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Present Status, Constraints and Potentials of Mud-crab Culture in West Bengal

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ABSTRACT

Background: Mud crab (*Scylla serrata)* farming offers better prospects for all sections of rural people, particularly those who have a poor land base and an abundant labour force. It offers reliable incomes to both small and large farming operations, but there are several barriers to crab farming that limit its potential.

Methods: The present study was conducted in three randomly selected villages of Gosaba block in the South 24-Parganas district of West Bengal, which has the highest concentration of crab farmers. Three villages from the Lahiripur Gram Panchayat area of Gosaba block were selected by simple random sampling without replacement technique. A total of 60 crab farmers were randomly selected for the present study. Data were collected with the help of a specially constructed structured interview schedule and non-participant observational technique.

Result: The findings of the study showed that the majority (61.67%) of the respondents practiced traditional crab culture techniques and 83.33 per cent preferred the November-February months of the year as an ideal time for crab farming. A good number of respondents (68.33%) reported that they collected seeds from wild sources, *i.e.*, swamps and deserted water bodies. It was conspicuous from the present study that the majority of the respondents used *Puntias sp.* as supplementary feed. The major diseases of crabs in the study area were ulcers on carapace, necrosis of appendages and fungal diseases and they applied lime and potassium permanganate ($KMnO_4$) to get rid of these diseases. Lack of crab seeds emerged as a prime constraint, followed by marketing problems, transport problems, credit problems and problems related to diseases.

Key words: Crab culture, Crab fattening, Crab farmer, Fishery, Mud crab.

INTRODUCTION

Aquaculture of the mud crab has been practiced for past hundred years in China. Nowadays crab culture is also very common in India, as well as in many Asian countries. India is the second largest fish producing country in the world accounting for 7.56 per cent of global fish production along with crustaceans and mollusks of about 161.87 lakh tons in 2021-22. In 2021-22, India had exported 13,69,264 MT of seafood worth Rs 57,586.48 crore (US$ 7,759.58 million) (Ministry of Commerce and Industry, PIB Delhi, 2023). Out of which Crab exports (excluding imitation products) was about 6938 MT. Mud crabs are the perfect species for live export to foreign nations and the domestic market because they are resilient and can survive out of water for prolonged periods of time at lower temperatures. In addition, mud crab is less susceptible to disease, easier to culture and is even able to live without water for a certain time (Salam *et al.,* 2012). As larval rearing of crab has not yet reached a commercially viable level for stocking into aquaculture farms, the crab culture production mostly relies on wild caught stock and somewhat on grow out culture method and crab fattening method mainly in mangrove regions. China, Vietnam, Indonesia, Philippines *etc.* are the leading countries in crab production due to their mangrove area, as crabs are most likely to live in shaded bushes of the mangroves and enjoys hiding (Huang and Zhang, 2009). They can also have good natural food source from the mangroves.

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West Bengal coast has large numbers of estuaries, rivulets, mangrove swamps, flowing mudflats and saline water bheries. It upholds around 150 types of crabs. Among the consumable species, two broadly perceived and plentifully accessible mud crab species, *Scylla serrata* (Forskal) and *Scylla tranquebarica* (Fabricius), famously known as Nona kankra, are considered as the most esteemed species around here.

There are four species of mud crab that is- *Scylla serrata, S. tranquebarica, S. paramamosain* and *S. olivacea* that are the focus of both industrial fisheries and aquaculture production throughout their circulation. The largest species, generally referred to as green crab, that is *Scylla serrata*, whereas *S. olivaceae* has orange to reddish coloring on its

