Scope of Chanos Farming

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Among the cultivable waters in India, a total of 1.7 million ha is brackish in nature. Brackish water is more fertile and productive than sea water. It is dynamic, influenced by the tides, currents and waves. Estuaries were mainly useful for fish capture. Since estuaries are found to be the feeding and breeding places for many of the fishes, their importance is more felt now in view of the fisheries development.

In the recent years of aquaculture development, brackish waters have gained more importance and suitable technologies are available for culturing fish and shell fishes. Hydrobiology of brackish waters is paid attention and the suitability of the water quality is also studied throughout our country. The brackish water areas are more useful for natural seed collection and fish cepture. A good number of fast growing euryhaline fishes are present in the brackish water environment, which is highly a changing one in its master environmental factor, the salinity and the other related ones. While considering the total matrix, for arriving which the various biological features of the fish are considered, *Chanos chanos* comes first in the list among the cultivable brackishwater fishes (Hanson, 1974).

The area for culture of *Chanos chanos,* which is commonly known as milkfish is not a question of paucity in our country. It is worth surveying the literature on the availability of the young ones of *Chanos chanos.* Ganapati *et al* (1950) has pointed out the availability of *Chanos chanos* in Tamilnadu States. Seeds of *Chanos chanos* are reported to be available in a total of 36 centres out of the 58 centres studied indicating their distribution in about 62% of the stations. The period of seed availability is mainly from April to August, the summer part of the year and also from November to December in limited centres. It is thus evident that the seeds are available in two seasons, namely the hot summer and the monsoon. Recently also, the availability of the seeds of *Chanos chanos* and their culture have been well documented by many authors from various parts of our country. (Basu and Pakrasi, 1976; James, 1980; James *et al,* 1980; Lal Mohan and Nandakumar 1980; Marylal and Thirunavukkarasu, 1980; Natarajan and Bensam, 1980; Rao, 1971; Rao and Raghavulu, 1980; Reddy, 1980; Venkataraman *et al*, 1980).

With proper food, milkfish attains sexual maturity in floating cages (Anon, 1980). Since fish movement can be

more free for an extensive area in fish pens, maturity can as well be achieved in pen grown chanos also if some more attention is paid in this line, in view of the fact that chanos goes to the sea for breeding, Induced breeding of *Chanos chanos* too is achieved recently (Anon, 1977, Kwo *et al,* 1979). In our country breeding experiments on *Chanos* are in experimental stages and it is hoped that the success in mastering this technology is not very far off. Hence, the seed need can be satisfied both by natural collection and induced breeding.

Chanos chanos is highly euryhaline, disease resistant and fast growing. It feeds near the bottom and spawns annually or biannually and can grow to a maximum weight of 15 kg. As adults, it feeds on both phytoplankton and zooplankton with no specificity among these divisions of plankton and it is a high quality fish for human consumption (Bardatch *et al,* 1972). Also it is not cannibalistic and supplemental feeding is not a must (Iverson, 1976). While considering the various factors of the basic bioeconomic matrix, the matrix total of milkfish is second in rank among fishes, the first being *Salmon* (Nash, 1974), The biological features of *Chanos chanos* would attest the fitness of the species for culture. The biological data of milkfish was made available sufficiently earlier by Schuster (1958).

The wide culture value of *Chanos chanos* depends on the salinity tolerance of the species. As indicated in the literature, it is in excellent health in waters upto 100% salinity. However, beyond this level, its body condition is impaired and yet it can survive upto 139% salinity. Under some unique conditions with food resources, some *Chanos* have also survived even upto a maximum of 150% (Anon, 1978). For proper growth of the fish and better production, the salinity of the water should not exceed 35% even though the tolerance level is very high. It seems, the ability of *Chanos chanos* to tolerate high salinities is obtained in their juvenile stage itself. As Dwivedi and Reddy (1977) have pointed out, in the salt pans of Kakinada, *Chanos* juveniles are available in waters with a salinity of 65%. *Tilapia mossambica,* and *Mugil* spp. which are also notable euryhaline species, are not comparable ones in this respect with *Chanos chanos.*

Milkfish also can be acclimatised at low salinities, As reported by Quinitio (1980) even at 8% the survival rate was 97.8 per cent. However, less rates of survival are also reported in the literature (Tampi, 1960) and tt should have been not due to the salinity factor but due to any other factor, which should have been properly managed. In fact, *Chanos chanos* can be made to survive at freshwater also as in the case of mussels and hence, this species would offer scope for wide spectrum of culture, not only in sea water and brackish water but also in fresh water systems. Culturing *Chanos chanos* in freshwater has been done in Fisheries College at Tuticorin stocking it as one of the additional components in composite fish culture as the seventh species, and it has proved better with better production and suruival rates. The addition of this species in composits fish culture has enhanced the production.

