

Fattening of mud crab *Scylla serrata* in estuarine region of south-eastern West Bengal, India

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Adult crabs in market.

Crab fattening as a livelihood generating activity

Live mud crab *Scylla serrata* of large size has gained in importance due to its high export value and good overseas demand. Its export from India has increased markedly over the last fifteen years with the boost occurring after the introduction of crab fattening. In the Indian Sundarbans region in south-eastern West Bengal, agricultural crops are not high yielding due to the salinity of soil. The availability of commercially-important fishes and their stock in brackishwater rivers and creeks has been gradually decreasing during recent years, thus impeding fishing activities. Many households in coastal belt of West Bengal collect riverine tiger shrimp (*Penaeus monodon*) post-larvae but it has a long-term negative impact on aquatic biodiversity. Commercial *P. monodon* farming has also suffered multiple setbacks mainly due to flare of viral diseases.

In this context, mud crab offers an alternative to *P. monodon*. In crab fattening, the turnover is fast, the period between investment and return is relatively short, a lower level of

investment and risk is required, costly pelleted feed is not required and it can be practiced in small water bodies. Crab fattening has emerged as a promising component in coastal aquaculture and as a profitable vocation with prospect of high returns in Indian Sundarbans, as a result of which the activity has spread organically amidst the North and South 24 Parganas districts.

Crab fattening in small enclosures

During July-August 2018, I held conversations with three well-established and professional crab fatteners in the estuarine region of North and South 24 Parganas to gain knowledge on the state-of-the-art of fattening of *S. serrata* meant exclusively for export to Singapore, Malaysia and China. Sri Oli Ahmed Mollah at Village Dhamakhali in North 24 Parganas is maintaining nine earthen chambers of 160-180 m² each, water depth 1.2 m, located at the confluence of two tidal rivers, the Kalagachhia and Rampur. In each of these tide-fed crab fattening enclosures have been established with strong net fencing supported by split bamboo screens up to a height



Chambers of Sri Jana.

of 1.8 m from the bottom. Sri Mollah stocks male and female crabs separately, of size 200-500 g and 150-250 g, respectively @ 100kg/chamber. These are bought @ Rs 300-500/kg from fish merchants of Dhamakhali market supplied by crab collectors of the Indian Sundarbans region.

Crabs are fed daily with cut pieces of fresh brackishwater finfishes *Johnius* sp. (Rs 25-40/kg), *Setipinna phasa*, *Coilia dussumieri* and sometimes *Tilapia nilotica* @ 10% of body weight. Sri Mollah fattens his stocked crabs for 15-16 days during June-July to October and 25 days during November to February-March, within which their shells are hardened with an additional weight of 40-50gm as they gain meat. Ripe ovaries develop in females. He supplies the healthy ready-for-market crabs (males 500-700 g; females 250-300 g) in early morning to a company in Baghajatin area in south-eastern Kolkata, who are eminent exporters of live mud crab. He gets Rs 650-800/- per kilogram of fattened crabs and earns a profit of Rs 9,000-24,000/- from 90kg produce in 15 days (considering 90% survivability). Crabs fetch a much higher price in winter (Rs 900/kg). Excluding the period April to June, crab fattening is done here round the year. After two successive crops, Sri Mollah drains the water from the fattening chambers and applies CaCO_3 @ 12kg and Zeolite @ 4kg/160 m² mixed with bottom earth to eliminate obnoxious gases. Oxygenation of water is carried out when crabs rise up to the surface and cling onto the net screen.

The crab fattening methodology of Sri Jagannath Jana at Village Rampur Khiristola is quite similar. Sri Jagannath owns a total 2,880 m² water area; a set-up comprising five chambers of 240 m² each, three chambers 360 m² each and the largest one 600 m². Water exchange takes place in each daily at depth of 0.45 m via tidal influence of Bidyadhari River. Sri Jana stocks 250-300 male and 450 female crabs separately in every 240 m² area (total weight 100kg; females 180-250 g, males 400 g) and applies 8kg feed daily for every 100kg crabs. He realizes a high demand during winter. After one crop, he applies 5kg CaCO_3 , 1kg bleaching powder and 1.5kg Zeolite / 240 m² over water mass and subsequently the bottom mud is raked. Sri Jana supplies his harvested fattened crabs (carapace width 13-16cm) in the forenoon hours to an agency reputed in mangrove crab exports near Muchipara Police Station in Sealdah, Kolkata via an auction point in Canning Fish Market and gets Rs 600-700/kg produce. Export trade of fattened live mud crabs of the Indian Sundarbans is undertaken by nine exporters located in and around Kolkata¹. Sri Jana has experienced higher mortality of stocked crabs during summer. In cases when fishermen go for long duration trips in the deeper waters of Matla and Thakuran estuaries, wild-caught adult crabs are kept on-board for 3-4 days before being sent to market. Such crabs are stressed probably vulnerable to infection, Sri Jana opined.



Sri Mollah with male crab that needs fattening.



Female crab needs fattening.



Crab fattening boxes on a raft.

