was selected in close proximity to the natural clam bed but sparsely populated by clams. It is about 300 m from the shore, north of Yetimoga fishing village and is located within the Kakinada Bay. The farm is in the subtidal region and elevated in such a way that a minimum of 25 cm water level is maintained at low tides. It was cleared of dead shells, debris etc. and casuarina poles were planted to mark the boundaries of the farm (Fig. 1). The bottom is muddy with 64% clay, 25% silt and the rest sand and dead shells. Split bamboo screens (Fig. 2) interlaced with hemp twine were used in constructing pen enclosure. Each screen measured 5 m long, 0.3 m high and interspaced with 6 numbers of 1 m long bamboo sticks driven upto 0.75 m into the mud to hold the screen vertically. In the farm the monthly average water temperature varied from 28.9 to 33.5°C, salinity

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from 22.29 to 34.4‰ and dissolved oxygen from 4.98 to 7.00 ml/l.

Seed availability and stocking

The spawning period of the blood clam in the Kakinada Bay is prolonged and it spawns for the

major part of the year, attaining peak activity in January-April period. Heavy settlement of seed on the natural bed takes place from February to May which is the ideal period for collection. The collection sites are about 1 km east of the farm in the Kakinada Bay where the depth is about 1 m at low tide. The seed were collected at low tide by scooping the muddy substratum

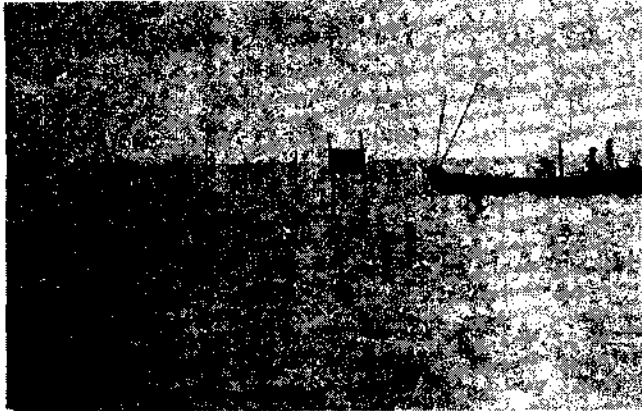


Fig. 1. Part of the clam farm

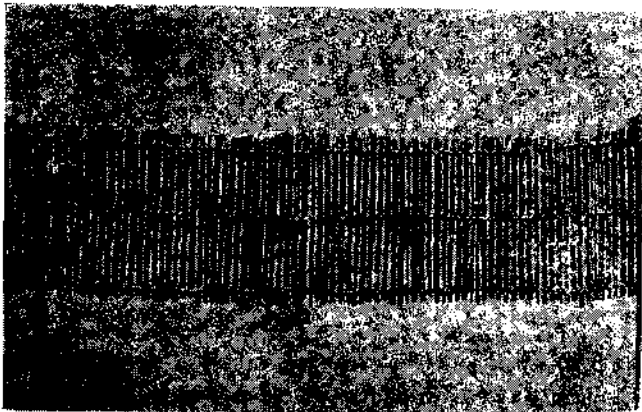


Fig. 2 Part of the split bamboo screen used in pen construction

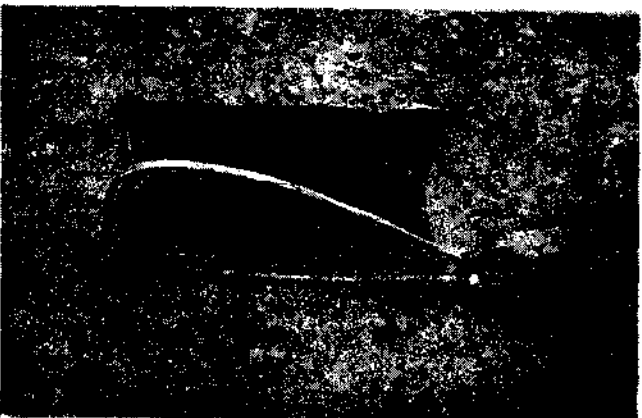


Fig. 3 *Nathudu vala*, a small bag shaped hand net used in the collection of clam seed in mud flats

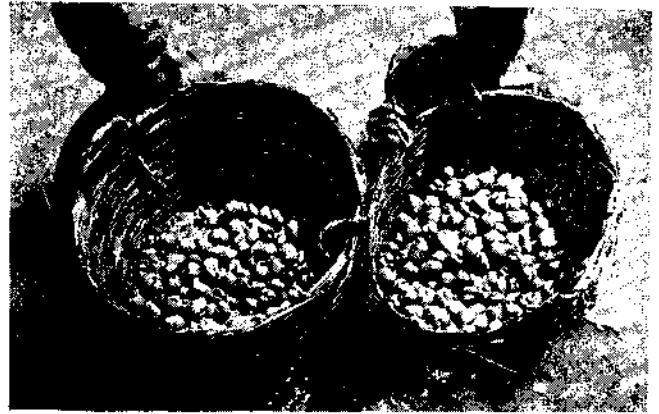


Fig. 4 After washing the clams are ready for emptying into the boat

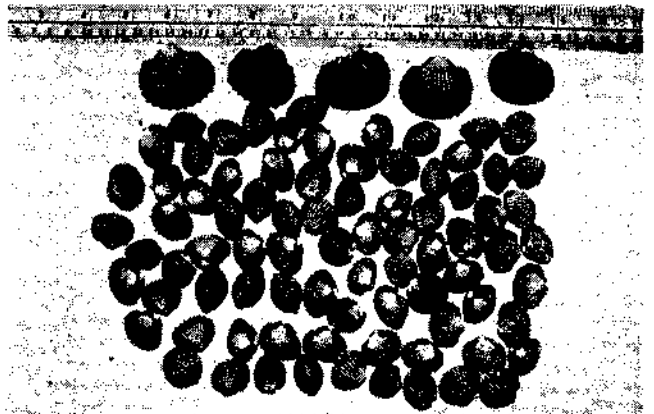


Fig. 5 Numerous small clams and at the top 5 large clams indicate the lengths at stocking and harvesting respectively

