

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/313359189>

# Spiny Lobsters and Potential of Sea Cage Culture of Spiny Lobster Resources in India

Chapter · January 2017

CITATIONS

0

READS

427

6 authors, including:



**Santhosh B Santhosh**

Central Marine Fisheries Research Institute

41 PUBLICATIONS 76 CITATIONS

[SEE PROFILE](#)



**Anil Mk**

Central Marine Fisheries Research Institute

83 PUBLICATIONS 145 CITATIONS

[SEE PROFILE](#)



**Suryavamsi Jasmine**

Siva Sivani Institute of Management

42 PUBLICATIONS 89 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Studies on Cephalopods(Cephalopoda: Mollusca) of Vizhianjam Coast of Kerala with special emphasis on their aquaculture prospects [View project](#)



Systematics and biology of Pomacentrids [View project](#)

**COURSE MANUAL**



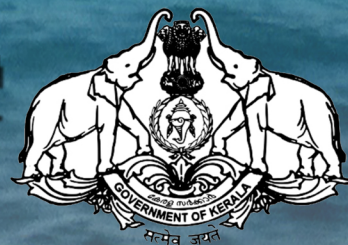
# Training on Recent Advances in Mariculture



**ICAR- Vizhinjam Research Centre of Central  
Marine Fisheries Research Institute, Vizhin-  
jam, Thiruvananthapuram, 695 521, Kerala**

**&**

**Department of Fisheries, Government of  
Kerala, Thiruvananthapuram, Kerala**



## **Spiny Lobsters and Potential of Sea Cage Culture of Spiny Lobster Resources in India**

**K. N. Saleela, B. Santhosh, M. K. Anil, S. Jasmine, C. Unnikrishnan. and Arathy. R. Pillai**

Vizhinjam Research Centre of CMFRI, Vizhinjam, Thiruvananthapuram,  
Kerala, India, 695 521  
Email:saleela.ajay@gmail.com

### **Introduction**

Fishery science and technology contributes a vital role in the augmentation of fish production globally. Among the seafood items, spiny lobsters have a prime position in terms of high unit value, demand, nutritional qualities with less perishable nature. Lobsters have great demand in international and domestic market, especially from tourism based beach resorts and restaurants as a luxury food. The annual lobster landings in India has been declining from a peak of 4,075 t in 1985 to the present annual average of 1,546 t. On an average, the fishery is contributed by Gujarat (43.7%), Maharashtra (25.4%), Tamil Nadu(14.6%) and Kerala (13%) (CMFRI Annual Report 2000-2015). Lobster fishing in India is mostly carried out by region specific traditional fishermen communities inhabiting along the coastal belts of different maritime states. Over the years the lobster fishery in India witnessed changes in fishing pattern, utility pattern with the introduction of live export market , sea cage culture and increased consumption and demand from tourism sector .

Live Lobsters have a prominent place in the sea food export market both in terms of demand and price from Japan, Korea, China, Taiwan, Europe and USA. India witnessed a sea change in foreign exchange earnings through marine products export worth 46,975 million rupees during 1997-98 and 55,111.12 million rupees during 2014-15, from an initial value of 25 million rupees in 1950-51 (Sakthivel, 1999). The marine products export accounted for 0.5 % of India's total exports in the early 1950's and contributed 3.5 % of the total exports in 1990s. Our marine product exports in the initial stages were in dried and canned form. It has gradually progressed into frozen and live forms. India's export of live marine products was 2,000 t worth 340 million rupees in 1996-97 (Sakthivel, 1999). Spiny lobsters formed one of the items in the live fish export along with mud crabs and reef fishes. The annual average revenue earnings by India through the export of lobsters is amounted to Rs.74 crores.

