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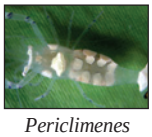
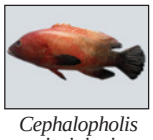

Periclimenes brevicarpalis


Cephalopholis nigripinnis

CONTENTS

The Marine Fisheries Information Service : Technical and Extension Series envisages dissemination of information on marine fishery resources based on research results to the planners, industry and fish farmers, and transfer of technology from laboratory to field.

Growth and production of *Meretrix casta* (Gmelin) under experimental culture conditions in Moorad Estuary, north Kerala

P. Laxmilatha, M. P. Sivadasan*, V. G. Surendranathan* and N. P. Ramachandran*
Regional Centre of CMFRI , Visakhapatnam
**Research Centre of CMFRI, Calicut*

The Moorad Estuary (11° 32' N to 11° 35' and 75° 35' to 75° 40' E) located along north Kerala, southern India is a small estuary with a water-spread area of about 1.4 km^2, supporting fishery of finfish and bivalves. *Meretrix casta* forms a major fishery of this estuary. The clam beds are composed of sand and mud. Suitable site for clam culture was selected in the Moorad estuary based on the salinity, tidal flushing and substratum for the experimental culture of the white clam *M. casta*.

Two methods of rearing were followed at three stocking densities. Seed clams of average total length 15 mm and average total weight 1.25 g collected from the natural clam beds in the Moorad Estuary were used for the experiment and reared for a period of five months. Seed clams were stocked in pre-fabricated netlon cages of 1mm mesh size (100 x 50 x 5 cm). The bottom set cages were stocked at 800 (B-SD^1), 1200 (B-SD^2) and 1600 (B-SD^3) numbers per m^2 and the suspended cages were stocked at 1600 (S-SD^1), 3200 (S-SD^2) and 4800 (S-SD^3) numbers m^{-2}. The experiments were set up in duplicate. The hydrological parameters *viz.*, salinity, pH, clarity, dissolved oxygen, productivity and nutrients were monitored at monthly intervals. The growth and survival were also monitored at monthly intervals. The clams from natural bed were also sampled for comparison of growth. The production was estimated for each system at the end of the experiment.

The hydrological conditions in the culture site were as follows: salinity ranged from 7‰ in July to 35‰ in February/December 2003. The pH ranged from 0.57 in October to 8.2 in May and average value was 6.9. The average clarity at the farm site was 48 cm. The dissolved oxygen content ranged from 3.9 ml l^{-1} in March to 8 ml l^{-1} in February. Average gross productivity was 0.71 mg C $m^{-3}day^{-1}$ and the average net productivity was 0.33 mg C $m^{-3}day^{-1}$

Bottom culture

In bottom culture, the clams attained an average length of 28.26 mm, 28.1 mm and 27.2 mm at the three stocking densities 800 numbers m^{-2}, 1200 numbers m^{-2} and 1600 numbers m^{-2} respectively in four months. The instantaneous growth in terms of total length was 12.5, 11.8 and 11.1 mm and the growth increment per month was 2.1 mm, 2.9 mm and 2.8 mm for the three densities respectively. The increase in the total weight was 7.3 g, 6.7 g and 6.3 g respectively for the three stocking densities. The instantaneous growth in terms of total weight was 6.2 g, 5.5 g and 5.1 g and weight increment per month was 1.6 g, 1.4 g and 1.3 g respectively. The average weight per clam attained was 7.5 g, 7.3 g and 6.3 g for the three stocking densities. The weight increment was 6.2 g, 5.5 g and 5.1 g respectively, recording highest growth in the lowest stocking density (Fig. 1).

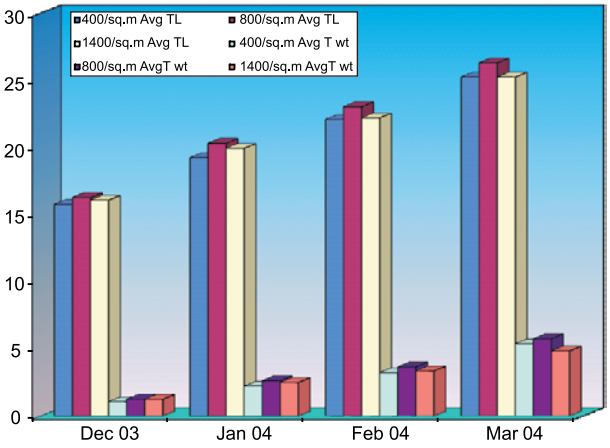


Fig. 1. Growth pattern of *Meretrix casta* in bottom culture at different stocking desities

The highest survival was recorded in B-SD^2 at 68% followed by B-SD^1 37% and very poor survival in B-SD^3 at 6%. The survival rates fluctuated during

the culture period with high mortalities during March-April. The mortality was high in the higher stocking B-SD^3 and continued to rise. The mortality in the lower stocking B-SD^1 was high during the third month due to smothering by seaweeds. The mortality in the medium stocked cage B-SD^2 was low during the first three months and then increased in the last month.

Suspended culture

In the suspended culture, the clams attained an average length of 26.2 mm and 26.5 mm and 25.5 mm in the three stocking densities 1600 numbers m^{-2}, 3200 numbers m^{-2} and 4800 numbers m^{-2} in five months. The instantaneous growth in terms of total length was 10.7 mm, 10.6 mm and 9.5 mm and the growth increment per month was 2.1 mm, 2.1 mm and 1.9 mm for the three densities respectively. The corresponding increase in the total weight was 5.9 g, 6.9 g and 14.6 g respectively for the three stocking densities. The instantaneous growth in terms of total weight was 4.7 g, 5.7 g and 13.6 g and the weight increment per month was 0.9 g, 1.1 g and 2.7 g respectively. The average weight per clam attained was 4.7 g, 5.7 g and 12.8 g for the three stocking densities. The weight increment was 0.9 g, 1.1 g and 2.6 g respectively, recording highest growth in the highest stocking density (Fig. 2).

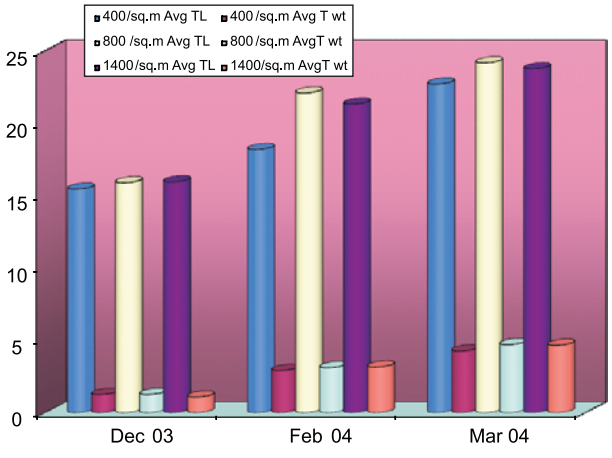


Fig. 2. Growth details of *Meretrix casta* in suspended culture at different stocking densities

The highest survival was recorded in S-SD^2 at 44% followed by S-SD^3 at 13% and very poor survival in S-SD^1 at 4%. The survival rates fluctuated during the culture period with high mortalities during April-May. The mortality was high in the higher stocking S-SD^3 and continued to rise. The mortality in the lower stocking S-SD^1 was high during the third month due to smothering by seaweeds. The mortality in the medium stocked cage S-SD^2 was low during the first three months and then increased in the last month

