



SEA URCHIN DIVERSITY AND ITS RESOURCES FROM THE GULF OF MANNAR

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ABSTRACT

A detailed investigation was undertaken for a period of 20 months from October 2013 to May 2015 to study the landing characteristics and species diversity of sea urchins in two landing centres viz., Pampan and Vedalai along the Mandapam coast of Gulf of Mannar. A total of 16 species of regular sea urchin have been documented during the study period. The species *S. virgulata* and *T. toreumaticus* were abundant in the catch between December and March period and the maximum total landing were found to be 7,239 kg and 3,103 Kg respectively in the trawl landing at Pampan. The landings were estimated to be 2,819 kg of *S. virgulata* and 1,208 kg of *T. toreumaticus* at Vedalai, which is a major bottom set gill net landing centre. The species composition of these two species were analysed to be 70:30 for *S. virgulata* and *T. toreumaticus* respectively in the landings. The morphometric study revealed that the overall population showed a great concentration of lengths within the diameter classes 20 – 60 mm for *S. virgulata* and 20 – 45 mm for *T. toreumaticus*.

Key words:

Sea urchin, Gulf of Mannar, Echinoid, Species diversity.

INTRODUCTION

Gulf of Mannar is the richest marine biodiversity hotspot along the Southeast coast of India, encompassing the territorial waters from Dhanushkodi in the north to Kanyakumari in the south. It has a chain of 21 islands, located 2 to 10 km from the mainland along the 140 km stretch between Thoothukudi and Rameswaram. The area of Gulf of Mannar under the Indian EEZ is about 15,000 km² where commercial fishing takes place only in about 5,500 km² and that too only up to a depth of 50m. This marine ecosystem holds nearly 117 species of corals, 441 species of fin-fishes, 12 species of sea grasses, 147 species of seaweeds, 641 species of crustaceans, 731 molluscan species (Kumaraguru, 2006). There are around 950 species of sea urchin in class Echinoidea which comes under two subclasses. A wide variety of fishing gears and crafts are used along the Gulf of Mannar coast for the exploitation of various pelagic and demersal fishery resources. Among the echinoderms, sea cucumber and sea urchins are commercially exploited globally and in India, sea urchin is usually discarded by the fishermen and some quantity of sea urchin test is utilized in souvenir industry. In the Gulf of Mannar region, four species of Echinoidea are used as ornamentals and curios (Chellaram, 2003). Fishery for sea urchin roe has been in practice from time immemorial in Western

Europe, Mediterranean countries, the north Pacific and more recent one in Chile and Pacific North America (Kawamura, 1973; Mottet, 1976; Sloan, 1985). Many small-scale artisanal fisheries for sea urchin occur throughout the tropics and they are harvested from intertidal regions by hand or by using rakes, spears, dredges etc., and from the shallow subtidal waters by divers.

MATERIALS AND METHODS

For the quantification of sea urchin landing from trawl net and bottom set gill net, weekly sampling was carried out in Pampan and Vedalai landing centres during the study period from October 2013 to May 2015. The landing characteristics were analyzed for quantifying sea urchin mostly from the non-edible biota, because sea urchins are not currently traded along this coast for any purpose. Ten percent of the boats in a day were selected to calculate effort. This value was multiplied by the total number of boats fishing on the particular day of observation to obtain daily estimate. The collected data were pooled and multiplied by the number of fishing days in the month to obtain the monthly catch estimates for both the landing centres and the fishing gears. During the study period from October 2013 to May 2015, once in each month a sample of 30 specimen of *Salmacis*

virgulata and *Temnopleurus toreamaticus* were collected from the bottom set gill net landing due to its freshness so that it is suitable for further histological studies. The collected sea urchins were transported to the Central Marine Fisheries Research Institute (CMFRI), Mandapam laboratory in sea water and their morphometric measurement test diameter and test height were taken using a digital vernier caliper ($\pm 0.1\text{mm}$). Test diameter was measured at the ambitus, while test height was measured along the oral-aboral axis. The total weight of the sea urchin was measured to the nearest 0.001g, only after draining water from its test.

