



## A study on the mud crab (*Scylla serrata*) fattening practices and its overall importance

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### Abstract

Advances in hatchery and nursery protocols are fostering a more sustainable trajectory for the mud crab industry. By disseminating critical expertise in larval rearing and selective breeding, this research optimizes culture conditions and enhances our collective grasp of breeding and fattening practices. Such insights are instrumental in securing the future of mud crab aquaculture, a sector of significant global economic importance. Furthermore, mud crab fattening remains a highly lucrative venture, characterized by rapid harvest cycles, minimal overhead, strong survival metrics, and robust consumer demand. As these crustaceans continue to serve as a vital export commodity, the prospects for large-scale, sustainable crab farming remain exceptionally promising.

**Keywords:** Aquaculture, hatchery, culture, mangrove, export, feeding, marketing

### Introduction

For many years, the coastal export market was dominated by shrimp production. Lately, however, mud crabs have gained significant traction as a high-value commodity. Often called mangrove or green crabs, these crustaceans are naturally abundant in the estuaries and brackish waters of the Indian and Pacific Oceans. In many parts of Asia, they are traditionally harvested alongside fish or shrimp in integrated farming systems. While Southeast Asian nations have cultivated mud crabs for decades usually by fattening wild-caught juveniles the industry is still emerging in South Asia (Samarasinghe *et al.*, 1992) <sup>[6]</sup>. Because global demand consistently outstrips supply, wild populations are under immense pressure. Consequently, there is an urgent need to shift toward formal, controlled crab aquaculture, an endeavour that Azam *et al.*, (1998) <sup>[4]</sup> noted is becoming a popular and viable livelihood for coastal communities.

The genus *Scylla*, commonly referred to as mud or mangrove crabs, is characterized by rapid growth rates and significant body size. These crustaceans are widely distributed across the Indo-Pacific, thriving in estuarine, intertidal, and offshore environments, particularly within mangrove ecosystems (Keenan, 1999; Devi *et al.*, 2017) <sup>[8, 9]</sup>. As a staple of small-scale coastal fisheries across tropical and warm temperate regions, these crabs are prized for their substantial meat yield and refined taste. Furthermore, their impressive nutritional profile—comprising 13.6g of protein, 3.8g of fat, 14.1g of ash, and 68.1g of moisture per 100g serving—has established them as a premium commodity in both domestic and global seafood markets.

Mud crab fattening has become an increasingly attractive business opportunity due to its low overhead costs and significant potential for high returns. This practice has provided a reliable livelihood for many. The species, known scientifically as *Scylla serrata* and commonly called the black or mangrove crab, is ecologically significant. They thrive naturally in the mangrove swamps and estuaries found throughout the Australian, African, and Asian continents.

### Feeding the Mud Crabs

To effectively fatten mud crabs, prioritizing high-quality nutrition is essential. Feed the crabs twice every day, opting

for bivalve meat or fresh fish (either small or chopped). The portion size should be calculated based on the crab's weight, typically ranging from 5% to 10% of their total body mass. Throughout the process, perform regular weight checks to track progress. Keep the cages clean by removing trapped seaweed and debris; this prevents damage and keeps the water circulating properly. Feed can be given by broadcasting it into the cage or by using feed trays.

Mangrove crab fattening is a long-standing practice throughout Southeast Asia, widely recognized as an environmentally friendly aquaculture approach (Mirera, 2011) <sup>[19]</sup>. Private enterprises initiated this technique to fulfil the high volume of domestic and international orders by accelerating the growth of marketable crabs (Samarasinghe *et al.*, 1991) <sup>[22]</sup>. Typically, these operations involve a short 15- to 20-day fattening cycle, allowing consumers to savor the succulent meat of large males and the vibrant roe found in gravid females (Trino and Rodriguez, 2001) <sup>[25]</sup>. Due to their impressive growth rates, *Scylla serrata* has emerged as a premier species in modern aquaculture (Rodriguez *et al.*, 2007<sup>[21]</sup>; Ye *et al.*, 2011; Meng *et al.*, 2017; Wan Yusof *et al.*, 2019) <sup>[18, 27]</sup>. Despite this potential, local market prices for *S. serrata* often remain depressed because undersized crabs are frequently harvested, leading to diminished interest from export channels (Trino and Rodriguez, 2001) <sup>[25]</sup>.

Early experimental efforts in the 2000s explored various containment systems for these crabs, including pots, bamboo structures, and specialized cages (Khatun, 2007). In regions such as the Indian coast and Bangladeshi lagoons, producers utilize galvanized wire, polyethylene netting, and bamboo pens to facilitate the fattening process (Cholik and Hanafi, 1992) <sup>[6]</sup>. In the Philippines, this practice has also served as a vital alternative income source for local fishing communities (Trino and Rodriguez, 2002) <sup>[26]</sup>.

Commercially, several mangrove crab species specifically *S. serrata*, *S. ocellata*, *S. transquebarica*, and *S. paramamosai* are harvested from both wild habitats and aquaculture installations (Susanto *et al.*, 2015) <sup>[24]</sup>. Because they are usually transported and sold live, they rank among the most economically significant crab species globally (Shelley and Lovatelli, 2011) <sup>[23]</sup>. Historically, early mangrove crab farming programs in Africa and Asia relied primarily on

feed sources such as clam meat, animal by-products, and trash fish (Fitzgerald, 2002; Hairol *et al.*, 2022) <sup>[10, 12]</sup>.

