The Red-Bellied Pacu: A South American Fish Making Waves in Indian Aquaculture

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Abstract

Piaractus brachypomus, a freshwater fish that belongs to South America, became an important species in Indian aquaculture. Introduced via the ornamental fish trade around 2003–2004, it is now cultivated across different states of India, in both monoculture and polyculture systems. The species is valued for its rapid growth, small head, easy flaking, and tolerance to varying water temperatures, making it economically attractive for small- and medium-scale farmers. Farming practices involve broodstock management, induced breeding using synthetic hormones, hatchery rearing, and grow-out culture with proper pond preparation, feeding, and water management. Despite its advantages, challenges such as fin-nipping behaviour, disease risks, low dissolved oxygen, hybridization, and ecological impacts from escapes require careful management. With standardized practices, scientific guidance, and responsible farming, the red-bellied pacu offers potential for profitable and sustainable aquaculture in India.

Keywords: Red-bellied pacu, aquaculture, hatchery, sustainability, Piaractus brachypomus

Introduction

Piaractus brachypomus, commonly called pirapatinga, is a freshwater fish origin to South America (Fig. 1). This fish is often mistaken for piranhas, though the two are taxonomically distinct. Unlike piranhas, which are omnivorous and possess sharp, blade-like teeth, pacuprimarily feed on plant matter. During their juvenile stage, pacu bear a close resemblance to the piranha (Pygocentrus nattereri), but both show differences in feeding behaviour, despite belonging to the same family, Characidae. (Singh & Lakra, 2011). It is indigenous to Brazil but has been introduced to numerous countries worldwide. It holds significant commercial value for aquaculture production and is increasingly gaining importance in fish farming across Asia, particularly in India (Kumar et al., 2018; Sahoo et al., 2003). It is now being cultured in several Indian states, including Andhra Pradesh,

Maharashtra, southern regions, and the northeastern regions (Chatterjee & Mazumdar, 2009). It possesses appealing body traits, including a small head and easy flaking, which are favourable for the local market, along with farming advantages such as rapid growth and strong tolerance to varying water temperatures (Ribeiro et al., 2016).

Status of Farming in India

In India, pacu entered through the ornamental fish trade around 2003–2004, originally coming from Bangladesh as an alien species. Although it was never formally introduced, its farming area has gradually expanded, particularly in polyculture systems. Locally referred to as Rupchanda in states like Tripura, Assam, and West Bengal, the species has become established within the Indian aquaculture sector (Reenamole & D'cruz, 2014). India's total yearly production is expected to cross 0.2 million tonnes. Its farming began in 2004 in the Western Godavari district, where it is now cultivated over 2,600 hectares in both monoculture and polyculture with IMC and striped catfish. West Bengal is the main hub for seed production and nursery rearing, while states like Andhra Pradesh, Kerala, Chhattisgarh, Bihar, and Odisha are prominent in grow-out culture (Seshagiri et al., 2022; Singh, 2018).

Status of Farming in India

Pacu broodfish, typically aged 2–3 years and weighing around 3.0 kg, are selected and moved to broodstock conditioning ponds around density of 1,500 kg/ha, three to four months before the breeding season. During this period, they are fed a supplementary diet of oil cake, fishmeal, and other ingredients at approximately 5% of their total biomass per day. In hatcheries, pacu are bred using synthetic hormones, with eggs typically hatching within 16–19 hours at water temperatures of 28–31 °C. The hatchlings are initially reared in ponds or tanks until they reach a length of 2–3 cm, a process that takes 15–20 days. Afterward, the seed is supplied to farmers. Farmers then grow the fry to fingerling size before releasing them into culture ponds (Seshagiri et al., 2022) (Fig. 2).