RESULTS AND DISCUSSION

Among the 264 species of echinoderms reported from Gulf of Mannar, regular echinoid diversity stands at 24, of which 16 species of sea urchin were collected in the present study and has been shown in the Table.1. Many species of regular echinoids are ecologically important and many species are cultured around the World for their 'roe' which is considered a delicacy in Japan and France. The present work assessed the regular echinoid diversity in Gulf of Mannar which could form a baseline data to quantitatively assess their population and reproductive cycle that are necessary for any aquaculture attempts on sea urchins.

Sea urchin species viz., *T. toreamaticus* and *S. virgulata* are caught in large quantity in shrimp trawl and bottom set gillnet operators along the Gulf of Mannar, but there is no commercial value for sea urchin in these areas, hence, they are simply dumped along the seashore. The present study made an estimate of the landings of *T. toreamaticus* and *S. virgulata* from two landing centres viz., Vedalai and Pampan over a period of 20 months from these fishing gears.

The 20 months data (Figs.1 & 2) on the landing of sea urchin in the bottom set gillnet and trawl net revealed that two species of sea urchin *S. virgulata* and *T. toreamaticus*, were the dominant in the landing and other species were stray in the catch and not found in a quantifiable level. Both the sea urchin species were abundant in the catch between December and March period and the maximum total landing of *S. virgulata* and *T. toreamaticus* were found to be 7,239 kg and 3,103 kg respectively in the trawl landing at Pampan during the 20 month study period from October 2013 to May 2015. The bottom set gill net centre Vedalai, landed an estimated quantity of 2,819kg of *S. virgulata* and 1,208 kg of *T. toreamaticus* respectively.

The composition of these two species of sea urchins in the landing was 70:30 for *S. virgulata* and *T. toreamaticus* respectively. The area of operation of trawl fleet from Pampan is larger than the area of operation of bottom set gill net which is mostly restricted to the surrounding of the islands. This might

be the reason for the difference in the landing quantity. In trawl more than 700 kg *S. virgulata* was observed during the month December-2014 and March-2015 (Fig.1) in by-catch, similarly for *T. toreamaticus* the peak maximum landing coincided with this period with more than 300 kg in landing from Pampan landing centre. The bottom set gillnet landing of Vedalai showed a peak in landing of both the species of sea urchin in the month of October- 2014 (Fig.2). The average monthly landing of *S. virgulata* in trawl and bottom set gill net was 402 kg and 157kg respectively. Whereas, the average monthly landing of *T. toreamaticus* was 172kg and 67 kg respectively in bottom set gill net landings.

CONCLUSION

Among the 24 varieties of sea urchin recorded from the Gulf of Mannar, only 16 species were recorded from the commercial landing of gill nets and trawl nets of Pampan and Vedalai landing centres. *S. virgulata* is the dominant species landed in the commercial catch as bycatch. As such sea urchins are not directly involved in any trade, however their test is of considerable importance in souvenir industry and the gonads of *Stomopneustes variolaris* is a delicacy among certain fishers along the Gulf of Mannar. Further studies on the edibility and suitability of sea urchin species from this ecosystem should be studied to understand their ecological role as well as to develop a potential species of sea urchin for aquaculture purposes.

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Table. 1 Sea urchin diversity in Gulf of Mannar

CIDARIDAE

Prionocidariscaculosa (Lamarck, 1816)

Eucidarismetularia (Lamarck, 1816)

Phyllacanthusimperialis (Lamarck, 1816)

TEMNOLEURIDAE

Temnopleurustoreumaticus (Leske, 1778)

Salmacis bicolor typica Mortensen, 1904

Salmacisvirgulata L. Agassiz in L. Agassiz & Desor, 1846

Salmacielladussumieri (L. Agassiz in L. Agassiz & Desor, 1846)

Mespiliaglobulus (Linnaeus, 1758)

TOXOPNEUSTIDAE

Tripneustesgratilla (Linnaeus, 1758)

Tripneustesdepressus A. Agassiz, 1863

Nudechinusscotiopremnus H.L. Clark, 1912

Pseudoboletiamaculata Troschel, 1869

Toxopneustespileolus (Lamarck, 1816)

ECHINOMETRIDAE

Echinostrephus molaris (Blainville, 1825)
Echinometramathaei (Blainville, 1825)
Heterocentrotus mamillatus (Linnaeus, 1758)
Heterocentrotus trigonarius (Lamarck, 1816)
Colobocentrotus (Podophora) atratus (Linnaeus, 1758)

