Fishery Technology 63 (2026) : 87 - 93

Optimizing Stocking Density for Asian Seabass (*Lates calcarifer* Bloch, 1790) in Estuarine Floating Cages

Sujitha Thomas, Rajesh K. M.*, Sunil Kumar Ail, Divya Viswambharan, Bindu Sulochanan, Akhila U. A., Dharshan K. S., Harshitha K. and Abdul Luhai
ICAR-Central Marine Fisheries Research Institute, Regional Centre, Mangalore, Karnataka, India – 575001

Abstract

Asian seabass (*Lates calcarifer*) is regarded as a sought-after species suitable for coastal aquaculture. Stocking density is considered to be one of the key factors influencing fish growth, feed utilization, and overall production. The present study was conducted over a period of 180 days to evaluate the significance of stocking density on the culture of Asian seabass in floating cages in estuarine waters. Asian seabass fingerlings with a mean total length of 110.46 ± 7.26 mm and mean body weight of 16.80 ± 1.26 g were stocked in floating cages (6 m × 3 m × 2 m) with four different stocking densities viz., 25, 27, 30, and 33 fish m^{-3}, in the Panchagangavalli estuary at Kundapura, Udupi. Growth and survival were monitored under the different stocking densities throughout the 180-day culture period. At the end of the culture period, seabass fingerlings exhibited variations in growth depending on the stocking density. At a density of 25 fish m^{-3}, fish attained an average length of 330.50 ± 23.76 mm and a weight of 453.00 ± 115.92 g. Similarly, at stocking densities of 27, 30, and 33 fish m^{-3}, the corresponding average lengths and weights were 329.76 ± 26.45 mm and 443.56 ± 95.11 g, 329.10 ± 18.35 mm and 441.83 ± 87.65 g, and 315.66 ± 26.16 mm and 383.33 ± 78.77 g, respectively. Growth parameters such as weight gain and specific growth rate showed significant differences with respect to the stocking density. Survival rate was relatively higher at stocking densities of 25 and 30 fish m^{-3}, while the density of 30 fish m^{-3} yielded higher production. The results of the study indicate that a moderate stocking density of 30 fish m^{-3} was the most economically feasible, yielding the highest benefit cost ratio (1.51) and return on investment (51.15%).

Keywords: Stocking density, seabass, food conversion ratio, specific growth rate, yield

Received 15 May 2025; Revised 23 November 2025; Accepted 4 December 2025

Handling Editor: Dr. P. S. Shyne Anand

**Email: rajeshmkm3@rediffmail.com*

Introduction

Marine fish production trends indicate that the extent of fish harvested in the wild is either stable or declining, highlighting the need for aquaculture practices that emphasize innovative production alternatives without depleting wild populations (Anil et al., 2010). Mariculture holds significant potential for fostering marine fish production, with cage farming representing the most effective approach among the technologies currently available (Ghosh et al., 2016). Asian seabass (*L. calcarifer*) is considered a highly sought-after species for coastal aquaculture due to its broad physiological adaptability. The species can tolerate a wide range of salinities, from freshwater to seawater, making it suitable for diverse aquaculture environments (Hassan et al., 2021). Its high market demand further enhances its potential for commercial cultivation.

Stocking density is considered one of the key factors influencing fish growth, feed consumption, and overall production (Gibtan, Getahun, & Mengistou, 2008). When determining stocking density, it is important to consider the species selected for culture, size of the fingerlings, culture duration, type of farming system and other operational factors. These parameters affect growth performance, survival rate, and overall production efficiency. In addition, carrying capacity of the cages and species-specific feeding habits influence suitable stocking densities. Improper stocking density may result in reduced growth, increased cannibalism in carnivorous fish, and compromised immune responses (Kalidas et al., 2020). Optimal stocking density and carrying capacity in cage culture vary with species, fish size, cage size, water flow rate, and culture duration (Philipose et al., 2013). Moreover, an increase in stocking density leads to higher variable costs, particularly for seed and feed (Chattopadhyay et al., 2013). In India, several studies have been conducted on the culture of seabass in floating cages in coastal waters (Anil et al., 2010; Joseph et al., 2010; Dineshbabu, Thomas, & Sasikumar, 2011; Mojjada, Dash, Pattnaik, Anbarasu, & Joseph, 2013; Philipose et al., 2013; Ghosh et al., 2016). However, limited research is available on the optimization of stocking density in cage culture of seabass (Sadhu, Sharma, Dube, Joseph, & Philipose, 2015; Ghosh et al., 2016; Suresh et al., 2018; Ganesh, Rao, Prasad, Rout, & Mandal, 2023).