Environmental factors such as water temperature above 15°C, salinity around 35%, dissolved oxygen above 3.0 ml/1 level, and alakline water (Bell and Canterbery, 1976) would promote the health and growth of *Ch nos ch nos.* Ling (1977) is of the opinion that the optimum salinity can be even still lower, ranging between 20 and 30%. Naturally available plankton, the live fish food is continuously available in the brackish aquatic system at a high order because of the availabtlity of nutrients during most part of the year due to quicker regeneration and also by the penetration of the fresh water into this system (Sundararj and Krishnamurthy, 1972).

The usual stocking density for milkfish farming in mono-culture by convensional method would be around 5000/ha (Dwivedi, *et al* 1980. The rate of stocking can be increased considerably in places like the brackish waters (not as ponds), where the water is dynamic in nature. When *Chanos* is cultured combined with mullets or prawns or both as in certain cases, its population density should be reduced accordingly. As per a study where *Chanos* and prawns were combined and cultured, it is evident that the competition between prawns and *Chanos* was negligible (Anon, 1980).

Pen culture method would be a more reliable and profitable one for the culture of *Chanos* in brackish waters. But for the 'fencing' to prevent escape of the stocked *Chanos* and limiting predation by predatory organisms from outside, *Chanos* are kept in their own natural habitat itself. Hence, there is every possibility to expect

fast growth and high production, when supplemental feeding is also done. Depending on the stocking density, artificial feeds made of plant origin, can be given during the calm hours of the tides, when there would be minimum or 'no' flow of water. Pen culture method is flowed in countries like Indonesia, Philippines and Taiwan (Bardatch *et al*, 1972) for raising milk fish. In India also, a reasonable start has already been made. Further experiments in this line would bring out the possibility and profitability, of this method of culture for nation-wide adoption.

In brackishwater culture, *Chanos chanos* has recorded a length of 37.5 cm (380 g), 54.5 cm (1.7 kg), and 71 cm (3 kg) in the first, second and third years respectively in Kakinada farm (Dwivedi *et al*, 1980). However, they did not attain sexual maturity in farm conditions perhaps due to the biological factors. In general the growth rate of *Chanos chanos* is more or less similar to that of Indian major carps.

The present production rate and the possibilities of increasing of *Chanos chanos* production also should be considered for further promotion of it-culture. In Ceylon, the productivity of *Chanos chanos* is reported to be 1000 kg/ha/year. In Philippines, by traditional method, the yield varies between 300-500 kg/ha/yr and by improved techniques, the yieid is 1000 kg/ha/yr. The average production rate of *Chanos* in Taiwan is 2000 kg/ha/yr. The best yield so far reported is 3000 kg/ha/yr (Bardatch *et al*, 1972).

In Tuticorin, *Chanos chanos* was cultured as a component in polyculture under more saline and freshwater

conditions respectively with marine and freshwater species of fishes. Under those different conditions of cuiture, it has baen found that monthly average growth of *Chanos chanos* was around 65 gm/fish/month in freshwater condition, when added as an additional component in composite fish culture. When the salinity was high (30-50%) in a marine polyculture study the growth rate of *Chanos chanos* was very low and it ranged between 2.0 and 29.1 gm during the different months of the culture period (Marichamy, *et al* 1980). From these findings, it is understood that *Chanos chanos* grows effectively in low saline waters. This would be physiologically also true while considering the body fluid concentration of *Chanos chanos*. Apart from these, continuous supply of rich plankton in composite fish culture ponds would have contributed more for *Chanos* growth. Such a high qunatity of food availability is not noted in high saline waters. Hence, brackish water regions with low salinities, with no sudden changes, should be selected for *Chanos* farming. In ecosystems like the fertile mangrove waters of Pitchavaram (Ramadhas and Sundararaj 1981), much areas enjoy less saline or medium saline waters and they could be profitably used for culture. The falling mangrove leaves, their protein increase after bacterial action would offer natural high protein food. Similar mangroves are also available in Tuticorin in limited area, mainly represented by *Avicennia* sp. This could also be utilised.

In the costal regions of Tuticorin and the adjacent locations, salinity of the water is notably high due to the presence of salt pans. Even in the 'freshwaters', there is salinity and it shoots up during summer due to evaporation. In the salt pans, where the water is super-saline usually, considerable decrease in salinity could be noted due to dilution during monsoon seasons and hence *Chanos chanos* can be cultured in the salt pans also when salt production is not possible. During this period, *Chanos chanos* seeds are available in nature and hence, for the salt producers, culture of *Chanos chanos* can offer continuous job. It is also suitable and favourable for paddy cum fish culture (Djajabiredja and Rudhiat Amidjaja, 1958; Djategsastro, 1959).

Further reports are also avaiiable on the polyculture of fishes among which *Chanos chanos* is one. In a study like this, Ramakrishna *et al* (1980) have recorded a high production of 2986 kg/ha/yr in the brackish water pond at Adyar. *Chanos chanos*, when cultured with *P. indicus* recorded a yield of 2196 kg/ha/6 months (Rao, 1978). These would explain the potentialities and importance of *Chanos chanos* for farming in brackish waters.

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