

# Integrated cage cum pond culture technology for Indian pompano

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## Abstract

Indian pompano *Trachinotus mookalee* an important candidate species for aquaculture and can be cultured in different aquaculture systems. Integrated cage cum pond culture is one of the important methods for fish culture. An experiment was conducted to observe its growth performance in cages integrated with pond farming and compare with the common pond culture. Two ponds of one-acre each were used for the study, in which one pond was stocked with 3000 numbers of *T. mookalee* and the other pond was used for integrated cage cum pond culture. The integrated cages were stocked with 4000 fishes @1000 nos/cage and 1000 fishes were directly stocked into the same pond. In the integrated cages, fishes were initially stocked at 40 numbers/m<sup>3</sup> and on growth advancement reduced to 10 numbers/m<sup>3</sup>. The mean weight of the fish after 10 months of grow-out culture was 358±0.21g and 584±0.08g for pond and integrated cage respectively. The result revealed that the fishes cultured in integrated cage cum pond performed better compared to pond culture method. Therefore, integrated cage cum pond culture could be adopted as alternative methods for culture of Indian pompano to further enhancing the fish production.

**Keywords:** Indian pompano, integrated cage culture, growth performance, *Trachinotus mookalee*

## Introduction

Finfish culture across the world is gaining importance to meet the global fish demand. Presently, marine finfishes are most commonly cultured in coastal ponds and sea cages; additionally, few other high-density culture methods have been introduced in aquaculture for increasing productivity, including recirculating aquaculture system (RAS), in-pond race way recirculating (IPRS) culture systems (Wang *et al.*, 2019). Among all, the pond-based culture uses low stocking density of up to 1 number/m<sup>2</sup>, whereas other methods use high stocking density of 15-30 numbers/m<sup>3</sup> area. In spite of having several advantages, the high stocking density methods are having several issues like high cost of production and dependency on

skilled manpower. An alternative aquaculture production system has been recently experimented for finfishes by integrating the concept of effective land utilisation and high production. One of such methods is the integrated cage cum pond culture system, in which fish culture in cages is integrated with semi-intensive culture of other or same fish species in open pond (Sipauba-Tavers *et al.*, 2016). Fishes in cages are stocked at high density and fed with artificial diet; while, same species or other low value fishes are stocked in pond and fed at low rate or allowed to utilize natural food derived from the pond. This technique uses the niche optimization concept for feeding i.e. the fish stocked in cages installed in pond are fed sufficiently, while, those fishes in pond outside the cage are either fed at low rates or not fed at all. Characters like

ease of breeding in controlled conditions, quick adaptability to different culture conditions, tolerance to wide range of salinities, fast growth rate; acceptance of artificial feed, good meat quality and high consumer preference (Ranjan *et al.*, 2018) makes Indian pompano *T. mookalee* a potential candidate species for mariculture. Standardised aquaculture practices for hatchery produced seed has been demonstrated in different culture systems such as cage, pond and recirculating aquaculture systems (RAS). Success in the fish adapting to different culture systems has paved way for attempting farming in integrated cage cum pond culture systems. The growth performance of the Indian pompano *T. mookalee* in integrated cage cum pond culture method was studied in detail during the culture period.

## Integrated cage cum pond culture

The experimental fish culture was conducted at Bhavadevarapalli, Nagayalanka Mandal, Krishna District, Andhra Pradesh. Advanced fry (1.5 g) of Indian pompano *T. mookalee* were transported and stocked in 2 m x 2 m x 1 m *hapa* for nursery rearing in the pond. These were nursery reared with floating pelleted feed, for two months in the *hapa*. After reaching juvenile fish stage (35g) these were used in two different grow-out culture systems. Two one-acre ponds were used for the study, in which one pond was directly stocked with 3000 numbers of Indian pompano. In the second pond four cages were installed for integrated cage cum pond culture. The

cages were stocked with 4000 fish @1000 numbers/cage and another 1000 fish were directly stocked into the same pond. Initially, fish were stocked in 4 m x 4 m x 1 m cages @40 numbers /m<sup>3</sup> till the fish reached 250 g. Thereafter, the fish were stocked in 8 m x 8 m x 1 m cages @15 numbers /m<sup>3</sup> till 350g and then the stocking density was further reduced to 10 numbers / m<sup>3</sup> for the remaining culture period. Fish in the pond and as well as in cages were fed four times a day with pelleted feed containing 40-45% crude protein and 10% crude fat. Monthly growth was monitored for a period of 300 days and growth parameters estimated at the end of the culture.