Buying crabs for fattening

Live *S. serrata* are caught by marine fishermen and crab collectors from the Sundarbans delta in sizes of 350-400 g (2.5-3 individuals/kg), 250 g and others. There are five grades of weight of male crabs which are bought by crab fatteners, with price varying from Rs 300-350/kg for 100-150 g size to Rs 450-700/kg for 400-500 g males. There are two grades of females sold at Rs 350-450/kg for 150-200 g and Rs 500-600/kg for those above 200 g. These are also available at Najat, Sorberia, Amtoli, Malancha, Brindaban Bazar, Chunokhali, Taldi, Canning wholesale fish and shellfish markets. Mud crabs grow up along the rivers and canals namely the Saptamukhi, Thakuran, Matla, Bidyadhari, Gosaba, Herobhanga and Raimangal in the Indian Sundarbans, also reckoned as estuaries. Important mud crab landing areas in the two districts are Basirhat, Basanti, Sonakhali, Port Canning, Kakdwip, Satjelia, Kumirmari and Namkhana. Both grow-out crab culturists and crab collectors supply healthy live adult crabs to the markets. Among those caught, Sri Mollah, Sri Jana and other crab fatteners choose soft-shelled females with under-developed ovaries and males

(somewhat lean) that have to grow to fill their new shells with meat (after moulting). Such adult crabs (CW: 8-14cm) are not accepted in export trade and thus need fattening.



Crabs undergoing fattening in boxes.



Crab fattening chambers of Sri Mollah.



Crab fattening chambers of Sri Jana.



Sri Majumdar with crab fattening box.

Plastic boxes for crab fattening at Namkhana

In order to prevent cannibalism among crabs and increase yield of fattened mud crabs, since December 2017, Sri Dibakar Majumdar at Village East Ganeshnagar South 24 Parganas has adopted the advanced Vietnamese concept of crab fattening technology in durable, perforated and submerged-type boxes in his 3,000 m² pond (90 m x 36 m; depth: 1.2 m), and is the first person to introduce the technology in West Bengal. He stocks females with an infirm outer covering and under-developed ovary individually in each box. His pond is within the tidal influence of the Saptamukhi River; 20% water is exchanged on every full moon and new moon. Boxes are positioned on floating rafts made of eight parallel 5 cm PVC pipes; one such raft holds up to 1040 boxes from one end of pond to another. Five rafts can be positioned in the pond at one time. Sri Majumdar is also a manufacturer of fattening boxes with the emblem 'Bengal Mud Crab Aquaculture', each 33.5cm long, submerged portion 14.4-16.5cm high, made of durable plastic, weighing 720 g with 6-7 years longevity and sold @ Rs 200/piece.

Female crabs 150-180 g size (Rs 300-350/kg) are stocked; *S. serrata* of the Indian Sundarbans region and those brought from Gujarat are fattened here for 25 days and 42-45 days respectively. At times when the supply of small-sized *Johnius* sp. and other fishes (Rs 20-25/kg) are insufficient, soft-shelled snails, mussel meat and pieces of *Tilapia nilotica* are fed to crabs @ 10% of body weight daily. It is easy to monitor the

condition of crabs undergoing fattening in boxes, and individual feeding results in higher feed utilisation, Sri Majumdar opined, who is maintaining a stock of 7,000 boxes. Fattened females with 25-30 g increase in individual weight are sold @ Rs 750-800/kg and air-lifted to Singapore on same evening. Sri Majumdar applies 30kg dolomite in the pond at an interval of 15-18 days. He is doing grow-out monoculture of baby mud crabs (50-80 g), *Mystus gulio* and monosex tilapia in his other three brackishwater ponds of 3,000-3,500 m² each. Sri Majumdar estimated an income and net benefit of Rs 57,600/- and 22,600/- respectively from a crop of 45 days; considering 500 female crabs are fattened in boxes in 640 m² water area and 180-200 g weight of each at harvest with 80% survivability.

End note

According to three crab fatteners, profit from tiger shrimp *P. monodon* farming is not guaranteed every year. Profit margin is realized after six months of farming but in *S. serrata* grow-out culture and fattening, it is realized from the third month. In these two districts, crab fattening is usual in the Gosaba, Basanti, Minakhan, Hingalganj, Hasnabad and Sandeshkhali areas. At times when flight service from Kolkata airport to importing countries is irregular, traders and agents keep the live produce with them for 2-4 days and fatteners get a price of Rs 150-200/kg less for the crabs supplied. Better economic return is realised from crab fattening in comparison to grow-out culture. In recent years, there is a rapid growth



Adult crabs in market - smaller size.



Another view of Sri Majumdar's pond.



View of Sri Majumdar's crab pond.



Large crab still needs fattening.

of crab markets in West Bengal². Mud crab traders and exporters in Kolkata sort the fattened crabs supplied to them into specific grades and accordingly fatteners are paid. Sri Majumdar stated that during November to January of the next year, the price of female fattened crabs reaches up to Rs 1800-2100/kg. In addition to male fatteners, appropriate training and extension services are expected to enhance the skill and knowledge of women involved in crab fattening in deltaic Sundarbans³.

References

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Author left with crab farmers at Gosaba.



Crabs brought for fattening.