carapace and claws. The majority of their commercial production is delivered live to market, making them one of the most valuable crab species in the world. Mud crab culture still has a lot of variations compared to other types of aquaculture practices, including the use of seedstock gathered from the wild as well as produced in a hatchery; farming systems that range from very extensive to intensive, monoculture to polyculture; and farm sites that range from mangrove forests to well-built aquaculture ponds or fattening cages. As a result, there is no one best method for raising mud crabs, but there have been established strategies, technologies and concepts that can be customized to match the demands of farmers and governments looking to establish mud crab aquaculture businesses. The subtle biological differences among the four species of *Scylla l*ead to variances in the most effective methods of aquaculture production. Farmers, researchers and extension personnel may need to modify findings from other species to fit their preferred species of mud crab and local environmental factors where variances are known and documented. Mud crabs can still be viewed as being in an early stage of development when compared to many other species that are the focus of industrial-scale aquaculture, as the use of formulated feeds for them is still in its infancy and little work has yet been done to improve stock performance through breeding programs. Presently, mud crab has emerged as an alternative livelihood, a source of income and nutrition and an innovative way of helping vulnerable littoral communities adapt to a changing climate (Rahman *et al*., 2017). North 24 parganas, South 24 South 24 Parganas, Purba Medinipur these three districts have brackish water resources so, crabs are generally cultured in these three districts of West Bengal. Brackish water is essential for culture of mud crab (*Scylla serrata*). Based on the outcomes of pilot study, it was found that among the three districts, South 24 Parganas has the highest concentration of crab farmers. So, keeping all the points in view the latest study was conducted to know the present status, potentials and constraints related to crab farming.

MATERIALS AND METHODS

To conduct the study scientifically, a suitable research design was evolved in order to arrive at an authentic conclusion. Out of 29 blocks in South 24 Parganas district, Gosaba block was purposefully selected as the maximum number of crab farmers were living in this block, as well as a good number of traders and exporters who were engaged in the successful running of crab fisheries in this block. Out of 14 Gram Panchayats in the Gosaba block, Lahiripur Gram Panchayat was selected purposefully, as this Gram Panchayat has the highest concentration of crab farmers. Out of 10 villages in the Lahiripur Gram Panchayat, three villages, namely, Lahiripur, Chargheri and Parasmoni, were selected by simple random sampling. Thus, a total of 60 crab farmers were selected from these three villages for the present study. Data were collected with the help of a structured interview schedule and non-participant observational techniques in 2021. Socio-economic and marketing methods were measured with the help of standard extension tools and techniques. Appropriate statistical measures like parametric, non-parametric and descriptive statistical tests were used to interpret the data (Ghosh *et al.,* 2013).

RESULTS AND DISCUSSION

Present status of mud-crab culture

Type of culture

The findings of the study revealed that the respondents adopted three types of culture practices for crab farming, *i.e*., traditional, semi-intensive and intensive culture practices. It can be mentioned here that those farmers who consulted with FEO or members of a cooperative society adopted crab culture in a scientific or semi-scientific way.

Data in Table 1 show that out of 60 farmers, the majority (61.67%) practiced the traditional culture method, followed by 35 per cent of farmers who practiced semi-intensive culture in the study area. Similar findings were found by Rahman *et al*. (2017). Whereas only 3.33 per cent of crab farmers did intensive farming.

Season of culture

Generally, crab farming depended on the source of seeds and market demands. It was clear from the study that 83.33 per cent of respondents cultured from November to February and short duration of culture found to be more profitable in India. Result is similar with the findings of Sathiadhas and Najmudeen (2004); Dana *et al.* (2015). The rest of the farmers-16.67 per cent-cultured throughout the year, presented in Table 2. November to January was referred to as the peak season, as told to the researcher. The farmers who did not culture throughout the year did agriculture farming, deep sea fishing in Andaman and Nicobar Islands, or labour work outside in urban areas.

Source of seeds

Seeds are the most critical input for crab farming. Out of 60 crab farmers, 68.33 per cent reported that they collected crab seeds from the seed collector. Similar findings were drawn by Salam and Ross (2000); Rahman *et al.* (2018).

Table 1: Distribution of respondents according to type of culture (N=60).

Category	Frequency (Nos.)	Percentage (%)
Traditional	37	61.67
Semi-intensive	21	35.00
Intensive	2	3.33

Table 2: Distribution of respondents according to season of culture (N=60).

Category	Frequency (Nos.)	Percentage (%)
November-February	50	83.33
Throughout the year	10	16.67

Table 3: Distribution of respondents according to source of seeds (N=60).