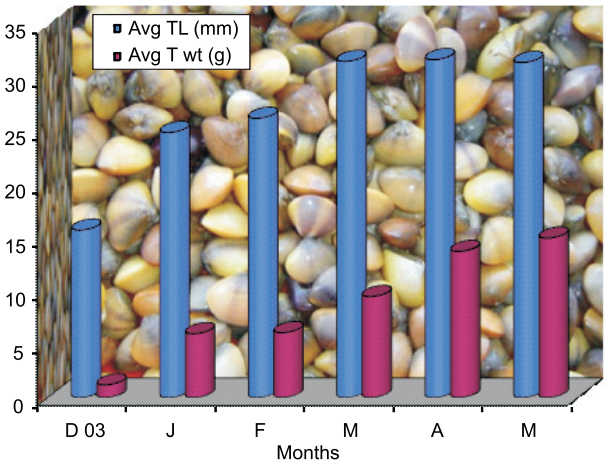


Fig. 3. Growth of *Meretrix casta* in natural bed

Natural bed

M. casta sampled from the natural bed recorded an average growth of 31.52 mm and average weight of 15 g in six months (Fig. 3).

Production per unit area

In the bottom culture experiment, the maximum production per unit area and meat production was in B-SD^2 at 5.3 kg m^{-2} and 0.7 kg m^{-2} followed by B-SD^1 with 2.2 kg m^{-2} and 0.3 kg m^{-2}. Production in B-SD^3 was 0.7 kg m^{-2} and 0.1 kg m^{-2} and 0.1 kg m^{-2} (Table 1).

In the suspended culture, the maximum production per unit area and meat production was in S-SD^3 at 14.1 kg m^{-2} and 1.7 kg m^{-2} followed by S-SD^2 at 14.1 kg m^{-2} and 1.5 kg m^{-2}. The production in S-SD^1 was 2.2 kg m^{-2} and 0.3 kg m^{-2}. Thus it can be seen that suspended culture gives a higher production per unit area compared to bottom culture even though the stocking densities were twice that of bottom culture (Table 1).

In the natural bed, the production was 7.9 kg m^{-2} and 1 kg m^{-2} meat in the month of April (Table 1).

In the bottom culture of *M. casta*, the overall growth was highest in the lowest stocking density *i.e.,* 800 numbers m^{-2}. However survival was highest in the B-SD^2 1200 numbers m^{-2} at 68%. Also the shell

on production was higher by nearly 59 % and the meat production was also highest in B-SD^2. Thus, a moderate stocking density of 1200 numbers $^{-}m^2$ would be ideal in case of bottom culture.

In suspended culture, the growth in terms of length increment was highest in the lower stocking density of 1600 numbers m^{-2}. However, weight gain was higher in the S-SD^3 of 4800 numbers m^{-2}. The survival was highest in S-SD^2. The shell on production and meat productions were highest in S-SD^3 (Table 1). Thus, in suspended culture, higher stocking densities gave higher production although survival rates were low. The suspended culture method gave higher production compared to bottom culture as well as natural bed.

Table 1. Average production of clams per unit area in the different culture systems in Moorad Estuary

Product	Bottom culture			Suspended culture			Natural bed
	B-SD^1	B-SD^2	B-SD^3	S-SD^1	S-SD^2	S-SD^3	
	800 no. m^{-2}	1200 no. m^{-2}	1600 no. m^{-2}	1600 no. m^{-2}	3200 no. m^{-2}	4800 no. m^{-2}	572 no. m^{-2}
Shell on production kg m^{-2}	2.2	5.33	0.68	2.24	10.4	14.08	7.87
Meat production kg m^{-2}	0.27	0.66	0.08	0.28	1.54	1.75	0.98

Restoration and natural revival of clam populations at Tuticorin Bay, Tamil Nadu after a mass mortality incident

V. Kripa, S. Chinnaduari, Padmanathan, Aathipandian, Sadhakatullah and Mohan Raj
Central Marine Fisheries Research Institute, Kochi

Bivalves play key role in ecosystem stabilisation due to inherent filter feeding capability and clams are important components of soft bottom benthic communities. In the Tuticorin Bay, mass mortality of fishes and shellfishes was observed in Februay 2008. The probable cause for the large scale mortality has been indicated as increased levels of ammonia (Asha *et al*., 2009). A rapid survey was conducted in the bay to assess the impact on the bivalve fauna. It was observed that, the heterogeneous clam population in the bay consisting of major species like *Meretrix meretrix, Meretrix casta, Anadara granosa, Marcia opima, Donax cuneatus* and *Paphia malabariaca* were drastically affected. In all the quadrant samples (N=50) collected from the Bay, more than 95% mortality was recorded as indicated by the occurrence of empty shells of clams and gastropods like *Umbonium* and *Cerithium*. Sampling during the subsequent months to evaluate the natural revival of the clam beds indicated that the settlement of new spat was negligible and slow. The impact on the clam population also affected the clam fishery in the bay, where local villagers used to fish clams for shell.

An experiment was initiated to revive the clam population by transplanting clams from other locations in October 2008. A pen enclosure of 10 m x 10 m was erected using netlon strip of 50 cm width, 50% of which was inserted into the soft bottom as fence. Casuarina poles were also used. The pen was partitioned into four experimental plots A, B, C and D each of size 5 m x 5 m. Within the pen, partitioned cages were placed for continuous monitoring. Macro-benthos (biomass and density) in the pen and the Bay at 10, 20, 30 and 40 m from the pen were assessed before stocking and periodically after clam stocking. *D. cuneatus* (1000 nos.), *M. casta* (1000 nos.) and *P. malabarica* (1000 nos.) collected from Hare Island and Vellapatti beach near Tuticorin were stocked in the pen. *P. malabarica* (800 nos.) collected from Ashtamudi Lake in Kerala were also stocked. Macro-benthos (biomass and density) in the pen and the bay were assessed before stocking.

Within each experimental plot, three trays with iron frame and netlon webbing of size 50 cm^2 were placed and stocked with 50 nos. of each species to monitor the mortality directly. The mortality due to transplantation/transportation was assessed through counting the number of dead shells in the experimental trays. Observations were made on days D-2, D-5, D-10, D-15, D-30. The survival was estimated from the number of surviving clams on each observation day. After one month, these trays were removed and further sampling was directly from each plot. Apart from this, about 2000 to 3000 different size group clams (*Meretrix* spp., *Donax* spp. and *Paphia* spp.) were just stocked in the open bay area randomly. Further observations were made on alternate months and assessments made in each plot.

Control sites were selected at distances 10 m, 20 m, 30 m to 40 m away from the experimental sites in all directions and the values were averaged to represent the macro-benthic molluscan population of the bay.

Survival of *Meretrix* spp. and *Donax* spp. was above 90%. Complete mortality was observed in the case of *P. malabarica* transported from Kollam and stocked in the experimental plots.. Survival of *Paphia* spp. from Vellapatti was 84%.

In January 2010 *i.e.*, 14 months after transplantation, the average density in the experimental plots were 29 nos m^{-2} with a biomass of 8.09 g m^{-2}. In addition to the stocked clams, cockles at a density of 6 no m^{-2} and gastropods like *Cerithidium* (218 nos m^{-2}) and *Umbonium* (278 nos m^{-2}) were also observed in the experimental site indicating natural settlement. By March 2011, the clam population in the bay was found to be completely revived.