The present study was undertaken under the Scheduled Caste Sub-Plan (SCSP) program of ICAR which aims to demonstrate proven technologies to marginalised community for livelihood improvement. In addition to promoting an alternative livelihood opportunity for farmers, the study seeks to standardize stocking density and evaluate its effects on the growth, survival, and yield of Asian seabass (*L. calcarifer*) cultured in floating cages installed in the Panchagangavalli estuary of Kundapura, Udupi.

Materials and Methods

Karnataka has great potential for sustainable coastal aquaculture, with approximately 8,000 hectares of brackish water and estuarine resources (Dineshbabu, Thomas, Lekshmi, & Sasikumar, 2012). The Panchagangavalli estuary at Kundapura in Udupi district (Latitude: 13°39’05.9" N Longitude: 74°42’08.9" E) was selected as the study site for seabass cage farming. A pre-assessment of the cage site was conducted, taking into account water quality and other parameters, including the necessity to maintaining minimum 2.5 m depth at lowest low tide, tidal fluctuations, accessibility etc.

Customised floating net cages designed by the Regional Centre of ICAR-CMFRI, Mangalore, with dimensions of 6 m × 3 m × 2 m, were constructed using 32 mm galvanized iron (GI) pipes. The cages had a water-holding capacity of approximately 36 tonnes and were installed in the estuary, approximately 200-250 m away from the shore. Each cage was fitted with double-layered nylon netting (40 mm mesh) and supported by six 200 L HDPE drums for flotation.

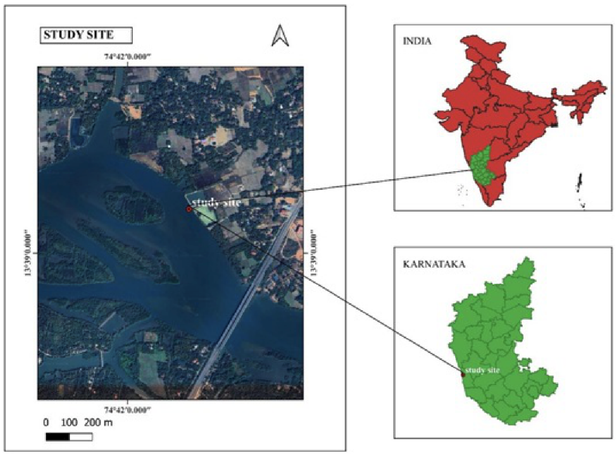

Fig. 1. Map showing the cage site of Asian seabass in Panchagangavalli estuary, Kundapura

Seabass fingerlings were procured from Canares Aquaculture LLP, Kumta, and carefully transported to the cage site in aerated containers with adequate water volume and oxygenation to ensure safe arrival. Fingerlings with a mean total length of 110.46 ± 7.26 mm and a mean body weight of 16.80 ± 1.26 g were stocked in triplicate at four different stocking densities, viz., 25, 27, 30, and 33 fish m^{-3}. Fish were fed with commercial floating pellet fish feed containing 40% protein (Skretting, India) at a rate of 5% of fish biomass initially, which was reduced to 3% after one month. Feed pellet size was adjusted according to fish growth, starting with 1 mm pellets and gradually increasing to 2 mm, 3 mm, and 4 mm as the fish grew. The stocked fingerlings were graded and segregated by size to minimize cannibalism, and this practice was continued until the fish attained an average body weight of 50 g. Cleaning of the outer net cages was carried out at regular intervals to ensure proper water exchange.