Figure 1. Red bellied pacu (P. brachypomus)

Grow out culture method

Pacu farming involves several key stages. Fingerlings should be healthy, uniform, and over 10 g, sourced from quality hatcheries with proper broodstock management, avoiding inbreeding, and acclimatized before stocking at densities of 1/m^2 in monoculture, 15–20% of the stock in polyculture with carps, and 30–50% with pangas (Fig. 3). Pond preparation requires clayey loam soil with a pH of 6.5–7.0 (soil) and 7.5–8.3 (water), a minimum depth of 1.5 m,

Figure 2. Seeds of Red bellied Pacu

application of lime and manure, and a good plankton population. Feeding consists of commercial floating pellets with 25–30% protein at 5–6% of body weight per day for juveniles and 2–3% for adults, given twice daily. Water management involves weekly application of manure or fertilizer, maintaining dissolved oxygen above 5 mg/L, and regular water exchange of 10–15%. Health management includes regular checks, prompt removal of dead fish, avoiding indiscriminate chemical use, and treatment based on diagnosis. Harvesting varies regionally: Andhra Pradesh at 6–7 months (1.0–1.1 kg), West Bengal at 8 months (500–800 g), and Kerala at 12 months (1.0–1.3 kg) (GOI, 2024) (Fig. 4).

Advantages of Pacu Farming in India

Pacu farming offers several advantages, including being economically profitable and viable. It is valued for its faster growth, which contributes to higher productivity within shorter culture cycles, and it has a relatively short culture period. Additionally, although to a lesser extent, pacu farming requires reduced manpower and is relatively easy to manage, making it an attractive option for small and medium-scale aqua culturists (Fig. 5) (Seshagiri et al., 2022).

Table 1. Market trend of Red Bellied Pacu in India.

Product Type	Price (INR)	Details
Fish Seed (juvenile, 3-inch)	₹1.20 per piece	Common hatchery price in Gujarat and other states for aquaculture stocking.
Ornamental Juvenile (Aquarium)	₹29–₹50 per fish	Retail price for aquarium hobbyists, varies by size and retailer.
Market-Size Food Fish (Adult)	₹150–₹300 per kg	Considered as a medium valued fish, prices are volatile.

Figure 3. Harvesting of Pacu

Figure 4. Harvested Pacu

Disadvantages of Pacu Farming in India

Pacu farming faces several challenges, including fin-nipping behaviour and the risk of fish escaping into natural water bodies. Low dissolved oxygen levels and the occurrence of 'Red disease' are significant health concerns. Additionally, the industry suffers from a lack of standardized farming practices, diffi-

Figure 5. Ornamental aquarium of Red bellied Pacu

-culty in accurate species and hybrid identification, and variable production levels across farms. There are increased disease and biosecurity risks, absence of regulatory oversight and farm registration, and ecological concerns arising from escapes and unauthorized introductions. Limited access to scientific knowledge and technical support, along with complications from widespread ornamental trade and hobbyist releases, further add to the challenges in maintaining sustainable pacu aquaculture (Devi et al., 2020).

Ecological Concerns with Native Fish Diversity

The rapid expansion of pacu farming and breeding in India, often without scientific verification of species identity and hybrids, poses several ecological concerns. Its prolific breeding and adaptability can lead to uncontrolled population growth, potentially displacing native fish and reducing biodiversity. Genetic interaction through hybridization with indigenous species further threatens native fish populations. Utilising the resource competition for food and habitat with native species is another concern, especially in biodiversity-rich areas such as Vembanad Lake and the Western Ghats. The risk of escapes and uncontrolled propagation adds to the ecological impact of this exotic species (Chanda, 2019; Duarah et al., 2023)

Conclusion

The Red-bellied Pacu has quickly gained attention in Indian aquaculture due to its fast growth, resilience, and consumer-friendly qualities. Although it presents exciting opportunities for farmers, challenges such as disease manage

ment, water quality maintenance, and preventing escapes must be addressed. By adopting improved farming practices, scientific guidance, and responsible management, this South American species can play a key role in boosting sustainable and profitable aquaculture in India.

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