Fig. 1. Heterogeneous population of clams from restored area of Tuticorin Bay

At the control sites, natural settlement of other clam species like *M. meretrix, M. opima* and *P. malabarica* were observed thereby establishing a heterogeneous population of clams (Fig.1) with an average density and biomass of 74 nos. m^{-2} and 115 g m^{-2} respectively. Clam fishing by nearby villagers (Fig. 2 and 3) started from March 2010 onwards at 15 days per month with a production of 2.5 t and the shells were marketed to the lime shell industry @ ₹ 25/ kg which earned them an estimated total value of ₹ 62,500/-. Thus by transplantation and through natural settlement of larvae, the clam population of Tuticorin Bay was revived and the fishery was re-established.

Fig. 2. Clam fishing in Tuticorin Bay

Fig. 3. Clam fishermen with catch, at Tuticorin

Ornamental shrimps collected from Kovalam, Chennai coast

Joe K. Kizhakudan, E. Vivekanandan, S. Krishnamoorthi and R. Thiyagu
Research Centre of CMFRI, Chennai

During routine fishing operations with the hooks and line by catamarans off the Kovalam coast, fishermen lookout for floating debris, particularly drifting woods and planks from river drainages during floods, as these floating objects are associated with large fish shoals of carangids, rainbow runners, tunas and breams. These objects normally have algal growth, *Lepas* colonies, barnacles, sponges, ascidian colonies, sea spiders, amphipods and several other associated fauna. A regular assessment of floating debris helps to understand changes induced due to climate change since it provides a profile of faunal distribution along temperature regimes. A sample of such driftwood collected from a depth zone of 40 fathoms provided live specimens of rare but highly valued marine ornamental shrimps. Nearly twelve numbers of white spot anemone shrimp, *Periclimenes brevicarpalis* (Schenkel, 1902) and two numbers of marbled shrimp, *Saron marmoratus* (Olivier, 1811) were collected.

Fig. 1. White spot anemone shrimp *Periclimenes brevicarpalis*

White spot anemone shrimp (11-24 mm TL), *Periclimenes brevicarpalis* (Infra order: Caridea, Family: Palaemonidae) also known as the five spot anemone shrimp or glass anemone shrimp, is transparent along the entire body length providing a clear view of the internal organs. The colour of hepatopancreas keeps changing with the status of nourishment and gonad maturation. Violet colouration at the joints on the legs and 5 spots on the uropod and telson are typical of this shrimp. These anemone shrimps are also known for their "sideways dancing" in aquaria and symbiosis with sea anemones, corals and sea cucumbers. Trade prospects are very high and they are valued at ₹ 1000-1200 per piece.

Marbled shrimp (15-17 mm CL), *Saron marmoratus* (Infra order: Caridea, Family: Hippolytidae) has typical tuft of cirri on the back, greenish to light brown in body color with yellowish and whitish speckled spots, turns more reddish in the night and nocturnal in habit. These shrimps are highly priced in the marine aquarium trade (₹ 400-500 per piece).

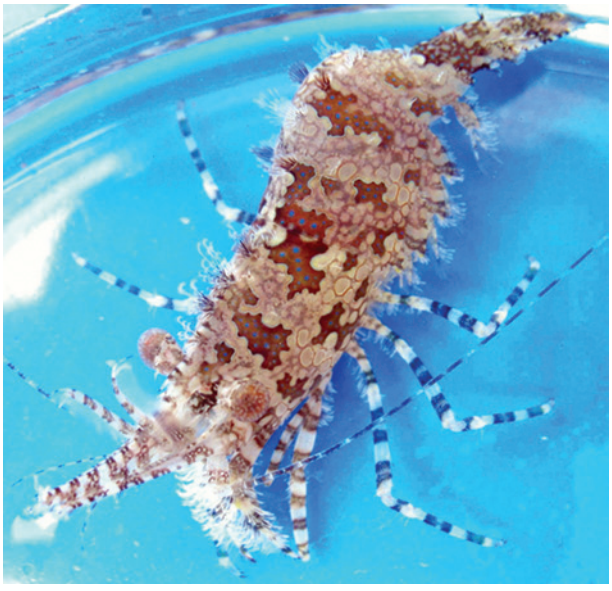


Fig. 2. Marbled shrimp, *Saron marmoratus*

Boat building at Malpe in Udupi District of Karnataka - an alternate livelihood option

P. S. Swathi Lekshmi and H. S. Mahadevaswamy
Research Centre of CMFRI, Mangalore

Fishing is one of the major source of income for coastal dwellers. People of the coastal region depend on a wide spectrum of fishery related activities for alternate sources of livelihood. Boat-building is one such avocation, which can be traced back to very ancient times.

An attempt was made to survey the boat builders of Malpe Fisheries Harbour and to analyse how boat building forms an alternate source of income generation and livelihood. There are two boat building yards at Malpe, one near Malpe Fisheries Harbour and another at Angarkatte, 5 km from Malpe. The boat-building yard at Malpe is 35 years old and the technology of boat building is a traditional profession and is the monopoly of the Aachari community. The entire boat building activity is in the hands of the "Head Maestri" who has a supervisor and a group of labourers (up to 35 numbers) working under him. The different types of boats built here are, the single-day trawler (40-42 feet overall-length, OAL) of 63 HP, the multi-day trawler (52-60 feet OAL of 122 HP) and purse seiner (50-55 feet OAL of 122 HP). Once the Head Maestri receives the orders for a particular type of boat, he makes the sketch of the boat and necessary instructions are given to the supervisors and group of labourers. The peak period of boat building is from August to May, when they are employed for 30 days in a month and the lean period of work is during June - July. During the lean period, they are engaged in other income generating activities such as painting and carpentry work in housholds.

Fig. 1. A view of the boat building yard at Malpe

Fig. 2. A multi-day deepsea trawler under construction at the boat building yard, Malpe

Usually a group headed by one maestri, one supervisor and ten labourers work for 10 h per day and build a single-day/multi-day trawler within a period of 2 months. The timings of work are from 0800 hrs to 1800 hrs. The wage per day for the maestri is ₹ 300 for the supervisor and for the labourer it is ₹ 250 each. The cost of wood, labour, provision for food and boat-building items such as fibre material, fans, copper nails, sawing machine and paints are borne by the boat owner. The cost of building one multi-day trawler inclusive of material cost and labour cost works out to ₹ 20 lakhs, that of single day trawler ₹ 8-10 lakhs and ₹ 18-20 lakhs for a purse seiner.

Annual earnings of a Maestri from boat building = ₹ 300 x 30days x10 months = ₹ 90,000/-

Annual earnings of a supervisor from boat building = ₹ 250 x 30days x 10months = ₹ 75,000/-

Annual earnings of a labourer from boat building = ₹ 250 x 30days x 10 months = ₹ 75,000/-

The boat builders (maestri, supervisors and labourers) avail medical insurance facilities since they encounter causalities of falling from heights in the yard, injuries caused by handling heavy logs, sawing machines *etc*. The ground space for the boat-building yard at Malpe has been leased out by the harbour authorities to the maestris @ ₹ 2,500 /year. The architects of these boats, deserve a special place in the socio-economic arena of the coastal society in particular and the community in general.

