

Farming of Asian seabass *Lates calcarifer* in freshwater impoundments in West Bengal, India

Subrato Ghosh

122/1V, Monohar Pukur Road, P.O. Kalighat, Kolkata – 700026, West Bengal, India. Email: subratoghosh2007@rediffmail.com



Sri R. A. Molla with a 900g Asian seabass.

The Asian seabass *Lates calcarifer* is a highly preferred foodfish in West Bengal, with a high meat content and commercial value compared to Indian major carps. Found in estuarine systems on the north-east and south-east coasts of the Bay of Bengal, Asian seabass is a hardy, euryhaline fish and suitable for culture in coastal marine, inland saline, brackishwater and freshwater ecosystems. Most of them are male when around 2-2.5 kg in size. They later become females as they attain more than 4 kg. Seabass feed voraciously on live fishes (young carp, mullet, gobies and prawns) coming their way in large confined water areas. The posterior edge of the pre-operculum bears sharp serrations and a spine that can cut fingers if live specimens are handled incautiously. In some parts of West Bengal, Asian seabass and mullets are cultured in brackishwater and freshwater ponds by stocking wild seed¹. During the past decade, Asian seabass has received greater attention and has been increasingly farmed commercially in modified-extensive systems in large freshwater impoundments (termed '*mithen gheri*' in local dialect),

mainly at the Canning-II, Kultali and Joynagar-I Blocks of South 24 Parganas District. It is reported to grow well² and faster in freshwater³.

In these large, rain-fed, perennial, low-lying fish farming areas, paddy farming was done traditionally but the fields have been converted into fish farming regions since 2011 for better profits. Peripheral areas on four sides are deepened and embankments constructed with excavated earth. Here, farmers are either doing grow-out culture of Asian seabass, Indian major carps or a combination of both, on their own. Professional fish farmers in nearby regions have taken tracts on long-term lease to undertake Asian seabass culture in freshwater on large scale. In such *mithen gheri*, tidal influence does not persist and water from the brackish rivers of the Indian Sundarbans region does not enter. This article outlines the on-growing farming system of Asian seabass in freshwaters and is a representation of progressive seabass farmers and their vocation.



Asian seabass cultured in a mithen gheri (freshwater impoundment).



Haul of Asian seabass from Sri D.Naskar's pond.



Displaying the pre-opercular spine.

Wild Asian seabass seed

In South 24 Parganas and East Midnapore districts of West Bengal, 5-7mm long of Asian seabass are caught by professional seed collectors two times a month during the spring tides from the Matla, Herobhanga and Canning rivers at Amjhara Village; Hooghly River at Nischindipur, Karanjali and Kakdwip villages; Hooghly estuary at Nandigram, Khejuri and Kukrahati villages, Nayachar Island and Agnimari Char south-east of Haldia town. Such post-larvae are reared in small freshwater earthen chambers for 10-14 days, attaining 8-12mm (early fry; dark brown with scattered yellow spots) and are supplied to farmers. Often those are reared @ 3,000 individuals / 40 m² for 15-20 days and sold at 24-30mm size. Seed caught during March-April are of superior quality and available till June; culture of Asian seabass in confined freshwater environments in South 24 Parganas is made possible by natural collection of wild fry. Advanced fry are collected in appreciable numbers from Kulpi and Rajnagar villages on Hooghly estuary, Thakuran and Matla rivers during May-October. Fins, opercular spines and mouth structure assume adult characters at around 15mm size. Asian seabass is cultured in low-lying excavated ponds whenever juveniles are available in the wild seed collection centers (April-June in West Bengal)⁴.

Stocking density and growth obtained

Procurement of fry

Md. Tahabur Sardar at Village Saranger Abad, Block Canning-II stocks 1000 g of spawn (around 800,000 individuals) of Indian major carps, brought from renowned carp breeding units of Bankura District, in his 1,320 m² nursery pond and rears them for 30-35 days until they attain 48-60mm (3.0-3.5 g). Finely-powdered mustard oil cake and rice polish is fed to growing spawn @ 400 g / 1,000 g spawn daily. During March-April, 1,000 seeds of Asian seabass (9-12 mm; bought @ Rs 5/- / piece) are stocked in a separate nursery pond/ chamber of 1,320 m² in area and reared for 45 days until they reach 40-60 g. Young prawns *Metapenaeus monoceros* are fed to the seabass. Subsequently seabass juveniles are stocked in his freshwater grow-out culture system 7,260 m² in area @ 160-180 individuals / 1,320 m² and at the same time, those advanced fry of Indian major carps are also stocked. Sri Sardar has experienced that in eight months of culture, out of an initial 1,000 seed, 80% of seabass attain 2-3 kg (sold @ Rs 580-600/- /kg in domestic market) and 10% attain 600-700 g, with around 10% mortality. Seabass prey upon the fingerlings of Indian major carps and also on naturally-occurring weed fishes.

During harvest of seabass, 9-10 months after spawn stage, 20% of his stocked Indian major carps survive with body weight gained accordingly: Rohu *Labeo rohita* and mrigal



Asian seabass at 200-250g.