Fortnight sampling was carried out and the growth was monitored for a period of 180 days (December 2023 to June 2024). Water quality parameters including temperature, dissolved oxygen (DO), pH, and salinity were measured *in situ* using a Horiba U-50 multi-parameter water quality checker (HORIBA Advanced Techno Co., Ltd., Japan), while ammonia-nitrogen and nitrate-nitrogen were analyzed following standard methods (APHA, 2023). Important growth parameters such as average daily weight gain (ADWG) (g), specific growth rate (SGR), feed conversion ratio (FCR), and survival rate were calculated using the following formulae:

ADWG = [Final fish weight (g) - Initial fish weight (g)] / Number of days

SGR = [(ln final mean bodyweight- ln initial mean body weight)/ Number of days] x100

FCR = Feed given (dry weight) (g)/ Body weight gain (wet weight) (g)

At the end of the study, percentage survival was estimated based on the number of fish harvested using the following formula:

Survival rate (%) = (Total number of fish survival/ Total number of fish stocked) x100

Economic parameters such as gross profit, net profit, and benefit-cost ratio were calculated using standard methods.

Benefit-cost ratio = Total Revenue/Total Cost

Returns on Investment = (Net profit/Total cost) ×100

Data on growth parameters were subjected to one-way analysis of variance (ANOVA) and Tukey's pairwise using Paleontological Statistics software (PAST) version 4.03 (Hammer, Harper, & Ryan, 2001). The level of significance was set at $p < 0.05$.

Fig. 2. (a) Cage site, (b) stocking, (c) sampling (d) harvesting of Asian seabass at Kundapura

Results & Discussion

The water quality parameters examined were within the recommended limits reported by Rimmer and Russel (1998) for the grow-out culture of seabass. The water temperature ranged from 29.63–34.43 °C (32.60 ± 0.73 °C), salinity from 13.21–30.37 ppt (19.45 ± 2.41 ppt), pH from 7.01–8.35 (7.84 ± 0.19), dissolved oxygen from 3.31–8.84 (6.25 ± 0.87), ammonia-nitrogen from 0.003–0.45 mg L^{-1} (0.12 ± 0.09 mg L^{-1}), and nitrite-nitrogen from 0.17–1.32 mg L^{-1} (0.54 ± 0.21 mg L^{-1}).

Growth performance in terms of final weight, specific growth rate (SGR), and average daily weight gain was comparatively higher at the lower stocking density (25 fish m^{-3}). A significant decrease in SGR and average daily weight gain (ADWG) was observed with increasing stocking density ($p < 0.05$). At a density of 25 fish m^{-3}, the fish attained an average weight of 453.00 ± 21.16 g, while at 27, 30, and 33 fish m^{-3}, the average weights were 443.56 ± 17.37 g, 441.83 ± 16.00 g, and 383.33 ± 14.38 g, respectively.

The average daily weight gain (ADWG) was highest at the lowest stocking density (25 fish m^{-3}), with a value of 2.85 ± 0.19 g, compared to 2.38 ± 0.09 g, 2.30 ± 0.08 g, and 1.82 ± 0.09 g at stocking densities of 27, 30, and 33 fish m^{-3}, respectively. A similar trend was observed for SGR, which was 1.91 ± 0.03, 1.82 ± 0.02, 1.80 ± 0.03, and 1.68 ± 0.03 at stocking densities of 25, 27, 30 and 33 fish m^{-3}, respectively (Table 1).

The survival rate of seabass varied across stocking densities, with the highest survival (86.44 ± 0.58%) recorded at the lowest stocking density (25 fish m^{-3}), followed by 30 fish m^{-3} (84.17 ± 0.33%), 27 fish m^{-3} (81.60 ± 1.67%), and 33 fish m^{-3} (80.00 ± 0.58%) ($p < 0.05$). However, when considering total yield, the highest production was observed at a stocking density of 30 fish m^{-3} (408.7 kg m^{-3}), followed by 33 m^{-3} (368.00 kg m^{-3}), 27 m^{-3} (361.90 kg m^{-3}), and 25 m^{-3} (352.43 kg m^{-3}).

