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Part Two

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NATIONAL SYMPOSIUM ON RESEARCH AND DEVELOPMENT IN MARINE FISHERIES

MANDAPAM CAMP
16-18 September 1987

Papers Presented
Sessions III & IV

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
(Indian Council of Agricultural Research)
P. B. No. 2704, E. R. G. Road, Cochin-682 031, India

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Limited Circulation

EXPERIMENTS ON INDUCED MATURATION AND SPAWNING
OF TIGER PRAWN (*P. MONODON* FABRICIUS) THROUGH
EYESTALK ABLATION

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ABSTRACT

Details of experiments on the ovarian maturation of *P. monodon* through eyestalk ablation in the brackishwater impoundments (bheries) in the lower Sunderbans areas of West Bengal are given. Immature females of tiger prawn (100 g and above) cultured in a bheri (65 ha) were ablated uni/bilaterally and kept with an equal number of healthy mature males (80 g and above) in split bamboo enclosures (2.25 m x 2.25 m) in the impoundment. The test animals were fed twice daily with the minced flesh of freshly caught penaeids and bivalves from the area. Fast gonadal maturation and subsequent spawnings were observed in a period of 10-21 days after the ablation. The prospects of setting up a seasonal tiger prawn hatchery during the dry months of February-July when the fast rate of water evaporation in these shallow coastal water bodies renders the salinity (26-32 ppt) highly suitable for undertaking this venture are discussed.

INTRODUCTION

Much emphasis is given to the controlled reproduction of *P. monodon* due to the highly unstable and limited availability of its post-larvae from the natural habitats. The technology has been more or less standardised (Primavera, 1985). Efforts have been made by various workers (Lio, 1973; Arnstein and

Beard, 1974; Alikunhi *et al.*, 1975; Muthu and Laxminarayana, 1977; Santiago, 1977; Halder, 1978; Primavera, 1978; Beard and Wicken, 1980 and Ruangpanit *et al.*, 1985) to induce gonadal maturation in captive females of the species using eyestalk ablation. All these attempts with varying degrees of success were made either in various matura-

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tion system using sea water or in earthen tanks very near to the coastline. Details of an experiment in inducing maturation and spawning of *P. monodon* in brackishwater impoundments (bheries) located more than 100 km from the main sea (Bay of Bengal) are embodied in this communication.

MATERIAL AND METHODS

Twenty healthy females (100-112 g) were collected from a brackishwater impoundment of roughly 65 ha in the Dwarir's jungle area. Ten of the females were ablated unilaterally and the rest ten, bilaterally following the technique given by Primavera (1978). After first eyestalk ablation, the females were allowed to recover for 2-3 days before ablating the 2nd eyestalk. The uni and bilaterally ablated females were kept separately with an equal numbers of healthy mature males (av. wt. 80-84 g) in split bamboo enclosures (2.25m x 2.25m) installed within the same impoundment (Fig. 1.) The split

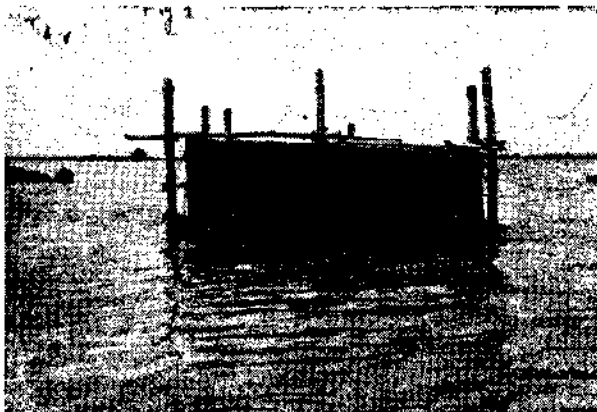


Fig. 1 Split bamboo enclosure in the impoundment to keep ablated females

bamboo *pattas* which were woven tightly at several points were pushed upto 30 cm into the bottom mud and strengthened by means of strong horizontal and vertical bamboo poles. The enclosures were covered with nylon netting cloth to protect the shrimps from predatory birds and snakes from above. The prawns were fed twice daily with fresh flesh of penaeids and bivalves @ 20%