Innovations in the trawl fisheries of Karnataka and its possible impact on fisheries sector

P. S. Swathilekshmi, A. P. Dineshbabu, H. S. Mahadevaswamy and Lingappa
Research Centre of CMFRI, Mangalore

Mechanisation of fishing operation in Karnataka was initiated with the introduction of 30 to 43 feet trawlers in 1957 for exploiting inshore demersal resources including shrimps. Introduction of purse seiners in the 1970s extended the area of fishing operation and enhanced pelagic fish landings significantly. Motorisation of traditional crafts like gillnetters and longliners and encouragement of offshore fishing beyond 50 m depth using bigger vessels for duration of 12-15 days have effectively increased the range and effort of fishing operations. Further, financial institutions have extended loan facilities for acquiring fishing boats which helped to enhance the fleet strength.

Presently, out of 10,892 mechanised crafts in the state of Karnataka, there are 4,482 trawlers alone. The rest is constituted by purse seiners, gillnetters and longliners. The steel trawlers, an innovation introduced in the marine fisheries of Karnataka 14 years back, has brought about a visible and phenomenal increase in the capture fisheries sector by virtue of its bigger size, larger fish holding capacity, longer fishing duration and durability to endure rough weather at sea.

Single-day trawlers are operated using Ruston engine of 35-75 HP. The crew consists of 4-5 men. The species caught by such fleet include prawns, lobsters, crabs, anchovies, silver bellies, scombroids, pomfrets and ribbonfishes. The boats operate mainly shrimp nets with cod end mesh size of 10-12 mm. These units leave the shore during early morning and return the same day afternoon after fishing for 5-6 h. Multi-day trawlers are now mostly steel trawlers with a length of 55 feet and operate using Ashok Leyland engine of 130 HP. They operate at a depth of 500 m and each trip lasts for a period of 10 days. The diesel consumption of these units is 5000 l and the fish holding capacity is 20 t.

According to the catch and effort data analysis of CMFRI (2002-2008), the present multi-day trawler effort in Karnataka is 33% more than the required effort to exploit the resources of the coast. The calculation is based on the engine capacity of the fleets pertaining to the period. Steel trawlers are increasingly becoming preferable over wooden trawlers because of the advantages like bigger fish holding capacity, less maintenance/repair cost, better capacity to withstand rough weather conditions *etc*. The steel trawlers can venture into longer distances at sea and at deeper fishing grounds when compared to wooden trawlers. Yet another modification noticed in the case of steel trawlers is the advent of Chinese engine operated steel trawlers. Introduction of Chinese engine for trawling appears to make disparity in the income generated by the trawlers operated with traditional engines. Chinese engines with nearly double the capacity (240 HP) are virtually utilising almost double the fishing effort when compared to traditional engines. This increased use of engine power/unit is equivalent to increasing the

number of fleets in the fishery. Fishers are smart enough to make good for the loss of catch incurred due to effort restrictions by modifying their gear or craft through a process known as "technological creep". In the case of Chinese engine operated trawlers, the speed is 11 nautical miles and that of trawlers with ordinary engine, the speed is 8 nautical miles. The consumption of diesel by Chinese operated engine is 22 l h^{-1} and for ordinary engine it is 12 l h^{-1}. Chinese engine has got bigger fan size and the blade length of fan is 28 inches, width being 14.5 inches and has a weight of 140 kg. The blade length of fan of ordinary Leyland engine is 21 inches; width 12 inches and weight is 110 kg. From resource point of view, the additional capacity of trawlers equipped with Chinese engines are going to put additional pressure on the resources which are already on the verge of overexploitation.

Alepes djedaba (Forsskal, 1775) - a promising carangid species for capture based aquaculture

Sujitha Thomas, A. P. Dineshbabu, K. M. Rajesh and G. D. Nataraja
Research Centre of CMFRI, Mangalore

Carangids are highly esteemed food fishes and have been evaluated as potential aquaculture species in different countries. Carangid fishes *viz*., *Seriola quinqueradiata, Caranx mate* and *Trachinotus* spp. are commercially cultured in Japan, Hawaii and USA respectively. Captive breeding and seed production of the silver pompano, *Trachinotus blochii* as well as the successful demonstration of farming of the hatchery produced pompano seed in earthern ponds is one of the breakthrough achievements of the Central Marine Fisheries Research Institute in India.

The concept of capture based aquaculture (CBA) was adopted by the fishermen along the Karnataka coast and the diffusion of the technology in some villages has been phenomenal. Successful adoption of CBA in cages by fishers along the coast is encouraging and more and more fishers are coming forward to take up the culture. Experiments on culture of many potential finfish species have been carried out in cages along the coast. As a part of the CBA programme, Mangalore Research Centre of CMFRI attempted culture of the carangid species, *Alepes djedaba* commonly known as shrimp scad along with the mangrove snapper, *Lutjanus argentimaculatus* in 13 cages of 3 X 2 X 2 m size in Uppunda village, Byndoor, Karnataka. Out of the total 650 fishes stocked, about 60 fishes were shrimp scads. The seeds of both the species were collected

Alepes djedaba (Forsskal, 1775)

from the local estuary during second and third week of November 2011. Fishes were fed with trash fish everyday @ 5% body weight. After a culture period of about 240 to 250 days, the shrimp scads reached an average size of 640 g with an average survival of 86.6% which was almost equivalent to the growth of red snapper (average weight 760 g and survival 92%).

The shrimp scad is a large species of scad, growing to 40 cm, but more often seen around 25 cm. It often forms large schools and is carnivorous, consuming a variety of crustaceans and small fishes. The species is primarily an inshore inhabitant of reefs and open sand patches, even in moderately turbid waters. The species is occasionally found in offshore environments and seeds are often caught in the

estuarine areas. There is good demand for this species and it fetches Rs. 250-300/kg. Being a highly priced fish, the inclusion of this species in CBA could help to improve the economic returns of the fisherfolk.

The results of the demonstration suggests that the shrimp scad, *Alepes djedaba* is a promising carangid species for capture based aquaculture in estuaries of Karnataka.

Collection and acclimatisation of the greasy grouper, *Epinephelus tauvina* (Forsskal, 1775) for broodstock development and captive breeding

Biji Xavier, Ritesh Ranjan, G. Maheshwarudu and Biswajit Dash
Regional Centre of CMFRI, Visakhapatnam

Groupers belonging to the genus *Epinephelus* (Family: Serranidae) *viz*., *Epinephelus akaara*, *Epinephelus salmoides*, *Epinephelus tauvina*, *Epinephelus fuscoguttatus* and *Epinephelus malabaricus* are suitable for mariculture owing to their fast growth, good feed conversion rate and high adaptability to different culture systems. This particular group of teleost fishes exhibit sex inversion as part of their reproductive strategy. The greasy grouper, *Epinephelus tauvina* which is a protogynous hermaphrodite has good potential for mariculture. Being protogynous in nature, mature males of this species are rare in the wild. Efforts are being made for broodstock development and captive breeding of this species at the Visakhapatnam Regional Centre of CMFRI.