The feed conversion ratio (FCR) was lowest at 30 fish m^{-3} (1.90), indicating better feed efficiency compared to 25, 27, and 33 fish m^{-3}. The higher FCR was recorded at the highest stocking density (33 fish m^{-3}).

The economic parameters such as gross profit, net profit, and BCR were calculated and are depicted in Table 2. In the present study on cage culture of Asian seabass, the economic analysis revealed considerable variation among stocking densities. The BCR and return on investment were highest (1.51 and 51.15%, respectively) at a stocking density of 30 fish m^{-3},

Table 1. Effect of stocking density on growth and survival of Asian seabass stocked in floating cages for 180 days of experiment

Parameters	25 fish m^{-3}	27 fish m^{-3}	30 fish m^{-3}	33 fish m^{-3}
Initial weight (g)	16.80 ± 0.23	16.80 ± 0.23	16.80 ± 0.23	16.80 ± 0.23
Final weight (g)	453.00 ± 21.16^{a}	443.56±17.37^{ab}	441.83± 16.00^{b}	383.33± 14.38^{c}
Total weight gain (g)	436.20 ± 21.16	426.77 ± 17.37	425.03 ± 16.00	366.53 ± 14.38
ADWG (g)	2.85 ± 0.19^{a}	2.38 ± 0.09^{b}	2.30 ± 0.08^{b}	1.82± 0.09^{c}
SGR	1.91 ± 0.01^{a}	1.82 ± 0.01^{b}	1.80 ± 0.03^{b}	1.68 ± 0.03^{c}
Survival (%)	86.44 ± 0.58^{a}	81.60 ± 1.67^{b}	84.17 ± 0.33^{ab}	80.00 ± 0.58^{b}
FCR	2.10	2.10	1.90	2.15

Mean values and standard error (mean ± SE) are presented for all parameters. Different superscripts in a same row indicate significant differences among different stocking densities (One way ANOVA, Tukey's Post-Hoc, $p < 0.05$)

Table 2. Cost–benefit analysis on cage culture of Asian seabass under different stocking densities

Particulars	25 fish m^{-3}	27 fish m^{-3}	30 fish m^{-3}	33 fish m^{-3}
No: of fish stocked	900	1000	1100	1200
No: of fish harvested	778	816	925	960
Yield (kg)	352.4	361.9	408.7	368.0
Feed consumed (kg)	740.0	759.9	776.5	791.2
Total cost of production (in Lakhs)	1.12	1.17	1.22	1.26
Gross profit (in Lakhs)	0.58	0.57	0.73	0.50
Net profit (in Lakhs)	0.47	0.46	0.62	0.39
BC ratio	1.42	1.46	1.51	1.31
Returns on Investment (%)	41.57	39.17	51.15	31.28

** Fish were sold at Rs. 450 per kg.*

compared to 25, 27, and 33 fish m^{-3}. These findings indicate that a cage with stocking density of 30 fish m^{-3} is economically more feasible than the other densities evaluated.

The present study indicated that seabass stocked at lower stocking densities exhibited better growth performance, supporting the findings of previous reports. Sadhu et al. (2015) reported better growth performance of Asian seabass in open sea net cages at lower stocking density (14 fish m^{-3}) compared to higher stocking density (35 fish m^{-3}). Suresh et al. (2018) observed that the final average weight of Asian seabass was higher at lower stocking density-SD_{20}, followed by SD_{40}, SD_{60} and SD_{80}. Ganesh et al. (2023) reported better growth performance of seabass fingerlings stocked in 4 fish m^{-3} than 6, 8, and 10 fish m^{-3}. These studies suggest an inversely relationship between stocking density and growth. This may be attributed to crowding stress, which cause increased energy expenditure, reduction in appetite and feed intake, ultimately resulting in growth retardation (Sinha & Ramachandran, 1985; Björnsson, 1994).