body weight using feeding trays. A small quantity of widgeon grass (*Ruppia maritima*) was occasionally put into the enclosures for providing shade and shelter to the test animals. Water level in the enclosures ranged between 0.9-1.10 m and a strong wave and wind action, normally prevailing in the large water spread helped in maintaining high dissolved oxygen values (4.3-16.0 ppm). The *bamboo pattas* were cleaned regularly using a hard coir rope brush to prevent any algal or fungal growth. Various physico-chemical parameters were recorded at regular intervals. Salinity ranged between 26.2-30.0 ppt; temperature, 28.3-31.7°C; dissolved oxygen 4.3-16.0 ppm and pH 7.6-8.4. The brooders were observed regularly for gonadial maturation. On attainment of stage IV (Rao, 1968), one female was transferred to a plastic pool (1000 l) containing clear filtered water from the same impoundment and aerated continuously. In the absence of proper equipment / facilities, observations were made only upto the hatching out of nauplii. Details of the experiment are furnished in Table 1.

RESULTS AND DISCUSSION

As seen in Table 1, there was a cent percent survival of the unilaterally ablated females, while 20% of the bilaterally ablated females did not survive. Whereas, only 7 out of the 10 unilaterally ablated females became fully mature (stage IV), 7 of the 8 surviving bilaterally ablated females became fully mature. However, viable spawnings could be obtained only from 3 unilaterally and 2 bilaterally ablated females due to the limited facilities available at the experimental site (field). Similar results were also obtained when induced maturation experiments were conducted in a large brackishwater impoundment in the lower Sunderbans at Deulbari area consecutively for three years viz. 1983, '84 and '85. Results of these experiments have been reported somewhere else. In fact, the number of days required to attain full maturation was only 7-8 days at this place where water salinity is not only more but is also free from any agricultural, domestic or

Table 1: Details of induced maturation/spawning of *P. monodon* females

Date of ablation	Total nos ablated	Body length (mm)	Body weight (g)	Nos. survived	Nos. attaining stage IV	Date of spawning	Estimated number (1000)		No. of days	Remarks
							Eggs	Nauplii		
30.7.82	10	240	103	10	5	20.8.82	205	122	21	Spawning could be obtained only from 3 uni and 2 bilaterally ablated females due to limited facilities available.
30.7.82		232	100			23.8.82	194	61	24	
30.7.82		237	101			24.8.82	78	46	25	
30.7.82	10	244	107	8	7	10.8.82	92	33	17	
30.7.82		250	112			9.8.82	117	70	10	

industrial pollution and highly suited for setting up a tiger prawn hatchery. The minimum period required to attain full maturity was 21 days in case of unilaterally ablated ones as against only 10 days in case of the bilaterally ablated females. Ruangpanit *et al.*, (1984) obtained gravidness in 51% of the unilaterally ablated females collected in the Phuket area, a natural spawning ground, as against only 19.51% in Songkhla lake in Thailand which is not a spawning area of *P. monodon*. Santiago (1977) reported 0 and 38 per cent mortality of bi and unilaterally ablated females of *P. monodon* respectively, after a period of 196 days. Change of environment and the ablation stress are the two important factors, besides handling and nutritional deficiency etc. generally responsible for mortality of the ablated females. Almost cent percent survival of the bilaterally ablated females could be obtained by allowing the first eyestalk to fully recover for 2-3 days before ablating the second one. Further, after ablation the brood stock was carefully maintained in bamboo enclosures installed within the same impoundment where they had been grown from the postlarval (10-12 mm) stage without effecting any change in the environment. The diet of fresh flesh of penaeids and bivalves rich in polyunsaturated fatty acids have helped in successful maturation and spawning of the ablated females. Aquacop (1977) obtained similar results when fresh troca univalves were

