



MARINE FISHERIES INFORMATION SERVICE



No. 58

JUNE, JULY, AUGUST

1984

Technical and Extension Series

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

COCHIN, INDIA

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

THE MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of information on marine and brackish water fishery resources and allied data available with the National Marine Living Resources Data Centre (NMLRDC) and the Research Divisions of the Institute, results of proven researches for transfer of technology to the fish farmers and industry and of other relevant information needed for Research and Development efforts in the marine fisheries sector.

Abbreviation – *Mar. Fish. Infor. Ser. T & E Ser.*, No. 58: 1984

CULTURE OF LARVAE OF *SCYLLA SERRATA**

Introduction

A system has been designed and evaluated for mass rearing of the mud crab *Scylla serrata* (Forsk.) in the coastal ponds developed in intertidal mud flats at Tuticorin bay. Declining fisheries of this group throughout most of its range have stimulated a number of aquaculture ventures particularly in few Southeast Asian countries. It is a compatible species and reared profitably with milkfish. Stocking of ponds is dependent on the collection of small crabs from wild for fattening. The success of largescale culture depends upon the various management techniques including the development of hatcheries for the production of seed of this desirable species. A series of experiments were carried out during March-September 1983 and the larvae of the mud crab were successfully reared to crab stage under laboratory conditions for the first time in this Institute. The rearing techniques are simple and relevant for establishment of a hatchery.

Rearing of broods

Ovigerous crabs were obtained from commercial catches and reared in aquarium having suitable facilities with salinity of $32 \pm 2\%$ and temperature in the range of 26–30°C. Mother crabs were fed with meat of bivalves and shrimp during incubation period. Excess food and at least half the volume of water were removed from rearing tanks every day. The incubation period varied from 8–13 days. At the time of collection, the egg mass appeared completely yellow and compact and the eggs measured 280–380 μ in diameter. As development proceeded with the formation of the chromatophore and the eyes, the egg mass changed the colour to a greyish-yellow, brown, brownish-black and finally complete dark. An increase in the size of egg mass was also evident and the abdomen which was slightly curved became almost straight, continuous with the cephalothorax, and the telson was slightly tilted upwards at the end of incubation (Fig. 1). Later the egg mass became loosened and the abdomen made jerking movements

*Prepared by R. Marichamy and S. Rajapackiam



Fig. 1. Berried female in last phase of incubation.



Fig. 2. Newly hatched zoea larva.

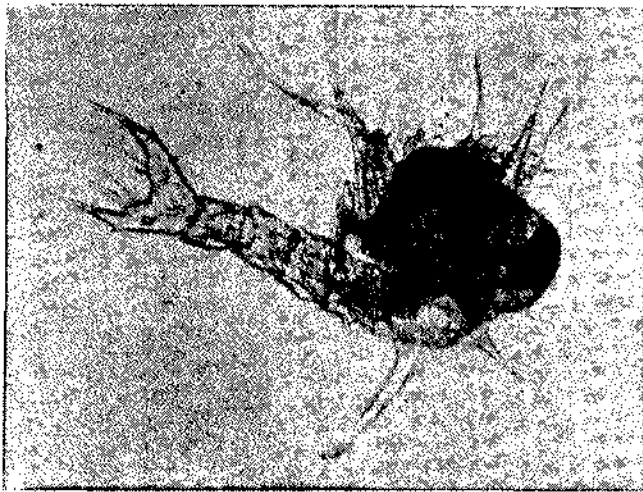


Fig. 3. Zoea V.



Fig. 4. Megalopa.

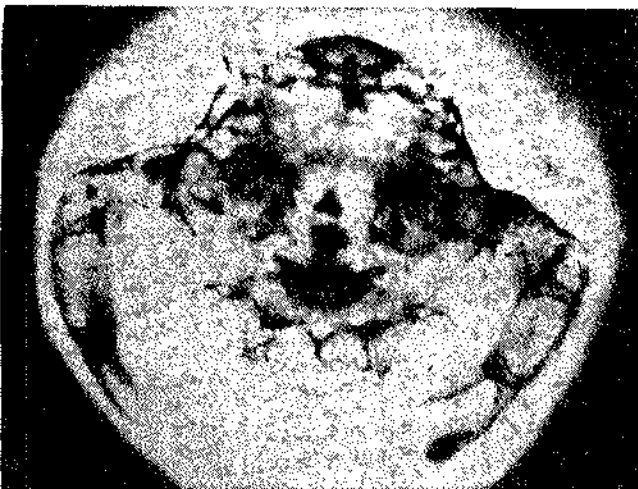


Fig. 5. Moult of first crab instar.

