EDITORIAL

The year 1994 is already more than half over. Aquaculture continues to expand around the globe, and so does the NTAS. The current membership stands at 525 from 93 countries. Aquabyte needs more articles, news items, letters and photographs from members for us to compile well-balanced issues or features on specific topics. Basically, we try to edit all submissions into publishable materials but we are always short of materials and we have to publish whatever is on hand and ready for publication at each press time. Please send us more material. Many thanks to those who have already done so, including the authors of this issue's mixed crop of articles - on silver barb (*Puntius gonionotus*) in deepwater rice systems in Bangladesh, carp breeding in Nigeria, and gregarine infestations of *Penaeus vannamei* in Ecuador. ***R.S.V. Pullin***

Mono- and Polyculture of Silver Barb *(Puntius gonionotus)* in Deepwater Rice Systems in Bangladesh

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Introduction

During the past two decades, the total area of deepwater rice in Bangladesh has declined from about 2.0 million to 1.0 million ha (Anon. 1990), mainly because farmers have rapidly switched to Boro rice cultivation using high-yielding varieties (HYV) during the winter months. Irrigated Boro rice provides the highest grain yield among the different rice cropping systems.

From June to November, the monsoon period, the deepwater rice environment provides a natural habitat for fish and offers scope for fish culture. The deposition of silt and organic matter decomposition favor the growth of phyto- and zooplankton. Deepwater rice systems are also rich in natural vegetation; e.g., water cabbage *(Pistia stratiotes)*, duckweed *(Lemna minor)*, water hyacinth *(Eichhornia crassipes)*, water spinach *(Ipomoea aquatica)*, duldula grass *(Hygrorhyza aristata)* and *Azolla pinnata*. Abundant natural foods, with or without supplementary feeds, allow fish rearing for four to five months.

Experiments with Fish Enclosures

Experiments with fish enclosures were conducted at the Deepwater Rice Farming Systems Research Site at Shuvullah, Mirzapur. This site is typical of about 60% of the deepwater rice environment of the country (Miah et al. 1990). The objective was to study the performance of silver barb *(Puntius gonionotus)* - called Thai sharputi or rajputi in Bangladesh - in mono- and polyculture [with grass carp *(Ctenopharyngodon idella)*, common carp *(Cyprinus carpio)*, catla *(Catla catla)* and rohu *(Labeo rohita)*].

Nylon net enclosures were installed during 1991, immediately after the harvest of Boro rice. Bamboo poles (sharpened) were inserted about 0.5 m into the soil. The poles were 7 m high to facilitate increasing net heights with the rise of the flood water. Each enclosure measured 21 m x 21 m with an approximate net height of 3.5 m. However, the area per enclosure was estimated at 660 m^2, with a 1.5 m flooding depth for most of the stocking period. The poles, erected 2 m apart, were tied horizontally with the upright ones to protect against high waves and wind. At the bottom, the net enclosures were tied with the help of bamboo pegs pushed into the soil and

bricks at a distance of 0.5 m. Bricks and pegs were arranged alternately to ensure the strong attachment of the net to the soil and prevent fish escape.

Fingerlings were stocked on 16 June 1991. Their sizes varied with availability of the chosen species. The stocking densities per cubic meter were 1 fingerling for Thai sharputi monoculture (enclosure 1) and 2 fingerlings for the polyculture systems (enclosures 2 and 3). The species ratios for enclosure 2 was 0.37:0.27:0.02:0.34 (grass carp:Thai sharputi:common carp:catla) and for enclosure 3, 0.4: 0.4: 02 (catla, rohu, Thai sharputi). Supplementary feeds mainly of rice bran, wheat bran, wheat flour and oil cakes were provided at a ratio of 3:2:1:1, respectively. Feeds were supplied twice daily at 8 a.m. and 4 p.m. at the rate of 5% of total fish body weight. Aquatic weeds, mainly duldula grass, duckweed, water spinach and azolla, were supplied to test their acceptability by different fish species. Water depth was monitored regularly.

Table 1. Mono- and polyculture of different carps in enclosure systems, Mirzapur, Bangladesh.

Fish species	At stocking: Average individual length (cm)	At stocking: Average individual weight (g)	At stocking: No.	At harvest: Average individual length (cm)	At harvest: Average individual weight (g)	At harvest: No.	Recovery (%)	Yield (kg)
Enclosure 1								
Thai sharputi	11.4	27.0	660	24.7	272.2	500	76	136
Enclosure 2								
Grass carp	7.2	16.0	485	31.8	475.0	371	76	176
Thai sharputi	11.4	27.0	360	26.0	286.0	329	91	94
Common carp	4.9	10.5	30	30.1	673.3	21	70	14
Catla	5.2	14.0	440	12.5	31.3	368	83	12
Enclosure 3								
Catla	5.2	14.0	528	11.3	30.1	460	87	14
Rohu	7.0	18.0	528	22.0	137.0	378	72	52
Thai sharputi	11.4	27.0	264	24.8	275.3	204	77	56

Results

In monoculture (enclosure 1), Thai sharputi performed well (Table 1). This relatively good production was mainly attributed to the use of appropriately-sized fingerlings and rapid growth from consumption of an abundant supply of azolla in addition to the feed given. *Azolla pinnata* is a promising feed for Thai sharputi but they did not feed on duckweed or other of the aquatic weeds given, despite earlier reports that duckweed is a potential feed for this species and for common carp (Journey et al. 1990).

Considering its present market value and the costs incurred, this kind of Thai sharputi culture earned a net return of US$17.50 (total cost of enclosure, US$171.53; gross income, US$189.03). If more azolla were available from the beginning of the season, and if recovery could be increased, the net returns could be higher.

For the polyculture in enclosure 2, the average weight gain of common carp was the highest (673 g) followed by grass carp (475 g) and Thai sharputi (286 g) (Table 1). The high yield and good net return of US$141.25 (total cost of enclosure, US$216.69; gross income, US$357.94) may be due to these species having different feeding niches. The pH ranged from 7.1 to 7.5 and the dissolved oxygen, from 6.55 to 7.00 mg/l measured at 8 a.m. and 4 p.m. Myxophyceae constituted more than 75% of the total phytoplankton, and rotifers more than 72% of the zooplankton.

For the polyculture in enclosure 3, the biological performances of Thai sharputi and rohu were also encouraging. The length and weight gains for Thai sharputi were almost the same as for the monoculture (Table 1). Rohu also performed better with a body weight gain of 137 g. However, mainly due to the exceptionally poor performance of catla, this system, even with supplementary feeding, gave a loss of US$23.30 (total cost of enclosure, US$184.74; gross income, US$161.44).

Conclusion

Farming common carp, grass carp and Thai sharputi in enclosures in deepwater rice systems looks encouraging. A community approach may be the best to manage such systems. This could reduce the cost of management and make the system economically more viable. Government and nongovernment organizations could take up such programs with farmer cooperators for efficient utilization of this vast underutilized natural resource system of Bangladesh.

References

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