Cirrhinus mrigala 350-450 g, *Catla catla* 800-900 g and *Labeo bata* 100 g. These are harvested along with the bigger Asian seabass and sold. In Asian seabass ponds, Indian major carps are fed mustard oil cake and by-products of wheat, pulses and gram @ 40 g / 1,000 g fishes daily. He opined that an Asian seabass consumes 14-15 kg of advanced fry and fingerlings of other fishes in its growth up to 1 kg size.

In early April, another farmer, Pinturam Mondal, at Village Miyergheri procures riverine Asian seabass seed (8-10 mm) in oxygen-packed containers @ Rs 3/- / piece. In a 1320 m² pond, 1,000 pieces are stocked and powdered mustard oil cake is used as feed @ 2,500 g / 1,000 seed / day initially and prawn *M. monoceros* ('metha chingri' in local dialect) later on. These attain 60-75 g in 30-45 days with near 100% survival and are further stocked in a freshwater grow-out pond 1,320 m² in area. Indian major carps 250-300 g in size (total 100 kg) and prolific breeding Mozambique tilapia *Oreochromis mossambicus* of 50-80 g size (total 5 kg) are introduced into the pond. In the next six months, Asian seabass reach 1,300-1,600 g and Indian major carps 750-1,100 g, at which size they are harvested.

Md. Safikul Sardar at Village Khagra owns a 13,200 m² *mithen gheri* for Asian seabass grow-out culture, which is rain-fed supplemented by water drawn in via deep tube-well, when required. During May, he procures Asian seabass seeds of 24-25mm from Canning Bazar (Rs 3.50/- / piece), which

are stocked in a nursery chamber @ 1,000 individuals / 384 m². Young gobies *Glossogobius giuris* and prawn *M. monoceros* are their live prey and the fish reach 60 g and above in one month. This stage is stocked in the *mithen gheri* @ 400 individuals / 13,200 m². Growing Asian seabass juveniles feed upon young tilapia and major carps; 400-450 kg of Indian major carps fry (60 mm), previously reared in the nursery pond, are released in the area. After 8-9 months, Asian seabass weighed 2-2.5 kg and 800 kg of marketable-sized fish are harvested (400 x 2 kg) and sold for Rs 448,000/-. According to Sri Sardar, from 5-7mm stage, 80-90% of Asian seabass will attain 2,500-3,000 g and weigh between 2000-3,000 g with sufficient and insufficient food availability respectively in 10-11 months of culture. A 3 kg Asian seabass can devour 100-150 g of Indian major carp fingerlings. In addition to Indian major carps fry meant to feed Asian seabass, Sri Sardar co-stocks Indian major carps of 150-300 g mainly for culture (total weight 500-550kg). Every 2.5-3 kg Asian seabass fetches him Rs 1,450-1,700/-, which are sold at Champahati, Taldi, Canning and Jibontala wholesale markets. Sri Sardar invests Rs 100,000/- as cost of 1,000 kg Indian major carps fry and larger fingerlings and another Rs 100,000/- on supplementary feed of Indian major carps.



Asian seabass at 400-450g size.

Procurement of Asian seabass juveniles

During August-September 2017, Sri Airaf Ali Molla at Village Parganti in Canning-II Block stocked 225 Asian seabass juveniles (25-30 g; 10-12 cm, each cost Rs 28/-) and 500 kg fry of Indian major carps and *Labeo bata* in his 9,240 m² freshwater impoundment (1.35-1.50 m deep). Asian seabass juveniles were brought from Simultala market near Amjhara village.

They prey upon the early stages of finfishes or *M. monoceros* as much as available. In 6-7 months of culture, they reached 0.8-1.25 kg and were harvested in March 2018 with a total weight of 200 kg. Indian major carps fingerlings 75-100 g (*Catla catla* 250 g) stocked in January 2018 weighed 250-350 g in March (*C. catla* 0.75-1 kg). Sri Molla stocks 60-70 kg of tilapia (100-150 g size) in a 256 m² nursery chamber and within 30-45 days, fry of 36-60 mm are obtained, which breed at two months intervals. Such fry are transferred to the main impoundment once in three months to feed the seabass @ 25-30 kg each time. Bag feeding with mustard oil cake and maize dust is done for Indian major carps. He gets Rs 420/- / kg for Asian seabass at Baburhat wholesale market under Minakhan Block in North 24 Parganas District.