### **Prospects**

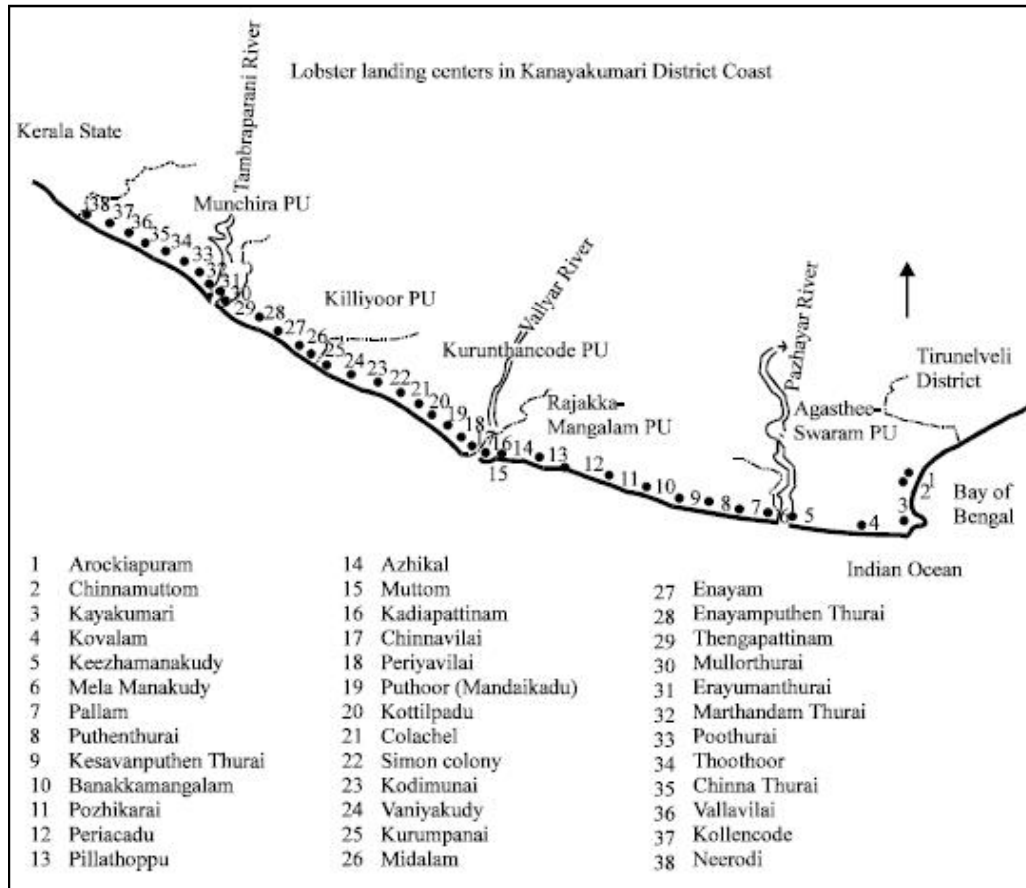
Spiny lobsters in live condition fetch 5 to 7 times increased price than frozen form in international market. The price of live lobster in domestic market ranged from a minimum of Rs 500 to Rs 2,000Rs/kg. They are hardy, tolerant to fluctuating environmental conditions, adaptable to captive conditions and are available in near shore waters. Though the Ministry of Commerce and Industry, Government of India has implemented minimum legal size for export of lobsters during 2003, still juveniles are caught and exported illegally which fetch very low price. These juveniles have cheaper price in lobster fishing centers sold @ Rs 100/kg. The fishermen can use these juveniles for stocking in cages.

Cage culture ensures propagation of seafood production and revenue generation from a small unit area when compared to high capital investment oriented onshore farming methods. Cage culture also, leads to social harmony and prosperity among the fishermen sector including coastal security. Cage aquaculture of spiny lobsters in India has a recent origin initiated during the year 2007, focusing increased production from coastal water bodies due to the declining seafood resource status, increasing demand and high prices in domestic as well as international markets. Prior to the introduction of larger sea cages, small scale fattening of juveniles of spiny lobsters were conducted by the fishermen along the coastal waters of Veravel in Gujarat. CMFRI in 2009, has successfully demonstrated lobster fattening in large marine floating cage moored at Vizhinjam Bay in Kerala, for the first time in India. CMFRI has also conducted a series of national training workshops on cage culture of spiny lobsters and finfishes to fishermen and entrepreneurs from different maritime states. As a result, fishermen from Gujarat, Tamil Nadu, Karnataka, Odisha, Andhra Pradesh and Kerala has ventured in to cage culture of spiny lobsters and finfishes using location specific marine cages moored along the coastal waters (Santhosh *et al* 2015, Lipton *et al* 2010, Gulshad *et al* 2010, Suresh Kumar *et al* 2012, Biswajit *et al* 2015, a & b, Divu *et al* 2015, Kizhakkudan *et al* 2015, Johnson *et al* 2015, Kalidas *et al* 2015.). At present marine cage culture in India is mostly practiced in Bays or in near shore waters with in 20 m depth. Cage culture can be extended to offshore waters that are free from domestic, agricultural and industrial pollution where safe and steady water quality and environmental parameters are available. Caution is also necessary to adopt safe season to do cage culture activities to prevent destructions from strong wind and water current.

### **Distribution of cultivable lobster resources of India**

The southern coastal waters of India between Neendakara in Kollam district of Kerala and Kanyakumari district of Tamil Nadu is characterized for the availability of spiny lobster resources. The coastal waters between these two districts have lots of scope and potential for the establishment of series of small scale cage units for the culture of spiny lobster resources. Lobster fattening can also be conducted in large cages of 6 m diameter HDPE cages floating/submerged. The bottom of the cage net should be of flat substratum provided with suitable types of artificial hide - outs. The top of the cage should be covered with a bird net having 80-100 mm mesh size. A total of 3 crops of lobsters for a period of 3 months can be fattened in a single cage unit. The studies conducted at Vizhinjam and Kanyakumari coastal waters shows 1,100-2,400 juvenile lobsters in the 45-90 g sizes can be fatten in 6 m diameter cages.