Collection of live groupers from the wild

Brood stock development, captive breeding and seed production of groupers mostly depend on collection of juveniles from wild. A preliminary survey was carried out along the coast off Visakhapatnam to identify centres where live groupers could be collected. Two areas *viz*., Bhimlipatnam and Visakhapatnam Harbours were selected for collection of live *E. tauvina*. Members of fishermen societies of the above identified areas were contacted and they were trained in the methods to be used for transport of live groupers. The fishermen were provided with 100 l capacity tanks and portable battery operated aerators in order to enable them to keep the fish in live condition until brought to the hatchery.

The local fishermen generally fish for groupers at a depth range of 20-25 m in the nearby rocky patches (Raitagalu) using baited hooks and line. The common baits used in the fishery are flatheads. The lines are generally set for 1-2 h and then drawn up with the entangled groupers (Fig. 1); the fishes are then unhooked and transported from the landing centres to the hatchery in aerated seawater.

Fig. 1. Live grouper entangled to the hook

Acclimatisation of groupers

Live groupers with average weight of 3-5 kg were collected. Groupers when hauled up from their habitat, gulp in air and usually are landed in a bloated condition (Fig. 2) due to their filled up airbladders. After reaching the hatchery, the fishes were degassed

Fig. 2. Groupers with bloated belly when hauled up from hooks and line

Fig. 3. Degassing the bloated groupers in the hatchery

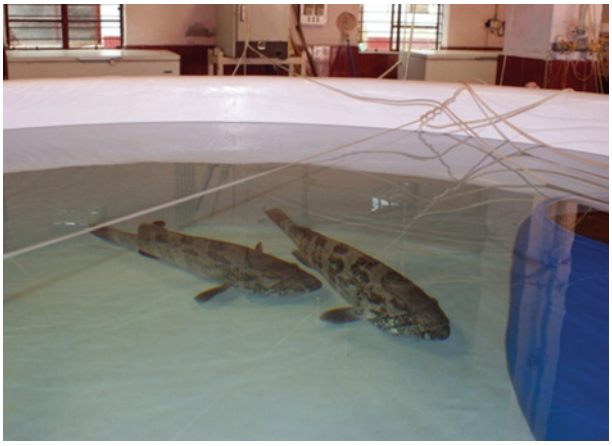


Fig. 4. Acclimatised *Epinephelus tauvina* in 5 t FRP tank in the hatchery

(Fig. 3), given treatment with 200 ppm formalin for 30 min followed by freshwater dip for 5 min and then transferred to 5 t (FRP)/10 t (cement) tanks with clean filtered seawater (Fig. 4). Different feed items such as live trash fish, shrimps, squids, frozen and thawed fish (*Decapterus* sp. and *Sardinella* sp.) were tried for the groupers maintained in the tanks. However, the fishes started taking feed after nearly a month. Once acclimatised, the groupers were fed regularly. The same process of acclimatisation is being followed for every batch of groupers caught and brought to the hatchery.

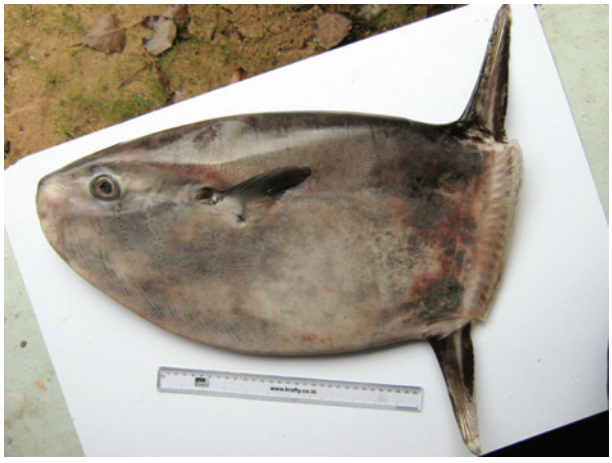
A note on the slender sunfish, *Ranzania laevis* (Pennant, 1776) landed at Chinnapalam (Pamban), south-east coast of India

N. Ramamurthy, K. Vinod and G. Gopakumar
Regional Centre of CMFRI, Mandapam

The slender sunfish, *Ranzania laevis* (Family: Molidae) is the only member of the genus *Ranzania*, found globally in tropical and temperate seas. They are oceanic and found in depths ranging from 1 to 140 m. The slender sunfish is the most elongate species of sunfish and the maximum reported size is 100 cm (total length). *R. laevis* lack a true tail and instead has a clavus.

One specimen of *R. laevis* measuring 550 mm in total length was landed at Chinnapalam fish landing centre at Pamban, south-east coast of India on 11th November 2011. The fish was an incidental catch in *kalamkatti valai* (gillnet) operated in this locality. In fresh condition, the fish is silver coloured with dark grey above, brownish green on sides. Six streaks of light colour with dark border, descend from snout to gill slits and curve downwards to the ventral profile. The posterior three streaks are branched. The lips are funnel-like forming a vertical slit when closed. The pectoral fins are elongated fitting into a shallow

concavity. The caudal fin is reduced to a leathery fold called clavus. The dorsal and anal fins are large. *R. laevis* has been earlier reported from Mandapam (Victor *et al*., 1998) and from Rameswaram (Sandhya Sukumaran and Kasinathan, 2006). The morphometric details of *R. laevis* landed at Chinnapalam are given in the table. The IUCN Red List status of slender sunfish, *R. laevis* is "Not Evaluated" (NE) and it is reported to be harmless to humans.



Slender sunfish, *Ranzania laevis* landed at Chinnapalam (Pamban)

Morphometric features of the slender sunfish *Ranzania laevis*

Parameter	Measurements (mm)
Total length	550
Depth of trunk region of body	285
Mouth length	35
Dorsal fin length	177
Pectoral fin length	115
Pectoral fin width	44
Anal fin length	144
Caudal fin length	47
Length of outer margin of caudal fin	214
Snout to origin of eye	74
Snout to origin of pectoral fin	204
Distance from the terminal portion of eye to origin of pectoral fin	100
Snout to origin of dorsal fin	465
Snout to origin of caudal fin	507
Snout to origin of anal fin	430
Snout to origin of anus	375
Length of anus	38
Distance from the terminal portion of anus to origin of anal fin	28
Length of eye	31
Diameter of eye	28

Green tide and fish mortality along Calicut coast

P. Kaladharan and P. K. Asokan
Research Centre of CMFRI, Calicut

Intense greenish brown coloured bloom was noticed in the Arabian Sea along the Calicut coast, on 27.09.2011, which lasted up to 17.10.2011 (Fig. 1). The blooming organism was identified as the "green tide" forming alga, *Chattonella marina* (Subrahmanyan) Hara & Chihara,1982. Fresh samples when observed under microscope which exhibited active movement aided by flagella and had many bright green disc shaped chromatophores distributed throughout the cell (Fig. 2). The samples when preserved in formalin, formed a jelly like mass.

This green tide was associated with large scale mortality of fish fingerlings of *Otolithus* sp.,

Fig. 1. *Chattonella marina* bloom observed along Calicut coast

Fig. 2. *Chattonella marina* (20 x)

Cynoglossus sp., *Liza* sp. and the mole crab *Emerita asiatica* from the second day onwards. The mortality was assumed to be due to the clogging of gills. During the bloom period the intertidal water appeared stagnant, viscous and had a soup like consistency. The water samples registered very low oxygen values (1.899 ml l^{-1}) during morning hours, but recovered subsequently to 4.275 ml l^{-1} during the afternoon. During the bloom period the tide levels were very low (0.01 to 0.08 m) in the evenings. Fourteen days after the incidence of the bloom, large number of shells of bivalves *viz*., *Perna viridis, Mactra violacea*, *Donax scrotum* and *Donax cuneatus* were found cast ashore (Fig. 3).