Krishna Ch. Sardar at Village Kaluakhali rears Asian seabass in an extended 15,840 m² freshwater plot of which 1,320 m² is a nursery chamber meant for tilapia and *Labeo bata*. During March-April, the latter, stocked at 36-48 mm length (total 50 kg) grow up to 50-60 g in three months and are released in

the seabass pond. Tilapia (60 kg adults in chamber) fry are transferred to main plot at three month intervals. In June 2018, he stocked Asian seabass juveniles (12.5-15.0cm; Rs 35-40/- / piece) bought from Putimari market, Sandeshkhali Block @ 60-70nos / 1320 m². According to Sri Sardar, Asian seabass juvenile consumes rohu and mrigal of 10.0-12.5 cm in size and fry of *Liza parsia*, *L. macrolepis* and *L. bata* are highly preferred by the predatory fish. 450-500 kg of Indian major carp fingerlings of such a size, reared previously for three months from 24 mm stage in the nursery chamber, are released in the main plot after introduction of fry of tilapia and *L. bata*. In addition, *M. monoceros* (65-75mm) reared for 2-3 months from 7-8 mm stage is also introduced, aiming to supply sufficient food matter of different kinds for the seabass. In January 2019, beginning with 700 Asian seabass stocked, Sri Sardar harvested 650 kg of marketable sized fish (1-1.2 kg) and 500 kg of Indian major carps (400-500 g; *C. catla* 1-1.4 kg). He sold Asian seabass at Baburhat market @ Rs 500/- / kg. It grows upto 3.5 kg in 12 months if sufficient live food is available in the culture system. Unlike Indian major carps, it feeds actively even during winter season and pace of growth is kept up. He stocked larger juveniles of giant prawn *Macrobrachium rosenbergii* (10.0-12.5 cm) in his 15,840 m² plot; Asian seabass will be unable to prey upon *M. rosenbergii* if its chelate legs are developed.



Above, below: Sri P. Mondal with a 1.25 kg Asian seabass..



Sri Rahamat Ali Molla at Village Homra-Polta took a 29,040 m² freshwater impoundment on lease @ Rs 6,500/- / 1,320 m² / year for seven years. In early April, he stocked 100,000 Indian major carp fry in a 2,640 m² nursery chamber brought from the Naihati fish seed market, North 24 Parganas District; those attained 50-70 g (12-14 cm) in 75-80 days. He released Indian major carps fingerlings and 500 Asian seabass juveniles (25-30 g) in the main plot and on 90th day of stocking, he obtained 500 kg of seabass (1-1.25 kg) and sold them at Taldi market @ Rs 450/- / kg. The fish fed mainly upon naturally-occurring weed fishes brought in by water of adjoining freshwater canal and young tilapia. He bought post-larvae of riverine *M. monoceros* @ Rs 200/- / 150 g in April, reared in nursery chamber for 45 days (8-10 g; 48-60 mm size) and stocked them in the main plot. On 90th day, larger *M. monoceros* that survived are harvested and sold @ Rs 360/- / kg. On the 30th day, Indian major carps reached 150-200 g, harvested and were sold live at Chingrighata market in east Kolkata @ Rs 10-15/- / piece.

According to Dilip Naskar at Village Naliyakhali, Block Joynagar-I, Asian seabass 20-25 g size (7.5-8.0cm; Rs 9-10/- / piece) is available at Karanjali market in Kulpi Block until August. After buying 100 pieces in July 2017, he kept them in hapa cloth enclosures for a day before stocking in a 1980 m² freshwater pond. 6-8 kg of tilapia (150-200 g) and Indian major carps yearlings (150-200 g) were also stocked. He harvested 55-60 kg Asian seabass (400-600 g) at the

end of January 2018 and a few of them attained 3.2-3.4 kg in December 2018. He sold the fish at Taranagar market in Joynagar-II Block @ Rs 400/- / kg. In six months, he sold Asian seabass (450 g) @ Rs 180/- / piece; juveniles of which had cost Rs 10/.

In March, for every 1,320 m² freshwater area, some farmers in Canning-II Block stock larger 5-6 month old Asian seabass juveniles 75-80 (100 g; Rs 35-40/- / piece), Indian major carps 60 g size (total weight 100 kg; 1,500-1,550 pieces), 20 kg of adult tilapia and larger *M. rosenbergii* juveniles 100 (Rs 4/- / piece). During harvest, by end of June, 68-70% of Asian seabass attain 1.5 kg each and are sold @ Rs 590/- / kg; 100-120 pieces of Indian major carps survive, attain 550-700 g each and are sold @ Rs 150/- / kg; 50-55 *M. rosenbergii* attain 100-120 g size (total weight 6.0-6.5kg) and are sold @ Rs 360/- / kg. Two crops can be raised every year, Asian seabass run after the growing Indian major carps even if they are unable to get hold of it and the growth of surviving Indian major carps is triggered due to the chasing impact of the former. Rice bran and wheat by-products are fed to Indian major carps. Growth of Asian seabass up to 0.7-1.5 kg in 12 months has been reported in perennial village ponds of 10,000-30,000 m² in the presence of Indian major carps, tilapia and freshwater prawn in Raigad district of Maharashtra⁵. According to the afore-mentioned fish farmers,



Sri D. Naskar with a harvested 3.2 kg Asian seabass.

polyculture of Asian seabass and major carps in freshwater is more profitable than carp culture alone in the Indian Sundarbans region.

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Juvenile Asian seabass at 25 g.



Nursery chamber in front and Mithen gheri of Md.T. Sardar.



Left: Growout impoundment. Right: Nursery chamber.



Sub-adult Asian seabass in R. A. Molla's pond.