MUD CRAB HATCHERY AND FATTENING

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INTRODUCTION

Among the marine crabs, mud crab is considered as a very expensive seafood delicacy all over the world. A number of countries in the Indo-Pacific have reported on the decline in crab population. Over exploitation and indiscriminate fishing and absence of any management measure have caused this adverse situation. It has become imperative to develop suitable, viable farming techniques for augmenting this resource. Experiments conducted in certain parts of brackish water regions and in coastal lands in our country have shown good prospects for commercial culture. Shrimp farming sector is facing crisis in recent years. Brackish water farmers are looking for diversification. Sea food production industry explores the possibilities to develop alternative farming systems in the already developed facilities. Potential ground for the collection of seeds of commercially important finfishes and crabs have been identified, But the resources are not adequate to meet the demand. As success of large scale culture depends upon the development of hatcheries, the Central Marine Fisheries Research Institute (CMFRI) has developed techniques for the production of mud crab seed in hatchery and also perfected the grow-out methods for commercial scale culture including the fattening of crab. A good number of farmers in Andhra Pradesh, Tamil Nadu, and Kerala have adopted these techniques and realised profits.

BIOLOGY

Primarily, there are two species of mud crab. *Scylla oceanica* with attractive ornamental markings, is popular in the southern peninsula, and grows to a maximum size of 1.5 kg and *S. serrata*, with deep brown or muddy coloured carapace, normally grows to 800-900g. Reproductive and spawning behaviour are more or less similar. *S. oceanica* attains maturity at 10-11 cm size and *S. serrata* at 9-10 cm. Till they attain maturity, mud crabs spend much of their life time in mangrove biotopes, estuaries, lagoons and inshore coastal waters. Some adults are caught in the open sea during reproductive migration. Spawning and larval development take place in open sea where conducive environment prevails. Once they attain megalopa stage, they prefer to migrate to the brackishwater environment. Mud crabs are omnivorous and feed predominantly on shrimp, crabs, bivalves and fish. They grow fast and attain marketable size in one year in brackishwater. Both the species are preferred for farming and the countries bordering the Bay of Bengal have ample scope for culture operations.

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Broodstock management

i. Gravid females could be produced from the culture site itself. When matured male and female are stocked together in a pond with salinity around 33 ppt, females invariably spawn and become ovigerous or berried. Supply of fresh bivalve meat promotes faster development of gonad.

ii. Mature crabs and berried crabs are available from commercial catches mostly during March-May and September-October. Such broods should be necessarily maintained in salinity around 33 ppt since brackishwater is not conducive for larval production. Spawner crabs are easily transported and they can remain out of sea water for about 10-15 hours in wet conditions.

iii. Spawners collected from wild and maintained in hatchery spawn more than twice in a period of 4-5 months without undergoing any copulatory ecdysis or further mating with male. This kind of multiple spawning within single mature instar is an interesting feature of portunid crabs.

iv. Depending upon the stage of maturation and development of eggs for fertilization, eye-stalk ablation triggers the mechanism to obtain spawner crab.

v. Broodstock thus obtained is to be maintained carefully in separate tanks. Maintenance of uniform salinity around 33 ppt, daily exchange of water or provisions for continuous flow system, supply of bivalve meat as feed and maintenance of water temperature around 28-31°C are essential in broodstock management.

Incubation and larval development

Mud crab is known for its high fecundity of about 1.5 million eggs. Berried female crab needs careful handling during incubation period. Nutritionally rich clam and oyster meat, filtered sea water, facilities for exchange, aeration and conducive water quality are the essential requirements. The period of incubation may vary from 8-15 days depending upon the season.

The egg mass is bright orange in colour then it turns into reddish brown, and finally black on the day prior to hatching. Salinity 32 + 2ppt and temperature in the range 28.5 - 31°C give better results of seed production In summer, it takes 8-10 days whereas in winter it takes more days for hatching.

Mother crabs are separated and active larvae alone are scooped and transferred to different tanks for further rearing.

Seed production

Zoea hatches out at the dawn of the day. Mud crab has lengthy larval life and takes 26-30 days to complete the metamorphosis. Each zoea stage takes 3-4 days and reaches the megalopa stage, on 18th day. Cannibalism is manifest from this stage onwards, because the chelate legs develop in this stage. To minimise the loss of stock, bunches of fresh seaweeds like *Sargassum* or cluster of nylon bristles are placed in rearing tanks. Once the larval stocks reach this stage, the salinity of rearing media is reduced and maintained around 25-27 ppt as this brackish condition promotes the growth rate. Crab instar I is attained from 26th day onwards.