Survival and yield also varied with stocking density, consistent with the findings of Ghosh et al. (2016), who reported higher survival at lower (15 fish m^{-3}, 87.3 ± 0.7%) and moderate (30 fish m^{-3}, 70.3 ± 1.7%) stocking densities, with higher production at moderate stocking density. Ghosh et al. (2016) suggested that the progressive development of shooters and resultant cannibalism could be contributing to the poor survival rate at higher stocking densities. Sadhu et al. (2015) noted that higher stocking densities negatively impact the survival rate of cultured organisms due to increased competition for food and space.

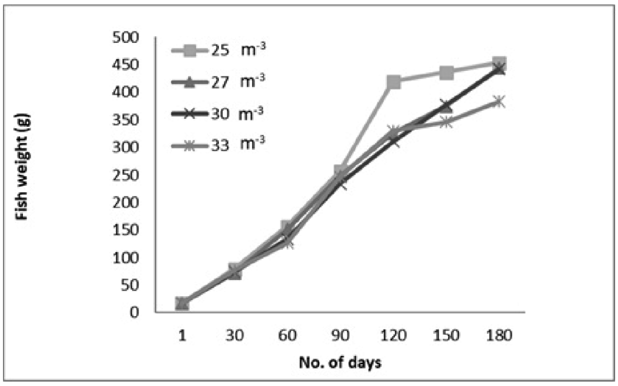

Fig. 3. Weight gain of Asian seabass stocked under different stocking densities

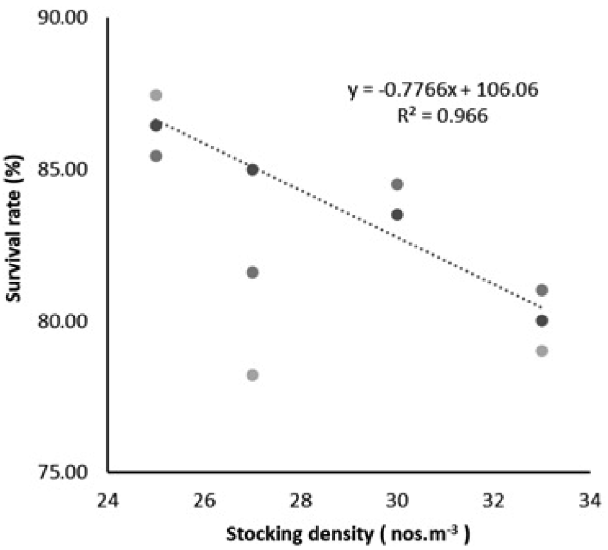

Fig. 4. Linear regression graph on the survival rate of seabass under different stocking densities for 180 days of experiment.

In the present study, the FCR at a stocking density of 30 fish m^{-3} (1.90) was found to be lower than those at 25, 27 and 33 fish m^{-3}, while the highest FCR was recorded at the highest stocking density. These results are comparable with earlier findings by Ganesh et al. (2023). Suresh et al. (2018) and Ganesh et al. (2023) reported FCR values of 2.27 and 2.86 for seabass stocked at lower densities of SD20 and SD4, respectively. The FCR values in the present study indicate more efficient feed utilization of feed among fingerlings at stocking density of 30 fish m^{-3} compared to other treatments. Liti et al. (2005) reported that fish reared at higher stocking densities exhibit reduced efficiency in converting feed into