fed to early maturing ablated *P. monodon*. A strong wave and wind action which normally prevailed in the large coastal water body, not only helped in keeping the maturation chambers pollution free by flushing away the metabolites and left over foods, but also maintained high dissolved oxygen values. Santiago (1977) observed that dissolved oxygen values above the saturation point helped in inducing gonadal maturation in the ablated females. The fact that most of the brackishwater impoundments (bheries) are of large size (40 ha and above) and shallow, which facilitates fast rate of evaporation (to attain desired high salinity) can be made use of for installation of the maturation chambers. Such chambers do not require artificial aeration/water circulation which otherwise, is rather difficult/quite expensive in the absence of an existing electric supply in the Sunderbans. Although most of the bheries are drained and dried every year during November-December, some population of shell/fin fish including *P. monodon* is retained in a deeper canal (a common feature in most of the bheries). These old stock of tiger prawn which are sufficiently large (100 g and above) can be used as the brood stock. Artificial feeding of the brood stock which normally becomes a problem or needs storage facilities can easily be done by utilising the palaemonid/mussel meat, locally available in plenty. Once the females become fully

mature they can be transferred to the spawning and larval rearing tanks. The newly transformed postlarvae can be transferred to nursery pens installed within the same large impoundment thereby minimising expenditure on aeration/water circulation and management. This will also drastically cut down the initial capital costs normally incurred towards the procurement of fibre glass and concrete nursery rearing tanks. The same hatchery facilities can be utilised for breeding and larval rearing of the giant freshwater prawn (*M. rosenbergii*) during July-September months when water salinity comes down to 10-12 ppt in the lower Sunderbans but is still suited for this purpose. The seed so produced can be utilized for stocking the freshwater ponds as well as bheries in the upper zones during the low salinity periods of July/August to November/December. This species too has a great demand in the domestic as well as the international markets.

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REFERENCES

- ALIKUNHI, K. H.; A. POERNOMA; S. ADI-SUKRESNO; M. BUDIONO AND S. BUSMAN, 1975. Preliminary observations on induction of maturity and spawning in *Penaeus monodon* Fabricius and *Penaeus mergulensis* de Man by eyestalk extirpation. *Bull. Shrimp Cult. Res. Cent.*, 1:1-11.
- AQUACOP, 1977. Reproduction in captivity and growth of *Penaeus monodon* Fabricius in Polynesia. *Proc. World Maricul. Soc.*, 8: 927-945.
- ARNSETEIN, D. R. AND T. W. BEARD, 1975. Induced maturation spawning of *Penaeus orientalis* Kishinouye in the laboratory by means of eyestalk removal. *Aquaculture* 5:411-412.
- BEARD, T. W. AND J. F. WICKINS, 1980. Breeding of *Penaeus monodon* Fabricius in laboratory recirculation systems. *Aquaculture*, 20: 79-89.
- HALDER, D. D. 1978. Induced maturation and breeding of *Penaeus monodon* under brackishwater pond conditions by eyestalk ablation, *Aquaculture*, 15: 171-174.
- LIAO, I. C. 1973. Notes on the cultured spawner of red-tailed prawn *Penaeus penicillatus* Alcock. *JCRR Fish. Ser. No. 15*: 59-65.
- MUTHU, M. S. AND A. LAXMINARAYANA 1977. Induced maturation and spawning of Indian penaeid prawns. *Indian J. Fish.* 24: 172-180.
- PRIMAVERA, J. H. 1978. Induced maturation and spawning in five month old *Penaeus monodon* Fabricius by eyestalk ablation. *Aquaculture*, 13: 355-359.
- RAO, P. V., 1968. Maturation and spawning of penaeid prawns of the Southwest Coast of India. Rome, *FAO* 2: 285-302.
- RANGPANIT, N., S. MANEEWONGSA, T. TATTANON AND P. KRAISINGDEJA, 1984. Induced ovaries maturation and rematuration by eyestalk ablation of *Penaeus monodon* Fab. collected from Indian Ocean and Songkhla Lake. *First Intl. Conference on the Culture of Penaeid Prawns/Shrimps*. Iloilo City, Philippines, 4-7 Dec. 1984, 6 pp+5 tables.
- SANTIAGO, A. C. Jr., 1977. Successful spawning of cultured *Penaeus monodon* Fabricius after eyestalk ablation. *Aquaculture*, 11: 185-196.