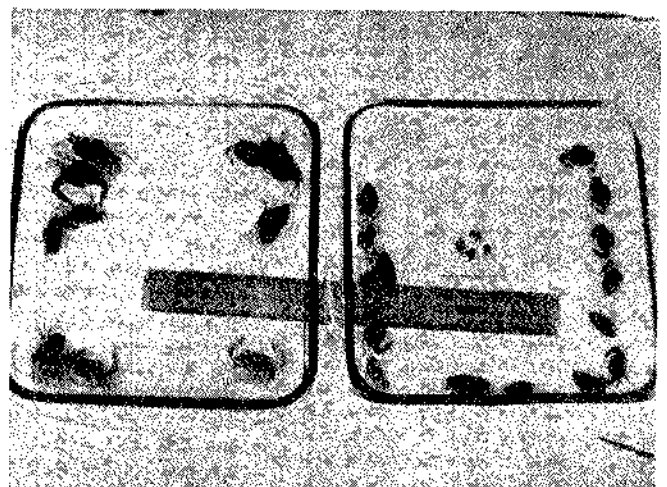


Fig. 6. Young crabs.

in quick succession while the second and fourth walking legs lightly jabbed at the egg mass. The mother crab was restless and by the frequent contraction of the abdomen, the larvae were released from the eggs. Most of the eggs hatched from the berry directly into zoea and a few as prezoa. The larvae were liberated normally around 6 A. M. and the process extended over a period of 2 hours. A maximum of 2 million zoea were hatched out on 18-4-1983 from a crab which measured 140 mm cw.

Larval development

Active newly hatched zoea (Fig. 2) were highly photopositive. These when congregated along water interfaces were transferred into different rearing tanks at a stocking density of 10-50/l. There were five zoea stages and one megalopa in the complete larval development of *S. serrata*. Each zoea took 3-4 days and the megalopa stage was attained on 18-20th day. Further metamorphosis was noticed after an interval of 8-11 days and thus the larval developments continued to 28-30 days to attain first crab instar. Heavy mortality was noticed during first, second and fifth zoea stages. The morphological changes of each stage were observed and recorded. Zoea I measured 1.2 mm while Zoea V measured 3.5 mm (Fig. 3). The cephalothorax of zoea has 4 spines, one dorsal, one rostral and two short lateral spines. All zoea stages except for the first have stalked compound eyes. The abdomen in all stages has lateral knobs on the second and third abdominal segments. Moulting in the zoea and megalopa took place by a split at the dorsal boundary between the cephalothorax and the abdomen. Megalopa resembled like a crab and swam by means of five pairs of pleopods which were functional for the first time. Prominent chelipeds were developed to catch prey (Fig. 4). Cannibalistic tendency was clearly indicated from this stage onwards. Carapace length including rostral spine measured 2.5 mm. A heavy mortality was noticed again when they turned into crab stage. The carapace length of first crab measured 3.2 mm while the width was 3.7 mm with slight variation. The length of the first crab instar in relation to the width was longer than in all later stages. Nine antero-lateral spines in carapace were formed and the abdomen was curved beneath the cephalothorax as in adult stage. The carapace, eye stalks and the periopods were marked with chromatophores which were able to change colour. The first crab instar moulted to second crab in 5 days period

(Fig. 5) and the moulting of second to the third instar took 4 days. A constant greenish-grey colour of carapace was noticed after the 7th moult. First instar crab although capable of sustained swimming, adopted an almost exclusive benthic habit.

Water quality and feeding

The preliminary study concerns the effects of water quality, antibiotics, phytoplankton and food on larval survival and development. It revealed several potential areas for more detailed research in larval biology. Several sea water treatments were conducted to determine their effect on larval survival and development. Filtered sea water was used directly or sterilized by passing water through a unit containing ultraviolet germicidal lamps. A commercial preparation of penicillin and streptomycin in powder form were used to minimize bacterial infection of crab larvae. Zoea and megalopa stages were maintained at salinity of $32 \pm 2\%$ at temperature varying from 25 to 30.5°C. Water was changed daily. The excess food settled at the bottom, as well as the moulted shell and dead larvae were siphoned out. Continuous aeration was provided in all tanks. Once in four days, samples were taken from the rearing tank and zoea were counted to provide estimates of the number of surviving larvae. The larvae were fed with different types of food. *Chlorella* sp. was added during first three days. Second and third zoea were supplied with rotifers as well as frozen *Artemia* nauplii. The later stages were fed exclusively with newly hatched nauplii of *Artemia salina*. Attempts were made to rear megalopa in diluted sea water and with food consisting of live copepods and macerated prawn meat. Loss of larval stock was controlled when megalopa were reared in small compartments or at lower stocking density with intensive feeding. After reaching crab stage (Fig. 6) the mortality was negligible at lower stocking density.

Remarks

Experiments conducted so far, in rearing the larvae were unfortunately of little commercial value and labour intensive. It calls for further investigation if laboratory production of the early crab stages as seed stock for culture in ponds is to be achieved. Efforts are in progress to culture the larvae of this valuable species. The present findings envisage the scope to develop the hatchery for the large scale production of crab seeds. An improved system is designed for a direct scale-up potential at Tuticorin Research Centre of Central Marine Fisheries Research Institute.