DIADEMATIDAE

Astropygaradiata (Leske, 1778)
Diademasetosum (Leske, 1778)
Diademasavignyi (Audouin, 1829)
Echinothrix calamaris (Pallas, 1774)
Echinothrix diadema (Linnaeus, 1758)

STOMOPNEUSTIDAE

Stomopneustes variolaris (Lamarck, 1816)

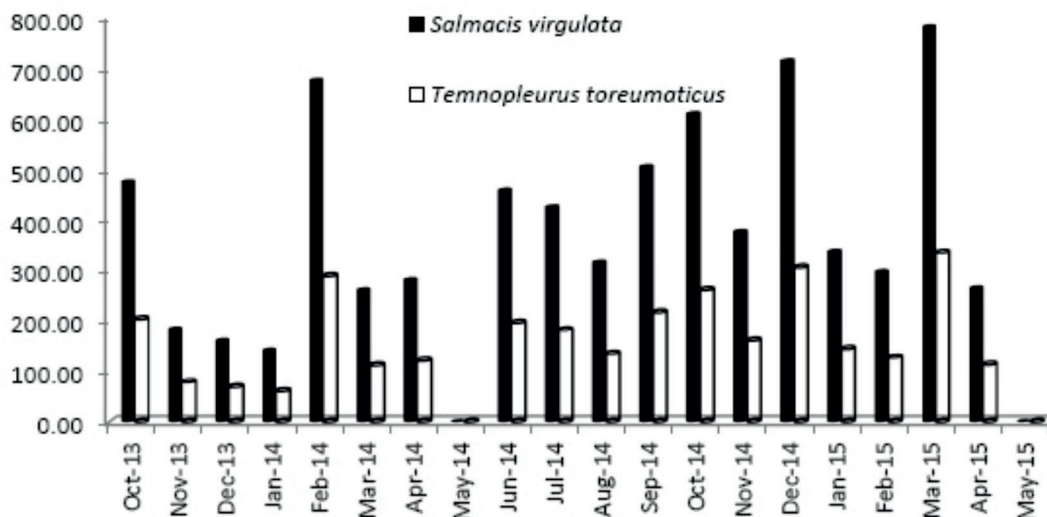


Fig.1

Comparison of the estimated landings of the two species of sea urchin from Pampan landing centre (in kg)

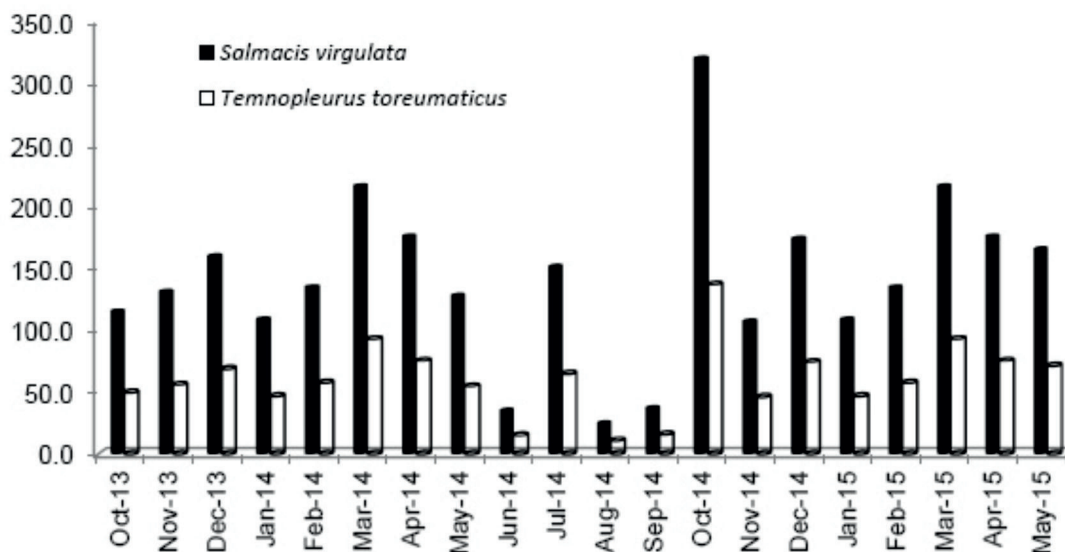


Fig.2

Comparison of the estimated landings of the two species of sea urchin from vedalai landing centre (in kg)

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