Category	Frequency (Nos.)	Percentage (%)
From seed collector	41	68.33
From creek and river mouth	7	11.67
From middlemen	12	20.00

Table 4: Distribution of respondents according to medicine used (N=60).

Category	Frequency (Nos.)	Percentage (%)
No medicine	18	30
Lime	36	60
$KMnO_4$	6	10

Almost 11.67 per cent of crab farmers collected seeds from creeks and river mouths and only 20 per cent of crab farmers collected seeds from the middlemen, presented in Table 3.

Feeding practices

The findings of the study showed that crab farmers generally used supplementary feed for crab farming; they also used various minor carps like *puntius sp.* as supplementary feed. Similar results were reported by Syafaat *et al.* (2019).

Potentials of mud crab culture

The marketing system depends on so many things, like demand, supply, import-export system, *etc*. The information about the marketing system helps to clear up the picture of the present status of crab farming. Crab farming provides new opportunities for lucrative exports and particularly commands a sizable market in Japan and the USA. As crabs contribute significantly to the protein intake of people of different ages, their size, high meat yield and delicate flavour are sought after as quality food items. In the study area, most of the crab yield is traded directly from the nearby Gosaba or Canning markets to the local consumers. Besides, middlemen and exporters also play a vital role in marketing. Crab meat is very expensive nowadays due to its food value, taste, flavour and size. Currently, crab is sold at Rs. 400 per kg in the local market.

Constraints of mud crab culture

General problems

Lack of crab seeds due to degradation of the natural breeding ground of crabs was found to be the greatest problem among all of the crab farmers undertaking crab farming in the study area. Marketing problems, lack of a transport system, problems related to enough capital, as well as sanctioning bank loans for crab culture, *etc*. were also the pivotal problems faced by the farmers. Besides the minor problems like rearing technique, more scientific culture procedures, cannibalism behaviour of crabs at the time of grow-out culture and technical and financial support regarding culture and trading, similar findings were drawn by Rahman *et al*. (2017); Rahman *et al*. (2020).

Incidents of diseases

The findings of the study revealed that the major diseases of the mud crabs in the study area were ulcers on the carapace of crabs, necrosis of appendages and other various fungal diseases in crabs. Necrosis of appendages mainly affects crabs through the causative agent Muscle necrosis virus, an icosahedral virus in cultured mud crabs causing 'sleeping disease' characterized by muscle necrosis. Experimental infection with 80-100 per cent mortality was observed by various routes of infection. Crab carapace ulcers are mainly caused by fungal infections in crabs because mud crabs live on the bottom, so the spread of various fungal infections is common. Liew *et al*. (2023) reported that disease outbreak of mud crab was one of the major constraints.

Medicine used

It is very overwhelming that the farmers were not using any commercial medication; they mostly depended on traditional treatments like lime or $KMnO_4$ treatment, presented in Table 4.

CONCLUSION

Fisheries turn themselves into profitable businesses due to increasing innovations and modern technology. But although crab farming in west Bengal is always kept in the dark, in recent years, there has been a rapid growth of crab markets in West Bengal. The coastal and estuarine waters of West Bengal provide a large quantity of crabs that can be exported. But the crab fishery in West Bengal is moving away from traditional farming and towards intensive farming. The crab farmers face the problems of that area. The crab farmers in the study area should be uplifted sustainably. It is urgently needed to give social recognition to crab farmers so that they can get enough credit when they need it. Greater emphasis is needed to provide the raw materials, like crab seeds and proper marketing channels. For the effective and meaningful economic development of crab farmers, the malpractices of middlemen should be minimized. Need-based training should be imparted to the crab farmers regarding cultural practices and marketing techniques so that it may help them to make good decisions and improve their knowledge and skills. For proper economic development, concerted educational efforts are needed to educate the crab farmers regarding the adoption of scientific crab culture practices. Necessary information should be provided on demand for the quality of crabs in the overseas market. The result of the research will help fishery extension personnel to know the lacuna of the crab cultural practices and the problems faced by the farmers during culture practice. It will help in the development planning and implications of various extension programs by policymakers, administrators and researchers in a more scientific and positive way.

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Conflict of interest

The authors declared that they have no conflict of interest.

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