The larvae are released at density of 20-30/l in rearing tanks. In the early stage, it is fed on *Chlorella* mixed with rotifers at the concentration of 15-20/ml. *Skeletonema* and *Tetraselmis* are also mixed at 5000 cells/ml during the first 7 days. In the second week, when zoea pass stage III and IV, *Artemia* nauplii at the rate of 10-15/ml is mixed with rotifer and in addition to this BMC pellets (Japan) of 100 micron size are also supplied. In later stages the larvae are fed with *Artemia* nauplii at the concentration of 50/ml. Decapsulated *Artemia* embryo at 20/ml can alsobe added. Malaysian workers have tried with pelleted feed known as SUTIMAL of 150-300 microns. Slightly larger size feed, such as adult *Artemia*, copepods, macerated shrimp and clam meat are supplied at regular intervals to the megalopa; young crab seed are fed with bits of clam and fish meat. Maintenance of water quality including water replenishment, removal of dead ones and excreta and designing of feeding schedule according to survival rate are part of management. Trials made in CMFRI envisage the scope for large scale hatchery operation and production of crab seed of 1-2 lakhs per run.

Crab culture techniques

Large scale crab culture is possible in coastal ponds. Number of farmers have suitably converted the existing shrimp ponds into mud crab farming. Fencing is a must to control the migration of crab from culture site. Intertidal mud flats are ideal to construct ponds, pen and net impounds to hold crab. Rafts can be fixed at a convenient depth to carry out cage culture. Monoculture with uniform size of seed, monoculture with multiple size stocking and polyculture with compatible species like *Chanos chanos* and seaweeds are carried out in coastal ponds. Small bits of cement pipes, used tyres, tiles, hollow bamboo pieces etc are spread at the bottom of the pond to serve as hideouts for crab especially at the time of moulting. This system helps the farmer to get a higher rate of survival. When mature male and female crab (9-10 cm) are stocked together in a pond having ideal water quality chances for mating and spawning are more. As there is no market for berried female, the stock should be segregated sexwise. However, in low saline media this problem will not arise. Brackish water areas are ideal for farming. Loss of energy by frequent moulting are less in such environment. Moreover crab will gain more weight. Water exchange is a must in ponds. Farm management is more or less similar to shrimp farming. The optimum stocking rate is determined as 5000/ha. The feed consists of trash fish, clam meat, discards of fish, squids, cuttlefishes, chicken and beef.

In polyculture system with milkfish the unconsumed organic feed materials decompose and enrich the ponds resulting in algal bloom. The green water with 'Lab Lab' and other algal material at the bottom become the natural feed for milkfish without any hindrance to crab stocks.

Fattening

Crab fattening is the latest technology widely followed in Thailand, Taiwan, Malaysia, Singapore and Indonesia. It means the rearing of particular size group of crabs under intensive feeding to promote fast growth to realise quick returns. Cages, pens and small ponds with net impoundment are designed for holding crabs for a short period of 3-6 weeks. Newly moulted adult crabs which do not fetch any value in market are also used for this purpose. During rearing days care is taken to minimise frequent moulting. This is possible by maintaining the salinity of water at lower

levels. In the fattening process the crabs of intermoulted and postmoulted stages collected from commercial catches are stocked in pens or ponds.

Crabs weighing 120 g and above are preferred for fattening. Gravid females with orange-red egg masses are in much demand in sea-food restaurants and because of its high price and demand, farmers prefer such females for fattening.

Production results

Growth, survival and production rates differ according to the system of culture. Total harvesting is done in ponds by draining the water and picking by hand nets. All the crabs have to be handled individually and tied with jute rope to arrest the movement of chelate legs before marketing them. Young crabs stocked at 35 mm (7g) grow to 153mm (617 g) indicating monthly growth of 14 mm (70 g) leading to production of 1700 kg/ha. In polyculture trials, the same yield is realised in addition to milkfish which grows to 346 mm (300g) from the stocking size of 20 mm. In mud crab maximum weight input is noticed when they attain the size of 12-13 cm. Males grow faster than females. The standard size for harvest is 14 cm by which size they weigh about 500g. This is the desirable size in export trade. Better production at 2000-2500 kg/ha were realised with fattening technology due to higher survival and faster growth in limited period.

Mud crab fattening in brackish water environment has become highly remunerative as reported by a number of farmers. At the stocking rate of 5000/ha and with optimum survival of 50% net production of 1200-1400 kg is easily attained which fetches a minimum income of Rs.2,50,000 in a period of 4-5 months.

REMARKS

Potential grounds and best season for the collection of seed and spawners have been identified. Suitable systems for farming, fattening and spawners management have been developed. Growth promoting factors in larviculture and rearing techniques for production of crab seed have been evolved for setting up a hatchery. Mud crab larvae are more tolerant to high temperature and salinity in tropical waters of southern peninsular area in India. Indiscriminate fishing of young and immature crabs are going on in commercial fishings grounds and such collections could be utilised for further fattening in ponds and cages according to size. The holding of female crabs in small ponds or cages until development of gonad proved to be most economically feasible technique in Thailand and the same can be widely followed in India. A fall in resources particularly in prominent fishing grounds indicates the effect of overfishing and stresses the need for proper management. Central Marine Fisheries Research Institute has accomplished good results in recent years both in hatchery techniques for seed production and farming. Fish farmers have derived the benefits through consultancy services from this Institute.