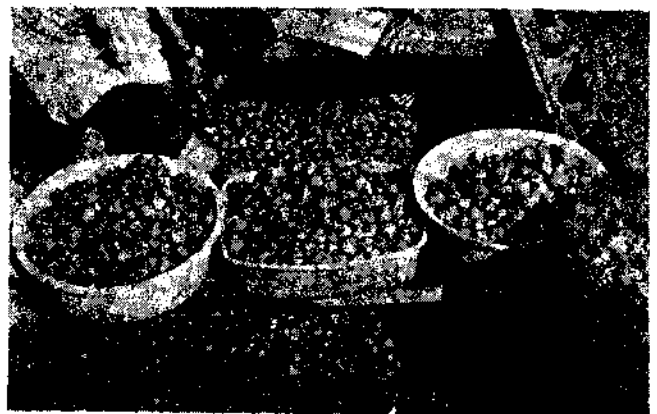


Fig. 6 Part of the harvest

with a small bag shaped hand net called *Nathudu vala* (Fig. 3) or by hand picking. In the culture experiment in May 1979 seed clams (Fig. 5) with an average length of 24.3 mm (average weight 5.53 g) were stocked in a 100 m² pen at a density of 140/m² (Table 1). In April 1980 seed of 23.0 mm average length (average weight 5.53 g) were stocked in a 625 m² pen at a density of 175/m². The stocking was done at high tide from a plank built boat by sowing the seed on the bottom, ensuring an even dispersal as far as possible.

Growth and production

During the culture experiments artificial feeding was avoided as they feed on the plankton and detritus which are abundantly available in the natural waters circulated by the tides. Except for watch and ward work, no other maintenance job was necessary during the period of culture. The clams were harvested in October by hand picking (Fig. 4) and washed in bamboo baskets to rid them of mud. In the experiment in 1979, at harvest they had attained an average length of 40.6 mm (Fig. 5) and an average weight of 31.06 g. The growth rate was 3.3 mm/month (Table). The survival of the clams was 88.6% and a production of 385.3 kg/100 m²/5 months was obtained. In 1980 they showed a growth of up to an average length of 39.2 mm (average weight 28.5 g and the monthly growth rate 2.9 mm). The common marketable size is 30-35 mm length. The survival of the clams was 83.4% and production 2.6 tonnes/625 m² in 5½ months (Fig. 6). The ratio of flesh weight to total weight of clams was about 20%. Proximate analysis showed that protein formed about 10% and fat 1.6% on wet flesh weight basis. In both experiments the results on the growth, production and survival were consistent and comparable.

Prospects

In shellfish culture it is well known that the environmental conditions required for profuse spat settlement differ from conditions needed for optimal growth and fattening. With this in view transplantation of seed clams to areas suitable for growth was carried out so that production can be maximised. In Malaysia, blood clam production by cultivation is 46,423 tonnes and the yield is 20.7 tonnes/ha/year. In the experiments at Kakinada, a very high production, nearly double the yield in Malaysia, was obtained per unit area in a relatively shorter period of culture operations. The yield could be further increased by en-

hancing the stocking density to 240 clams/m² since experiments showed that at this level the growth of the clams did not appear to be affected. The Kakinada Bay has a spread of about 130 km² and is mostly shallow. It is sheltered and several hundred hectares are suitable for blood clam culture. Clam culture is low intensive—both in capital and labour and has a tremendous potential.

During these experiments two important aspects have emerged for further studies. The clams burrow in the mud and their movements are very much restricted. So it would be worthwhile to investigate whether the pen is necessary. Another point for consideration is better utilisation of the ecosystem by way of poly-culture such as the on-bottom culture of the windowpane oyster and off-bottom stake culture of the edible oyster in association with the blood clams. Both these oysters are regularly fished in the Kakinada Bay. Further work on these aspects and also on the economics of clam culture are in progress at the Kakinada Research Centre of the Institute.

Table 1. Stocking and harvesting details of blood clam cultured at Kakinada

	Stocking	Harvesting
<i>Experiment 1</i>		
Area of pen	100 m ²	100 m ²
Date	23 & 24-5-1979	23-10-1979
Numbers	14,000	12,406
Size range	19-29 mm	34-49 mm
Average length	24.3 mm	40.6 mm
Average weight	6.7 g	31.06 g
Density	140/m ²	—
Survival rate	—	88.6%
Production	—	385.3 kg
Rate of production	— 385.3 kg/100 m ² /5 months	
<i>Experiment 2</i>		
Area of pen	625 m ²	—
Date	28 & 29-4-'80	12 & 13-10-'80
Numbers	1,09,584	91,439
Size range	20-28 mm	34-50 mm
Average length	23.0 mm	39.2 mm
Average weight	5.53 g	28.50 g
Density	175/m ²	—
Survival rate	—	88.6%
Production	—	2.6 tonnes
Rate of production	— 2.6 tonnes/625 m ² /5½ months	