Fig. 3. Bivalve shells along the beach following the bloom

Ullandi dhoni - the traditional fishing craft of Uttara Kannada District

P. S. Swathi Lekshmi, Lingappa and Chandrakant Ganapati Ulvekar*
Research Centre of CMFRI, Mangalore
**Research Centre of CMFRI, Karwar*

The traditional fishing crafts of Karnataka are catamarans, dug out canoes (dhoni/margi/oda/pathi), plank built boats (padavu) and outrigger canoes (pani/ullandi dhoni). The ullandi dhoni is unique to Uttara Kannada District. It has a mechanised inboard engine with an average length of 18-26 feet and average width of 3-4 feet. The engine has a horse power of 8-18. The ullandi dhoni operates up to 20-25 km from the shore at a depth of 37-50 fathoms in the sea. There are also non-mechanised dhonis in this category, which are operated with oars. These non-mechanised crafts operate up to 2 km in the sea. The gears operated in ullandi dhonis are :

- Beedu bale: drift gillnet with mesh size of 65-135 mm and is mainly used for catching seerfish, tunas, sharks and sometimes catfishes.
- Patta bale: gillnet with mesh size of 35-50 mm and is mainly used for exploiting mackerel, seerfish and sciaenids.
- Kargil bale: monofilament gillnet, having mesh size of 50-65 mm and used for catching mackerel.

Ullandi dhoni is generally operated by 3-5 people. The usual time of setting out is 1600 hrs and the

Fig. 1. Ullandi dhoni (motorised) of Uttara Kannada District

Fig. 2. Ullandi non-motorised dhoni with the outrigger made of wood from "Pongre" tree

nets (beedu bale) are dropped at around 1830 hrs. Fishing duration is 6-7 h and they return the next morning between 0600 and 0930 hrs. The dhoni is made of wood of mango tree and the ullandi (out rigger) is made of wood of hungerke tree (pongre tree). The ullandi is coated with suringe oil as well as sardine oil and sun dried to increase the longevity of the wood. This boat is used in open sea in the rough weather conditions also. The ullandi dhonis are operated along the coasts from Honavar to Majali in Uttara Kannada.

First record of the scyllarid lobster *Scyllarides tridacnophaga* from Chennai coast

Joe K. Kizhakudan, S. Krishnamoorthi and R. Thiyagu
Research Centre of CMFRI, Chennai

Bottom set gillnet operations for crabs is a common fishing practice along Chennai coast which also brings in catches of sciaenids, flatfishes and rays. One specimen of the giant clam killer lobster, *Scyllarides tridacnophaga* Holthuis, 1967 (Infraorder: Palinuridea; Superfamily Palinuroidea; Family: Scyllaridae) was obtained in a bottom set gillnet cast at 20 fathoms off Kovalam, Chennai, during July 2011. Although this species has been reported earlier from Rameswaram and from the west coast, this is the first report from Chennai coast. The species is known to be distributed in the Indo-West Pacifc region, from East Africa, Red Sea, Gulf of Aden and Pakistan to the west coast of Thailand.

The species is reported to grow up to 300 mm total length with carapace lengths ranging from 60 to 120 mm. The specimen obtained was a male, measuring 75 mm in carapace length. The species has no chela on periopods, antennal flagellum broad and flat, shallow cervical incision, no postorbital spine, carapace strongly vaulted, posterior margin of the pleura of second abdominal somite concave and broadly rounded, pregastric tooth distinctly two-topped, first abdominal somite with three red spots, shell very robust .The median carina on the dorsal abdominal somite is distinct and the humps are also rounded and distinct on somites 2,3,4. Male (CL-75mm) with rudimentary pleopods on the second and third pleura and the gonopore opening on the 5th leg coxa as a small opening in the anterior area. Body purplish to pink in colour with small rounded tubercles and granules, whitish irregular patches on the carapace sides and center. Nocturnal in habit and feeds on marine clams, holds fast on to substrate, moves very slow and slow to domestication. The shell opening capacity is found to be very high when compared to the sand lobster (*Thenus* sp.).

Scyllarides tridacnophaga collected from Kovalam, Chennai

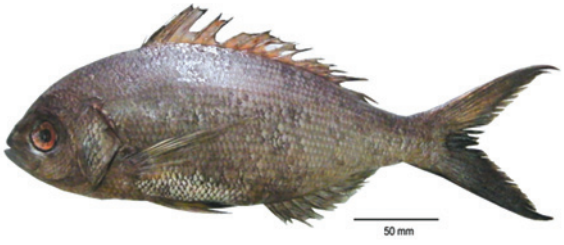
Occurrence of the snapper *Paracaesio sordida* Abe & Shinohara, 1962 from north-west coast of India

K. R. Sreenath, K. Mohammed Koya, Gyanaranjan Dash, Suresh Kumar Mojjada, R. C. Makvana, Sonia Kumari and K. K. Joshi
Regional Centre of CMFRI, Veraval

Paracaesio sordida Abe & Shinohara 1962, the dirty ordure snapper (Family: Lutjanidae), has a wide distribution in the tropical waters with its occurrence reported from Western Central Pacific and the Indian Ocean. From Indian waters, this species has been previously reported along the east coast, Lakshadweep and from Mangalore in the west coast.

This is the first report on the occurrence of *P. sordida* from the north-west coast of India. Two specimens of the species were collected from Veraval Fisheries Harbour on 4th November 2010. The specimens are deposited in the Marine Biodiversity Museum of Central Marine Fisheries Research Institute (Accession No. GB 31.88.10.1). Meristic and morphometric characters recorded are as follows:

Meristic characters: D X, 10; III, 8; P 15; V I, 5; C 18; LL 69-72; GR 9+21; BR 6



Paracaesio sordida Abe & Shinohara, 1962

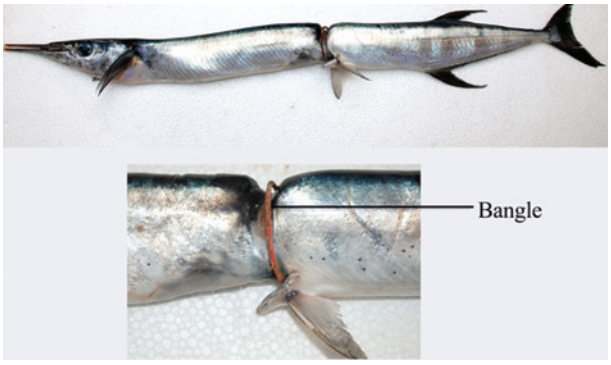
Table 1. Morphometric measurements (mm)