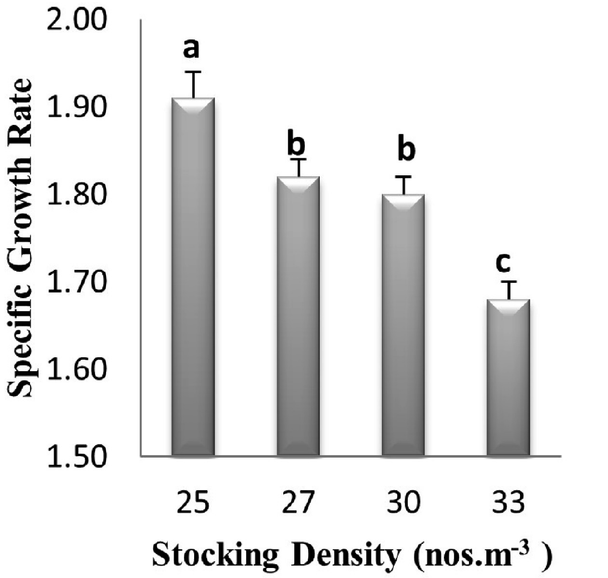

Fig. 5. Specific growth rate (SGR) of Asian seabass cultured under different stocking densities. Mean values and standard error (mean ± SEM) is presented. (One way ANOVA, Tukey's Post-Hoc, $p < 0.05$)

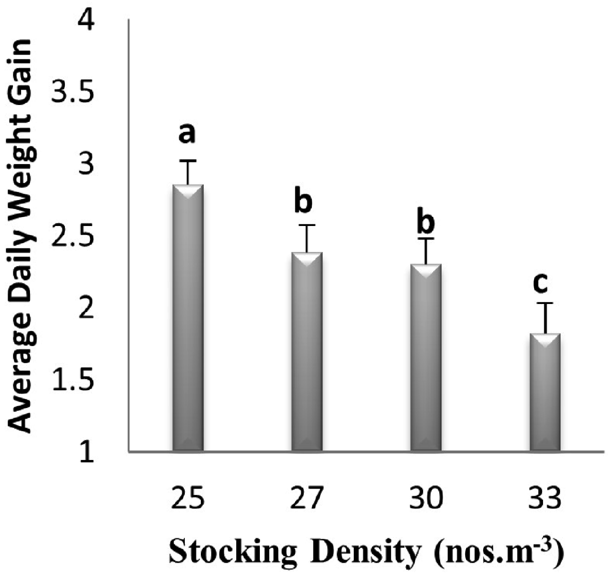

Fig. 6. Average daily weight gain (ADWG) of Asian seabass cultured under different stocking densities. Mean values and standard error (mean ±SE) is presented. Different superscripts in the bar diagram indicate significant differences among different stocking densities (One way ANOVA, Tukey's Post-Hoc, $p < 0.05$)

growth compared to those stocked at lower densities. Ganesh et al. (2023) suggested that feed wastage in open systems may be a factor influencing FCR. Braun, de Lima, Baldisserotto, Dafre, and Nuner (2010) observed that higher stocking densities induced hyperactivity and complex behaviour, leading to chronic stress that negatively affects feeding patterns and feed intake. Consequently, FCR declined and size variation among fish became more pronounced.

A small-scale economic analysis of the present study found a BCR of 1.42, 1.39, 1.51, and 1.31 for stocking densities of 25, 27, 30, and 33 fish m^{-3}, respectively. According to the report by Aswathy and Joseph (2018), BCR greater than one implies financial feasibility of cage farming. Kumaran et al. (2021) reported a BCR of 1.48 in pre-grow-out cage culture of Asian seabass in coastal brackish waters, while Priya, Shoji., Ajithkumar, Sunithakumari, and Smina (2021) observed a BCR of 1.44 to 2.06 under different feeding frequencies in cage culture.

The study assessed the impact of stocking density on the growth, survival, and yield of Asian seabass (*L. calcarifer*) in estuarine floating cages. Results indicated that stocking density significantly influenced these parameters, with optimal growth observed at 25 fish m^{-3}. However, in terms of overall yield and profitability, a stocking density of 30 fish m^{-3} was recommended. The study highlights the importance of appropriate aquaculture practices, including feed management and water quality maintenance, for sustainable cage farming. Further research is needed to evaluate the effects of stocking density on chronic stress, enzymatic activity, nutrient requirements, and overall fish health.

Acknowledgements

The authors are thankful to the Director, ICAR-CMFRI, and Dr. Madhu K., Principal Scientist and Coordinator of the Schedule Caste Sub-Plan (SCSP) of ICAR-CMFRI, for providing the facilities to carry out this work. The financial assistance received from the SCSP programme of ICAR-CMFRI is gratefully acknowledged. The authors also acknowledge the support rendered by the fish farmer Mr. Ravi Kharvi, Kundapura (National awardee), in undertaking this study.