The mean weight recorded for *T. mookalee* after 10 months of culture was 358±0.21 g, 584±0.08 g for pond and integrated cages, respectively (Fig.1). The growth performance in terms of absolute growth rate, AGR (g/day), specific growth rate, SGR (% /day) and feed conversion ratio, FCR were significantly (p<0.05) high for fishes cultured in integrated cage (2.91±0.025, 1.83±0.015 and 1.57±0.025) compared to that cultured in the pond (1.74±0.015, 1.53±0.15 and 1.92±0.03). The results showed that the fish stocked in integrated cage had gained 38.7% higher growth than that stocked in pond during the same culture period.

The integrated cages occupied about 11% of water spread area of the pond and produced 3.5 times higher production than the fish reared in pond at a low stocking density (Fig.2). Freshwater fishes experimented with higher stocking density of up to 100 numbers /m<sup>3</sup> in

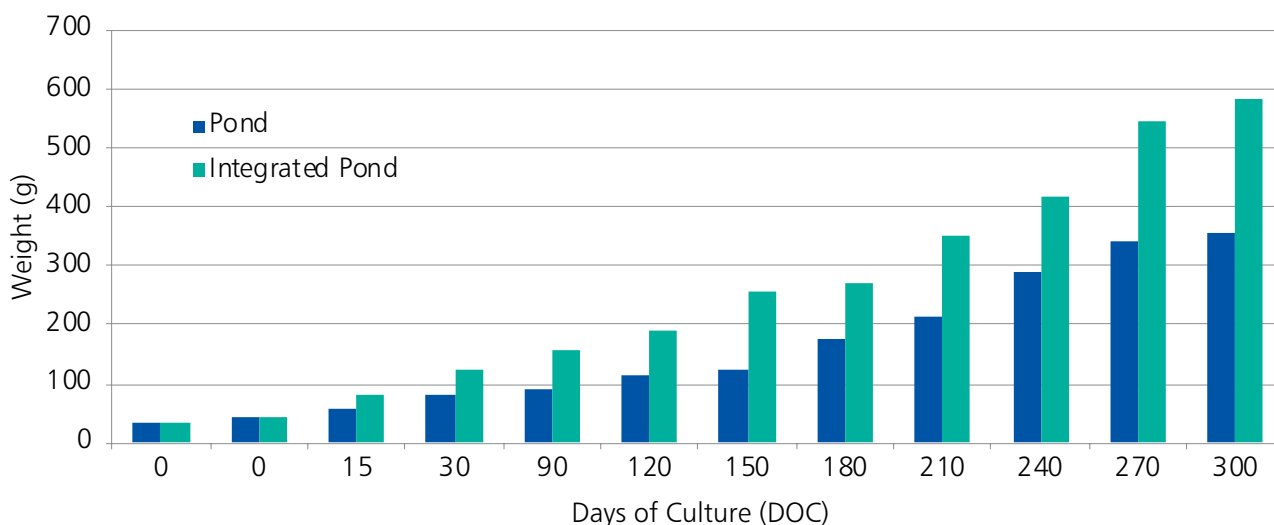


Fig.1. Growth performance of Indian pompano in integrated cages and open pond



Fig.2. Indian pompano sampling from integrated cages

integrated cage culture methods have reportedly attained the maximum production of 24 kg/m<sup>3</sup> by utilizing 20% of the pond area (Quagrainie *et al.*, 2011).

Maximum production within limited area of culture by effective land utilisation and scope for polyculture of marine fishes using high value Indian pompano stocked in integrated cages and omnivorous fishes or shrimp in the pond was indicated in the study. However, it was observed that the fishes reared in this method were prone to mortality due to oxygen depletion. Therefore, effective aeration systems in culture pond are required, to avoid fish mortality. The study has revealed that Indian pompano adapted to culture in this novel method exhibited better growth performance than being reared in pond directly. The better growth performance of the fish is due to effective feed utilisation and also restricted movement of the fish within the integrated cages, which reduces energy loss by the fish. Additionally, fish monitoring during culture period is easier and batch harvest is possible with

only minimum labour involved. The study suggests that the integrated cage cum pond culture is an innovative alternate method for India pompano culture and further studies to standardise different specific culture system parameters for the fish are required.

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