### Fattening of Mud Crabs

Crab farming primarily focuses on two processes: fattening lean crabs and cultivating juvenile seeds into mature adults. "Fattening" specifically refers to the practice of stocking underweight, soft-shelled crabs and rearing them for several weeks to allow their gonads to mature. This practice is often hindered by various challenges, such as disease outbreaks, the acquisition of low-quality stock, financial limitations, and a lack of specialized technical expertise. To improve both resource efficiency and profitability in this sector, it is essential to establish more hatcheries for crablets and implement comprehensive training programs for farmers. Typically, fattening operations utilize small bamboo pens situated in ponds or rivers. It is crucial that the fattening period concludes before the crabs begin to moult, as this process can lead to high mortality rates and decreased yields. In recent years, a different approach known as soft-shell or "moulting" crab culture has gained prominence in regions like Malaysia, Indonesia, and southern Vietnam. In this system, crabs are induced to moult by removing their pinchers and walking legs before being stocked in ponds. Once the crabs undergo the moulting process, the soft-shelled individuals are immediately harvested and frozen for commercial distribution. This specialized soft-shell product is particularly lucrative, often fetching prices five to ten times higher than those of standard hard-shelled crabs.

Mud crab fattening has emerged as a favoured aquaculture technique across South-East Asian coastal regions due to its ability to produce significant financial rewards within relatively short production cycles (Cholik and Hanafi, 1992; Liong, 1993) <sup>[6, 16]</sup>. While this sector holds immense potential, its development in South Asia remains largely in its infancy (Muhd-Farouk *et al.*, 2016) <sup>[20]</sup>. Currently, the practice is a staple industry in countries such as Bangladesh, Vietnam, the Philippines, Indonesia, India, Singapore, Malaysia, Taiwan, and Thailand. Traditionally, fattening is conducted in enclosed earthen ponds (Ganesh *et al.*, 2015) <sup>[11]</sup>. This approach is inefficient because it leaves the mid-water and surface layers of the pond unutilized. Furthermore, conventional methods often suffer from high mortality and diminished product quality; crabs frequently escape by burrowing, hide to avoid cannibalism, or sustain injuries and lose limbs during aggressive territorial disputes (Begum *et al.*, 2009; Wu *et al.*, 2021) <sup>[5, 28]</sup>.

To address these limitations, the use of floating cages has been introduced as a superior alternative that optimizes water column usage while reducing mortality rates and improving overall quality. These fattening systems typically constructed from polyethylene netting, bamboo, or galvanized wire are frequently deployed in shallow lagoons, coastal waters, and ponds (Cholik and Hanafi, 1992; Liong, 1993) <sup>[6, 16]</sup>. Research into these methods varies by region: in the Philippines, studies have focused specifically on the efficacy of net and bamboo enclosures (Albor *et al.*, 1999; Begum *et al.*, 2009) <sup>[1, 5]</sup>, while in Myanmar, fattening is commonly performed in canal-based cages, bamboo partitions, and ponds (Haque *et al.*, 2017) <sup>[13]</sup>. Similar cage-based systems have been documented in Vietnam (Dat, 1999) <sup>[8]</sup> and Malaysia (Md. Latiful *et al.*, 2021). Notably, trials in Bangladesh have indicated that bamboo cages provide a more successful environment for fattening than traditional earthen ponds (Begum *et al.*, 2009) <sup>[5]</sup>.

The practice of mud crab fattening is steadily rising in popularity due to its significant economic potential. Many

individuals have successfully established sustainable livelihoods by leveraging this high-yield, low-cost venture. Known scientifically as *Scylla serrata* and frequently referred to as black or mangrove crab this species plays a vital role in its ecosystem and is primarily native to the mangrove forests and estuaries across Africa, Asia, and Australia. Beyond its profitability, the mud crab serves as a valuable nutritional resource for humans, offering a rich supply of energy, essential minerals, and high-quality protein. Furthermore, their shells have been identified as a viable supplementary protein source for animal feed. However, successful cultivation requires addressing specific logistical hurdles. To mitigate the risk of stock loss, farmers must implement rigorous management strategies, including the installation of robust perimeter fencing and the maintenance of precise, consistent feeding regimens (Anil and Suseelan, 2001) <sup>[2]</sup>.

### Marketing of Mud Crabs

The dynamics of crab aquaculture are deeply influenced by market mechanisms, specifically the interplay between supply and demand and the complexities of international trade. A comprehensive grasp of these marketing variables is essential for evaluating the industry's present performance. Currently, the sector is positioned for significant export growth, with strong demand from key international markets such as United States, China, Japan, Hongkong, Korea, Malaysia, Taiwan, Singapore, Canada, Switzerland (Anisul *et al.*, 2013). Furthermore, due to their impressive nutritional profile, substantial meat content, and culinary appeal, crabs are increasingly recognized as a premium dietary staple suitable for all age groups.

### Conclusion

Fattening thin or small mud crabs for 12 days is a profitable practice. To boost production and survival in pen farming, farmers should prioritize balanced nutrition and avoid overcrowding. However, since the industry remains dependent on wild-caught stock, aggressive commercial growth could lead to the over-exploitation of female crabs and subsequent seed shortages. To maintain sustainability, the development of crab hatcheries is essential to reduce reliance on the natural environment.

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