The important places where lobsters are available in southern coastal waters of Kerala are ; Thottukuzhi, Thiruvambadi, Parakkada, Chillickal, Nadavambil, Odayam, Edava, Papanasam, Valiathura, Vizhinjam harbour, Mulloor, Poovar, valiathura, Karumkulam, Beema palli, Veli and Avaduthurai. In Kanyakumari district of Tamil Nadu a total of 38 lobster fishing centers are also available along the near shore waters extending from Neerodi to Arockiapuram (Vijayanand 2007). It has been observed that along Kadiapatanam, Chinnamuttom and Vizhinjam coast, fishermen occasionally use juvenile lobsters as a bait to catch cuttlefish. These juveniles can be stocked in submerged/floating cages moored at each centre.



Source: Vijayanand(2007)

### Cultivable species and their identity

Shallow water lobsters such as *P. homarus*, *P. ornatus*, *P. versicolor*, *P. polyphagus* can be considered for cage culture based on the respective regions of their availability. These species can be identified based on the external features and color markings.

#### *Panulirus polyphagus* (Herbst, 1793)

This species grows to a maximum length of 40 cm. They have light green colored body with round carapace, moderately covered with spines and tubercles of different sizes. Antennular plate with a single pair of anterior spines. Bases of antennae separated by a broad antennular plate bearing single pair of principal spines. Antennules very long, about 1.5 times of total body length. Each abdominal segment have distinct transverse band of white color along posterior margin and legs with indistinct blotches and short stripes. This species is found along Gujarat, Tamil Nadu and Maharashtra coasts.

#### *Panulirus homarus* (Linnaeus, 1758)

This species attain a maximum length of 31 cm. They have dark brown or greenish to blackish colour with round carapace covered with numerous spines of varying sizes. Antennular plate has two equal pairs of spines and many scattered smaller spines. Their abdominal segment is grooved transversely and the grooves interrupted medially

occasionally. Lateral border of abdominal segments have white circular spot. This species found along Calicut, Kollam and Trivandrum coastal areas in Kerala also along Kanyakumari, Tirunelveli and Mandapam in Tamil Nadu.

***Panulirus ornatus* (Fabricius, 1798)**

This species grows to a maximum length of 50 cm. They have grayish brown color and round carapace covered with numerous yellow spines and tubercles of different sizes. Antennular plate have 2 pairs of spines, off which, anterior pair is larger. Abdominal segments smooth with a broad, dark transverse band over the middle with large pale spot on sides. Antennular flagella is black and yellow banded and legs with stripes of same color combination. This species is found along rocky coastal area extending Kanyakumari to Chennai, in Tamil Nadu, Calicut and Kollam to Trivandrum coastal area in Kerala.

***Panulirus versicolor* (Latreille, 1804)**

*P. versicolor* attains a maximum length of 40 cm. They have greenish blue color with a distinctive pattern of blue-black patches. They have white lines on round carapace covered with numerous spines of varying size with a white transverse band bordered by 2 black lines, across the abdominal segments. Their legs and antennules are longitudinally striped. The base of antennae is bright pink which are separated by a broad antennular plate bearing 2 pairs of unequal separated principal spines. This species is available along Kollam and Trivandrum coastal area in Kerala and Kanyakumari, Chennai and Mandapam in Tamil Nadu.

**Cultivable species available along south India**



*Panulirus ornatus*



*Panulirus homarus*



*Panulirus versicolor*

**Lobster collection, packing and transportation**

Lobsters collected from traps are preferable than caught in gears because lobsters caught in gears have the chances for lose or breaking of appendages while entangling in the gear. Lobsters selected for cage culture should be healthy with good pigmentation, vigor, intact exoskeleton with all appendages (Syda Rao *et al* 2010). Rough and frequent handling of the lobsters should be avoided right from the time of their collection and throughout their maintenance. The stress caused due to rough handling, environmental factors, or food will cause tail cramp/ rot or wounds on their exoskeleton which cause invasion of opportunistic pathogens leading to diseases or mortality. Lobsters should be packed and transported quickly under moist conditions soon after their collection. Lobsters exposed to sun and wind will suffer severe drying effect which will weaken them. Prior to packaging, lobsters should be dipped for five

minutes in 13 °C cooled sea water to lower their biological activity. They should be then wrapped individually in news papers of suitable size and placed serially, preferably in single layers inside a polystyrene box. In case if more number of lobsters are to be transported, they can be placed one upon the other by placing news paper sprayed with 13 °C cooled sea water like a sandwich between the lobsters. Inside the packing box, 2 plastic bottles filled with 13 °C cooled sea water has to be kept at the corners to maintain ambient temperature. Finally a thin layer of news paper should be spread on the top of the lobsters and the box need to be tightly closed. Few holes on the sides of the box should be provided for maintaining aeration. Lobsters packed and transported in this method will be inactive and can survive for quite long hours or even for days without any mortality (Beard and Gregor, 1991).