References

Anil, M. K., Santhosh, B., Jasmine, S., Saleela, K. N., George, R. M., Kingsly, H. J., Unnikrishnan, C., Rao, G. H., & Rao, G. S. (2010). Growth performance of the seabass *Lates calcarifer* (Blotch) in sea cage at Vizhinjam Bay along the south-west coast of India. *Indian Journal of Fisheries*, *57*(4), 65–69.

APHA (2023). Standard Methods for the Examination of Water and Wastewater, 24th Edn. American Public Health Association, Washington, DC.

Aswathy, N., & Joseph, I. (2018). Economic viability of cage farming of Asian seabass in the coastal waters of Kerala. *International Journal of Fisheries and Aquatic Studies*, *6*(5), 368–371.

Björnsson, B. (1994). Effects of stocking density on growth rate of halibut (*Hippoglossus hippoglossus* L.) reared in large circular tanks for three years. *Aquaculture*, *123*(3–4), 259–270. https://doi.org/10.1016/0044-8486(94)90064-7

Braun, N., de Lima, R. L., Baldisserotto, B., Dafre, A. L., & Nuner, A. P. O. (2010). Growth, biochemical and physiological responses of *Salminus brasiliensis* with different stocking densities and handling. *Aquaculture*, *301*(1–4), 22–30. https://doi.org/10.1016/j.aquaculture.2010.01.022

Chattopadhyay, D. N., Mohapatra, B. C., Adhikari, S., Pani, K. C., Jena, J. K., & Eknath, A. E. (2013). Effects of stocking density of *Labeo rohita* on survival, growth and production in cages. *Aquaculture International*, *21*, 19–29. https://doi.org/10.1007/s10499-012-9528-2

Dineshbabu, A. P., Thomas, S., & Sasikumar, G. (2011). Successful demonstration of-Seabass cage culture in Karnataka. *Fishing Chimes*, *31*(1), 80–82.

Dineshbabu A. P., Thomas, S., Lekshmi, P. S. S., & Sasikumar, G. (2012). Adoption of sustainable capture-based aquaculture practices by traditional fishermen of Karnataka. *Indian Journal of Fisheries 59*(1), 49–52. https://doi.org/10.21077/

Ganesh, G., Rao, A. C., Prasad, G. S., Rout, S. K., & Mandal, S. (2023). Effect of stocking density on growth performance and survival of brackishwater fish Seabass (*Lates calcarifer*) in floating net cages. *Biological forum-An International Journal*, *15(*6), 603–609.

Ghosh, S., Megarajan, S., Ranjan, R., Dash, B., Pattnaik, P., Edward, L., & Xavier, B. (2016). Growth performance of Asian seabass *Lates calcarifer* (Bloch, 1790) stocked at varying densities in floating cages in Godavari Estuary, Andhra Pradesh, India. *Indian Journal of Fisheries*, *63*(3), 146–149. https://doi:10.21077/ijf.2016.63.3.49095-22

Gibtan, A., Getahun, A., & Mengistou, S. (2008). Effect of stocking density on the growth performance and yield of Nile tilapia [*Oreochromis niloticus* (L., 1758)] in a cage culture system in Lake Kuriftu, Ethiopia. *Aquaculture Research*, *39*(13), 1450–1460. https://doi.org/10.1111/j.1365-2109.2008.02021.x

Hammer, Ø., Harper, D. A. T., & Ryan, P. D. (2001). PAST: Paleontological statistics software package for education and data analysis. *Palaeontologia Electronica*, *4*(1), 1–9.

