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Pharaoh Cuttlefish *Sepia pharaonis*: A Candidate Species for Maricultur

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During 2002-2003, India has exported 41,381 tonnes of frozen cuttlefishes valued at Rs. 417.09 crores to countries like Japan, USA and the European Union, registering an increase of 35.4% in terms of quantity and 48.9% in terms of value compared to the previous year. Pharaoh cuttlefish *Sepia pharaonis* is an important one among them. Nabhitabhata and co-workers of Rayong Brackishwater Fisheries Station, Thailand have conducted pioneering research work on the culture of several species of commercially important cephalopods including this species. It is also successfully reared in USA employing sophisticated, temperature controlled recirculatory systems.

In India, Vizhinjam Research Centre of CMFRI too has succeeded in the rearing of this species from egg to adult stage under captivity which indicates that *S. pharaonis* is an excellent candidate for mariculture. An account of the rearing work donw is given here under.

Egg Collection: Egg capsules of this species were collected from sub-tidal areas by engaging skin divers during spawning season which extends from September to April. They can also be collected from boats engaged in bottom trawling or by putting artificial egg collectors in the open sea for a week at a time and relocating and retrieving the same with the help of GPS the following week. The egg capsules collected were immediately transferred to buckets containing seawater and brought to the laboratory.

Incubation and Hatching: The egg capsules (Fig. 1) so collected were incubated to spawning stage under captivity. The incubation tank was of 500 litre capacity, filled with filtered seawater and the eggs were acclimated gradually to the temperature and salinity of the water. Aeration was provided through air stones from an air blower. Hatching of eggs began on the 12th day of incubation and it took seven days for the hatching process to be completed at 27-31°C. They hatched out as miniature adults without any larval stages. The average size of hatchling (Fig.2) was 15 mm in total length (TL) with 8 mm mantle length (ML). In most of the cases yolk was completely absorbed before hatching.

Rearing: The hatchlings were reared at a stocking density of one per litre and the stocking density was reduced gradually as the animal grew to one per 100 litres by the sixth month of rearing. Hatchlings were reared in plastic tubs of 60 litre capacity, juveniles (Fig.3) in 500 litre FRP tanks and adults in one ton FRP tanks.

Water Quality Management: Water replacement was done daily with fresh filtered seawater which ranged from 80% in the case of hatchling tubs to 60% in juvenile tanks and 30-40% in adult rearing tanks. In the rearing containers water salinity ranged between 32-36 ‰ and the pH was maintained between 7.6 and 8.2. Temperature of the rearing medium ranged between 27 to 32° C and dissolved oxygen above 5 ml/litre.

All the rearing containers were provided with biological filters to maintain the water quality. Water filtration was effected by airlift mechanism using air flow generated by air blowers. The biological filters helped in converting the organic waste generated from uneaten food, excretory products and ink ejected by these animals into nitrite and nitrate with the help of the bacteria present in the bio-film developed on the filter-bed composed of charcoal and coral sand.

Food and Feeding: Live food organisms such as mysids, shrimp post larvae and artemia were th primary food items given during th first 20 days. Thereafter mysids fish larvae, juveniles of mullets *Therapon* sp. and caridian shrimp (*Macrobrachium idella*) were given a feed. The required quantity (*Ad libitum*) of feed items was take using scoop net and washed befor broadcasting in the rearing tank During feeding, cuttlefish showe the three stage attack sequence fixation of the prey, piosing itse in attacking position and strikin the prey with ejection of tentacle (Fig. 4). From the 50th day onward they were weaned to accept dea items like acetes, anchovie sardines and carangids. After a fe weeks of training they accepte fish pieces even from hand (Fig. or taking from the botto Quantity of feed given was 7 to 10 of the body weight of the stocke animals and the ration wa adjusted according to the fee intake. Feed was given two times day, once in the morning an another in the evening. Uneat food and excreta were remov twice daily by siphoning.

Growth and Survival: *Sep pharaonis* grew to an average si of 168 mm (521g) by the seven month of rearing. The survi rates were very high during th first four months. It was 86 % the end of fourth month b declined to 41% by the end of t seventh month.

Conclusion: Future commerc scale culture of this speci depends on the development mass culture techniques of mys for feeding hatchlings, with arte and also artificial feed supplemental for juveniles a adults. The average survival rat 41% in 7 months is conducive commercial scale operations. large quantity of egg capsu which get accidentally caught

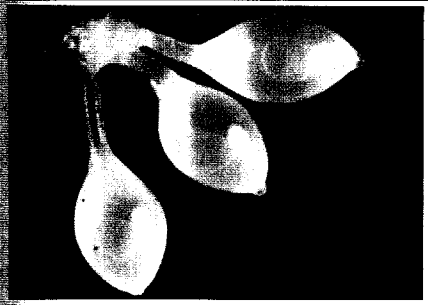

Fig. 1: *Sepia pharaonis* egg capsules

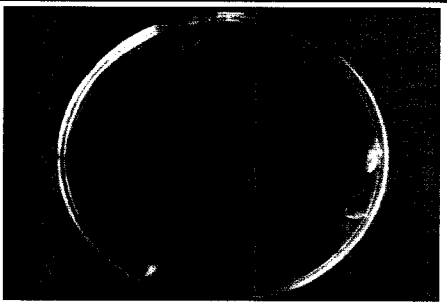

Fig. 2: *Sepia pharaonis* hatchlings

Fig. 3: *Sepia pharaonis* juveniles

Fig. 4: *Sepia pharaonis* juveniles feeding on live food by ejection of tentacles

Fig. 5: *Sepia pharaonis* being fed from hand

Fig. 6: *Sepia pharaonis* adults

the trawl nets can be utilised for the culture of these animals. This is one way of preventing the wastage of these eggs. With the use of culture systems such as onshore race-ways/recirculatory systems or floating cage type of rearing systems in open waters and better feeding schedules, commercial culture systems with better survival rates and growth can be developed.

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