### Husbandry practices

The packed lobsters should be carefully transferred in to the cages. Lobsters can be fed with mussel or soft clam as whole and also chopped trash fishes @16 -20 % of their body weight day<sup>-1</sup> during evening daily. The experimental lobster cage culture studies conducted at Vizhinjam proved that lobsters attain a body weight gain of approximately 1 gram day<sup>-1</sup>. The quantity of feed should be worked out before stocking lobsters in cages. The lobsters may be fed with additional feed accordingly with the advancement of cage culture. The cleaning of the cage structures should be carried out regularly depending on the attachment of biofoulers. Outer nets should be exchanged depending on the nature of the intensity of biofoulers with new one to ensure proper water exchange inside the cages. To ensure proper nutrition to the lobsters, different types of live/fresh feed should be given. When fed with live mussels, the shells should be removed from the cages to save space and weight of the cages.

### References

- Anil, M.K., Santhosh, B., Jasmine, S., Saleela, K.N., Rani Mary George., Jose Kingsly, H., Unnikrishnan, C., Hanumantha Rao, G., and Syda Rao, G. 2010. Growth performance of sea bass *Lates calcarifer* (Blotch) in sea cage at Vizhinjam Bay along the south-west coast of India. *Indian J. Fish.*, 57(4):65-69.
- Beard, T.W and Gregor, D.M. 1991. Storage and care of live lobsters. Ministry of Agriculture, Fisheries and Food Directorate of Fisheries Research. Laboratory leaflets. MAFF Lowestoft 33-66.
- CMFRI. Annual Report 2005-2013. Central Marine Fisheries Research Institute, Cochin.
- Lipton, A.P, Syda Rao, G, Jose Kingsly, H., Imelda Joseph., Suresh Kumar Mojada., Hanumantha Rao and Rajendran, P. 2010. Open sea floating cage farming of lobsters. Successful demonstration by CMFRI off Kanyakumari coast. *Fishing Chimes*, 30(2) pp 11-13.
- Nair, R.V., Soundararajan, R and Dorairaj. 1973. On the occurrence of *Panulirus longipes longipes*, *Panulirus penicillatus* and *Panulirus polyphagus* in the gulf of Mannar with notes on the lobster fishery around Mandapam. *Indian J. Fish.*, 20 (2):333-350.

- Radhakrishnan, E.V and Vijayakumaran, M. 2000. Problems and prospects for lobster farming in India. *Marine Fisheries Research and Management* 753-764.
- Santhosh B., Anil, M.K., Saleela, K.N., Jasmine, S., Jose Kingsly, H., Unnikrishnan, C., Hillary P., Benzeger, V.P., and Udayakumar, A., 2012. Seed collection, packing, transportation and stocking for sea farming. *In: Training manual: Sea farming avenues and cage aquaculture to cope up with climate variability*
- SydaRao, G., Rani Mary George., Anil, M.K., Saleela, K.N., Jasmine, S., HanumanthaRao, G., Jose Kingsly, H., 2010. Cage Culture of the Spiny lobster *Panulirus homarus* (Linnaeus) at Vizhinjam, Trivandrum along the south-west coast of *Indian Journal of Fisheries*, 57 (1); 23-29.
- Suseelan, C., Neelakanta Pillai, N.C., Radhakrishnan, E.V., Rajan, K.N., Sampson Manikyam, P.E., Manmadhan Nair, K.R and Saleela, K.N., 1992. The Lobster. Hand book on aqua farming shrimps, lobsters and mud crabs, MPEDA, Kochi pp 47- 54.
- Vijayanand, P., Murugan, A., Saravanakumar, K., Khan, S. and Rajagopal, S. 2007. Assessment of lobster resources along Kanyakumari, South East coast of India. *Fish. Aquatic Sci.*, 2: 387-394.
- Vikash Kumar and Gunjan Karnatak. 2014. Engineering considerations for cage aquaculture. *IOSR journal of Engineering*. Vol 04 (6) pp 11-18 ISSN (e): 2250-3021, ISSN(p): 2278-8714.

**ICAR- Vizhinjam Research Centre of Central  
Marine Fisheries Research Institute, Vizhin-  
jam, Thiruvananthapuram, 695 521, Kerala  
&  
Department of Fisheries, Government of  
Kerala, Thiruvananthapuram, Kerala**