Hassan, H. U., Ali, Q. M., Ahmad, N., Masood, Z., Hossain, M. Y., Gabol, K., Khan, W., Hussain, M., Ali, A., Attaullah, M., & Kamal, M. (2021). Assessment of growth characteristics, the survival rate and body composition of Asian sea bass *Lates calcarifer* (Bloch, 1790) under different feeding rates in closed aquaculture system. *Saudi Journal of Biological Sciences*, *28*(2), 1324–1330. https://doi.org/10.1016/j.sjbs.2020.11.056

Joseph, I., Joseph, S., Ignatius, B., Rao, G. S., Sobhana, K. S., Prema, D., & Varghese, M. (2010). A pilot study on culture of Asian seabass *Lates calcarifer* (Bloch) in open sea cage at Munambam, Cochin coast, India. *Indian Journal of Fisheries*, *57*(3), 29–33.

Kalidas, C., Kumar, P. R., Prabu, D. L., Tamilmani, G., Anbarasu, M., Rajendran, P., & Thiagu, R. (2020). Optimizing stocking density for grow-out culture of silver pompano *Trachinotus blochii* (lacépède, 1801) in marine floating cages. *Journal of Applied Aquaculture*, 223–233. https://doi.org/10.1080/10454438.2020.1829245

Kumaran, M., Vasagam, K. P. K., Kailasam, M., Subburaj, R., Anand, P. R., Ravisankar, T., Sendhilkumar, R., Santhanakumar, J., & Vijayan, K. K. (2021). Three-tier cage aquaculture of Asian Seabass (*Lates calcarifer*) fish in the coastal brackishwaters - A techno-economic appraisal. *Aquaculture*, *543*, Article 737025. https://doi.org/10.1016/j.aquaculture.2021.737025

Liti, D. M., Fulanda, B., Munguti, J. M., Straif, M., Waidbacher, H., & Winkler, G. (2005). Effect of open-pond density and caged biomass of Nile tilapia (*Oreochromis niloticus* L.) on growth, feed utilization, economic returns and water quality in fertilized ponds. *Aquaculture Research*, *36*(15), 1535–1543. https://doi.org/10.1111/j.1365-2109.2005.01376.x

Mojjada, S. K., Dash, B., Pattnaik, P., Anbarasu, M., & Joseph, I. (2013). Effect of stocking density on growth and survival of hatchery reared fry of Asian seabass, *Lates calcarifer* (Bloch) under captive conditions. *Indian Journal of Fisheries*, *60*(1), 71–75. https://doi.org/10.21077/

Philipose, K. K., Sharma, S. R. K., Loka, J., Divu, D., Sadhu, N., & Dube, P. (2013). Culture of Asian seabass (*Lates calcarifer*, Bloch) in open sea floating net cages off Karwar, South India. *Indian Journal of Fisheries*, *60*(1), 67–70.

Priya, N. P., Shoji, J., Ajithkumar, P. B., Sunithakumari, K., & Smina, M. S. (2021). Effect of feeding frequencies on growth and profit of Asian seabass (*Lates calcarifer*) in cage culture systems. *Journal of Aquatic Biology and Fisheries*, *9*, 165–170.

Rimmer, M. A., & Russell, D. J. (1998). Aspects of the biology and culture of *Lates calcarifer*. In S. S. De Silva (Ed.), *Tropical mariculture* (pp. 449–476). Academic Press. https://doi.org/10.1016/B978-012210845-7/50014-3

Sadhu, N., Sharma, S. R. K., Dube, P. N., Joseph, S., & Philipose, K. K. (2015). First results of culture of Asian seabass (*Lates calcarifer*, Bloch) in open sea floating net cages in India: effect of stocking density on survival and growth. *Indian Journal of Geo-Marine Sciences*, *44*(10), 1540–1544.

Sinha, V. R. P., & Ramachandran, V. (1985). *Freshwater fish culture*. Indian Council of Agricultural Research.

Suresh, G., Raveendra, M., Rajeswari, K. J., Devi, B. C., Anusha, M., Venkatesh, D., Reddy, D. R. K., & Madhavan, N. (2018). Growth and survival in nursery rearing phase of the Asian seabass (*Lates calcarifer*, Bloch) under different stocking densities in floating net cages. *International Journal of Current Microbiology and Applied Sciences*, *7*(5), 2061–2072. https://doi.org/10.20546/ijcmas.2018.705.242