Parameters	Specimen 1	Specimen 2
Total length	340	325.9
Standard length	255	245
Body depth	101	94
Head length	80.4	70
Head depth	76.6	75.2
Snout length	20	14.3
Orbital length	18.3	17
Inter-orbital length	25	24.2
Post-orbital length	41.6	39.2
Upper jaw length	27.36	26.2
Lower jaw length	27.6	25.4
Snout to first dorsal fin origin	92.6	78.8
Snout to anal fin origin	166.4	151.9
Snout to anus	154.8	143.5
Snout to pectoral fin origin	75	71
Snout to pelvic fin origin	90	84.6
Dorsal fin base	130.67	135.8
Anal fin base	52.75	54.5
Longest pectoral fin ray	84.15	80
Longest pelvic fin ray	53.21	51.6
Caudal fin length	85	83.1
4th dorsal fin spine length	34.47	33.8
Length of 1st anal fin ray	27	26.4
Caudal peduncle depth	29.4	29
Caudal peduncle length	43	43.1

Belonid fish *Ablennes hians* caught with entrapped plastic bangle, off Mangalore

G. D. Nataraja and S. Kemparaju
Research Centre of CMFRI, Mangalore

During our regular observation at Mangalore Fisheries Harbour, on 6th March 2012, a belonid fish, *Ablennes hians* (Valenciennes, 1846) was collected along with seerfish and mackerel landed by drift gillnet operated at 36-40 m depth, south-west off Manjeswara. This belonid fish was found to be



Ablennes hians caught off Mangalore with plastic bangle encircling the body

encircled with a plastic bangle in its belly part, with distinct deformation in the entangled part. The circumference of the plastic bangle (14.3 cm) was smaller than the circumference of the fish head which indicated that the fish got entangled with this plastic bangle when it was small. The body depth of the fish, anterior as well as posterior to the bangle ensnared area is much higher and the deformed base of the pelvic fin must have been caused due to the drag forces, which would have acted on the fish body as the fish grew. From this incidence, it could be understood how plastic can affect animals in the sea. Plastic garbage and used fishing nets lead to "ghost fishing" and entrap numerous marine organisms like seabirds, turtles and fishes.

Morphometric measurements of *Ablennes hians* with the plastic bangle

Paramenter	Measurement
Total length	86 cm
Head circumference	17 cm
Circumference of bangle	14.3 cm
Body depth (anterior to the bangle)	17 cm
Body depth (posterior to the bangle)	17 cm
Body depth (at the bangle trapped area)	11.7 cm
Wet weight of the fish	958 g

Occurrence of the sea slug, *Armina juliana* (Ardila & Diaz, 2002) off Chennai coast

S. N. Sethi and S. Rajapackiam
Research Centre of CMFRI, Chennai

The sea slug, *Armina juliana* was recorded for the first time in the landings at Kasimedu Fishing Harbour on 24th November 2011. They were caught in trawl net operated off north Chennai at a depth of around 100 -150 m. *A. juliana* is a large, colourful nudibranch. This species has been recorded off the northern Caribbean coast of Colombia at depths of 310 and 460 m in soft bottom sediments.

Morphometric characteristics

Live animals are bright red in color with contrasting white longitudinal notal ridges; the anterior margin of the oral veil and the apical portion of the rhinophores are also white (Fig. 1). The body is elongated, flattened, narrowing posteriorly. The notum bears 34 longitudinal dorsal ridges, the oral veil is distinct and the club-shaped

Fig. 1. Dorsal view of the sea slug, *Armina juliana* collected from Kasimedu Fishing Harbour

rhinophores, bear about 10 vertical lamellae. A caruncle is also distinguishable in front of the rhinophores. The genital opening is located on the right side, anterior to the branchial lamellae. There are approximately 20 branchial lamellae on each side of the body, and 15 hyponotal lamellae. A deep medial groove is present along the sole of the foot (Fig. 2) and the posterior white pedal gland is prominent.

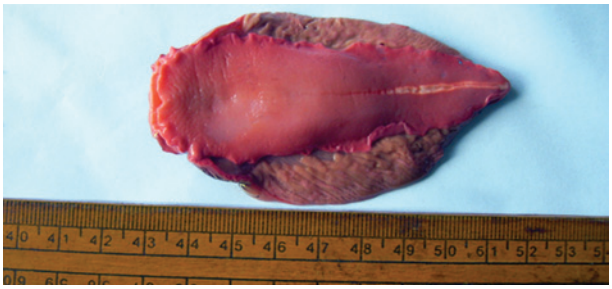


Fig. 2. Ventral view of the sea slug, *Armina Juliana* collected from Kasimedu Fishing Harbour

Juvenile whale shark, *Rhincodon typus* stranded at Ayikkara, along the Malabar coast of Kerala

K. C. Pradeepkumar, P. P. Pavithran and P. P. Manojkumar
Research Centre of CMFRI, Calicut

A female whale shark, *Rhincodon typus* measuring 475 cm in length and approximately 800 kg in weight was stranded near Ayikkara Fisheries Harbour in Kannur District on 25th November 2011. Whale shark is locally called as "pullisravu" and the stranding of this species is not common in shallow waters along the Malabar region. Whale shark is listed as an endangered species as per the IUCN Red List.

The shark was alive when it was stranded on the shore. There were no injuries or wounds noticed on the body of the shark. It is assumed that the whale shark was accidentally entangled in a drift gillnet set

Whale shark *Rhincodon typus*, stranded at Ayikkara

Morphometric measurements of whale shark stranded at Ayikkara

Paramenters	Measurements (cm)
Total length	475
Fork length	424
Pre-caudal length	364
Pre-first dorsal length	197
Pre-second dorsal length	288
Head length	131
Pre-branchial length	71
Pre-piracular length	61
Pre-orbital length	40
Pre-pectoral length	106
Pre-pelvic length	222
Snout vent length	258
Pre-anal length	288
Inter-dorsal space	116
Dorsal-caudal space	61
Pectoral-pelvic space	81
Pelvic-anal space	45
Anal-caudal space	61
Vent-caudal length	192
Pectoral length	96
Pectoral base	35
First dorsal length	51
First dorsal base	40
Second dorsal length	20
Second dorsal base	15
Dorsal-caudal margin	111

Ventral length	30
Ventral width	20
Ventral-caudal margin	40
Anal length	20
Anal width	13
Width of mouth	51
Total weight	800 kg

near Ayikkara on the previous day evening. Though the stranded whale shark was dragged into the sea with the help of the local fishermen and NGO's, it died while being rescued. Later on, the carcass was stranded in the Ayikkara beach on the same day evening. The fishermen towed it to deeper waters with the help of two boats and discarded the carcass.

Whale shark landings at Cochin Fisheries Harbour, Kerala

Sijo Paul
Central Marine Fisheries Research Institute, Kochi

A small whale shark *Rhincodon typus,* caught in gillnet was landed at Cochin Fisheries Harbour (CFH), Kerala on 20th November 2010. The whale shark was 17 kg in weight with a total length of 148 cm. Other morphometric measurements recorded are: standard length - 102 cm, pre-dorsal length - 59 cm, pectoral length - 23 cm and snout length - 22 cm.

Another small whale shark *R. typus* was landed by a gill netter on 3rd February 2011 at CFH. It had an approximate weight of 19 kg and a total length of 172 cm.

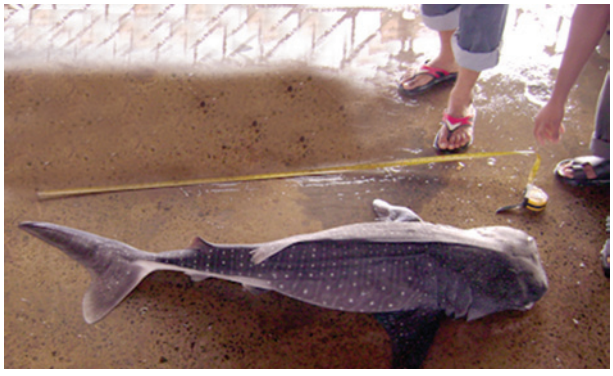


Fig. 1. *Rhincodon typus* landed at CFH on 20th Nov. 2010

Fig. 2. *Rhincodon typus* landed at CFH on 3rd Feb. 2011

Emerging fishery of unicorn leather jacket, *Aluterus monoceros* at Chennai

S. N. Sethi , S. Rajapackiam, S. Mohan, N. Rudramurthy and R. Vasu
Research Centre of CMFRI, Chennai

Since 2005 onwards, at Chennai Kasimedu Fishing Harbour, an emerging fishery for the unicorn leather jacket *Aluterus monoceros* (Linnaeus, 1758) locally called as "cheruppu meen", belonging to the family Monocanthidae has been observed. Landings of unicorn leather jacket

is increasing from year to year. During the period from September to December 2010, about 35 t of unicorn leather jackets were landed at Kasimedu Fishing Harbour. In November 2010, about 15 t were landed by mechanised trawlers operated at a depth range of 60-80 m. The length range of *A. monoceros* recorded in the landings was 380 to 590 mm with dominant mode at 490-499 mm. The weight ranged from 550 to 1400 g. The fishes were sold @ ₹ 50 per individual fish. The fish vendors remove the skin of the fishes at the landing centre itself and the skinless fishes are sold in the local markets and hotels in and around Chennai.

Aluterus monoceros landed at Kasimedu Fishing Harbour

First report of *Aluterus scriptus* (Osbeck, 1765) from Kasimedu Fishing Harbour, Chennai

S. N. Sethi, S. Rajapackiam, S. Mohan and N. Rudramurthy
Research Centre of CMFRI, Chennai

Occurrence of the scribbled leather jacket file fish, *Aluterus scriptus,* measuring 670 mm in length and of 1350 g in weight, was recorded for the first time at Kasimedu Fisheries Harbour, Chennai on 24th June 2011. It was caught in multi-day trawlers at a depth of 60-80 m. Scribbled leather jacket file fishes belonging to family Monacanthidae are distributed from tropical to subtropical region.

Aluterus scriptus landed at Kasimedu Fishing Harbour

The fishes have olive brown to grey body colour, elongate, strongly compressed body and black spots on whole body surface. Body is covered with leather like skin. Caudal fin is rounded and long.

Morphometric measurements of *Aluterus scriptus* landed at Chennai

Particulars	Measurements (mm)
Total length	670
Standard length	480
Snout to origin of first dorsal	260
Snout to origin of first spine	135
Snout to origin of pectoral	130
Snout to eye	120
Snout to anal	260
Length of first dorsal	450
Height of first dorsal	32
Length of pectoral	40
Weight (g)	1350

Pinctada magaritifera broodstock developed at CMFRI, Visakhapatnam

P. Laxmilatha
Regional Centre of CMFRI, Visakhapatnam

Broodstock of *Pinctada margaritifera* has been successfully developed in the marine hatchery at the Visakhapatnam Regional Centre of CMFRI. Five successful spawnings were achieved in the hatchery. However, due to high temperature and salinity fluctuations, larval rearing could not be completed. Successful spat settlement was achieved in the 3rd larval cycle. Spats collected from Lawson's Bay were reared in the hatchery and the broodstock developed within a period of 18 months.

Broodstock of *Pinctada margaritifera* at Visakhapatnam

Unusual landing of deepsea lobster *Palinustus waguensis* at Cuddalore

Joe K. Kizhakudan, S. Krishnamoorthi and R. Thiyagu
Research Centre of CMFRI, Chennai

Deepsea blunt horn lobster, *Palinustus waguensis* Kubo,1963 was landed by bottom set gillnets operated at Cuddalore during July 2011. Their occurrence has been reported earlier in the deepsea trawl landings at Kasimedu, Chennai. The size range of the specimens collected alive, was 40-52 mm and the specimens collected were all males. Anterior margin of carapace and inner margin of frontal horns bore several distinct spines, characteristic of the species. The animals responded when fed on wedge clams and remained hidden under rocks and corners.

Palinustus waguensis collected from Cuddalore

Juvenile black pomfrets landed at Chennai

S. Rajapackiam and S. Mohan
Research Centre of CMFRI, Chennai

Unusually heavy landings (1-2.5 t) of juveniles of the black pomfret *Parastromateus niger*, locally called as "karuppu vowal" was landed by mechanised trawlers at Chennai Fisheries Harbour during the period from June to August 2011. The length range was 90-144 mm with modal length at 110-114 mm and mean length of 113.2 mm. The juveniles were sold locally at the rate of ₹ 30-35 per kg.

Juveniles of *Parastromateus niger* landed at Chennai

Heavy landing of juvenile seerfish *Scomberomorus commerson* (Lacepede, 1800) along Chennai coast

S. Mohan, S. Rajapackiam, and R. Vasu
Research centre of CMFRI, Chennai

After the fishing ban (15th April - 30th May, 2011), heavy landings of juvenile seerfish *Scomberomorus commerson* (Lacepede, 1800) was observed along Chennai coast. During the period from April to August 2011, young ones of *S. commerson* were landed continuously by gillnet (*Pannuvalai*). The nets were operated near the shore in 5-10 m depth. The average catch per boat was 15-50 kg daily. The length and weight ranged from 156 to 362 mm and from 25 to 315 g respectively. The fishes were sold for ₹ 30-70/- each.

Size range of seerfish *Scomberomorus commerson* landed along the Cennai coast

Heavy landings of threadfin breams at Sassoon Docks, Mumbai

Sujit Sundaram and Vaibhav Mhatre
Research Centre of CMFRI, Mumbai

At Sassoon Docks (new jetty), which is a major fish landing centre in Mumbai, heavy landings of threadfin breams were observed on 19th July 2011. The catch was dominated by *Nemipterus japonicus* and *Nemipterus mesoprion*. The fishing ground was south of Mumbai in the depth range of 40-50 m. Twenty five trawlers unloaded their catch on this day and about 5- 6 t was observed in each trawler. The catch was carried by trucks to different processing units. The species fetched a price of ₹ 15 / kg at the landing centre.

Threadfin breams being loaded in trucks at Sassoon Docks, Mumbai

Occurrence of *Cephalopholis nigripinnis* (Valenciennes, 1828) in Maharashtra waters

Sujit Sundaram, J. D. Sarang and Vaibhav Mhatre
Research Centre of CMFRI, Mumbai

A single specimen of *Cephalopholis nigripinnis* was observed in the trawl catch at New Ferry Wharf on 12th November 2010 . The fishing area was in the depth range of about 30-40 m, 70-80 km off north-west coast of Mumbai. The present report appears to be the first record of the occurrence of this species from Maharashtra waters.

Cephalopholis nigripinnis (Valenciennes, 1828)

The total length of the specimen was 187 mm and weight 124 g. The fish was a maturing male. The gut was ¼th full with digested matter.


Marine Fisheries Information Service