Indian J. Fish., ***50****(4) : 519-523, Oct.-Dec., 2003*

Note

Fishery and biology of *Paphia malabarica* from Dharmadom estuary, north Kerala

SUJITHA THOMAS, P. LAXMILATHA, M.NASSER*, V.G. SURENDRANATH, N.P. RAMACHANDRAN AND M.P. SIVADASAN

Calicut Research Centre of Central Marine Fisheries Research Institute, Kozhikode - 673 005, India

** Department of Zoology, University of Calicut*

ABSTRACT

The short neck clam, *Paphia malabarica* forms a part of the bivalve fishery of Dharmadom estuary. Average annual catch during the period 2000-2002 was estimated to be 2.49 t. Peak fishing during the period was in October. *P. malabarica* of length range 18-50 mm contributed to the catch. Male dominated the catch except in January, August and November. Percentage of mature clam was found to be high during November to February indicating spawning period in these months with peak spawning activity in November - December.

Among the exploited molluscan resources of India, bivalves contribute the major portion and among them, clams are the most important along the east and west coasts. In this clam resource, *Paphia malabarica* is widely distributed and is an important component of the molluscan fauna of many estuaries and coastal waters of India (Nayar and Mahadevan, 1974). Along the west coast *P. malabarica* forms a major fishery in Mulky, Gurupur, Udyavara and Coondapoor estuary in Karnataka and Azhikkal Chittari and Ashtamudi estuaries of Kerala. (Narasimham, 1991).

Dharmadom estuary (75° 25' N and 11° 45'S) extends up to approximately six kilometers to the interior from the barmouth and supports good clam fishery. Major bivalve resources in this estuary are edible oyster *Crassostrea madrasensis*, clams *Meretrix casta* and *P. malabarica*. Blood clam *Anadara* sp. is also fished in minor quantity. *P. malabarica* forms only a subsistence fishery in this estuary.

Investigations have been carried out earlier on various aspects of this species along the Indian coast. Biology of *P. malabarica* from Mulky estuary was studied by Rao (1988). Infestation of peacrab on *P. malabarica* and its effect on the condition index was studied by Krishna Kumari and Rao (1974). Detailed study on the ecobiology and fishery of *P. malabarica* from Ashtamudi estuary was studied by Appukuttan *et al.*, (1999). Present study is aimed to understand the biological characteristics of *P. malabarica* of Dharmadom estuary.

Monthly samples of the clam, varying in length from 16-52 mm were col-

lected from the bar mouth during January to December 2002. The total length, weight and wet meat weight were recorded to the nearest 0.1 g. Gonad smears were examined under the microscope to determine the maturity stage. The classification of the maturity stages as stipulated by Ropes (1968) was followed. The percentage edibility was studied as percentage of wet flesh weight to total weight of the clam (Durve, 1964). Observations on the fishery were done regularly during the period 2000-2002. The data on effort, landings and fishery information were gathered.

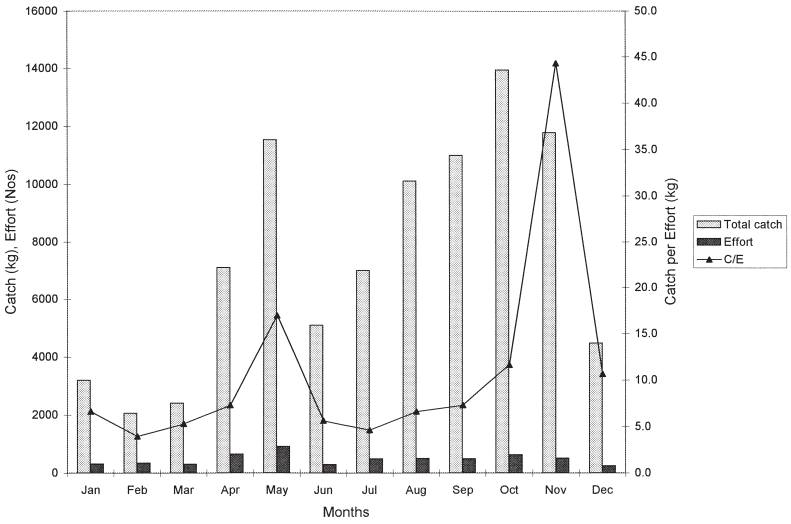

Fig. 1. Average catch, effort and catch per effort of *P. malabarica* from Dharmadom Estuary during 2000-2002

Clams are exploited from the bar mouth by the traditional method of hand picking during low tide. Usually fishermen reach the area either by swimming or by traditional canoes. Fishing is for two to three hours daily. Average annual catch during 2000-2002 was estimated to be 2.49 t. During the period 2000-2002 regular fishery occurred only in 2002. Fishery was poor in 2000 and 2001 due to red tide and also due to excessive mud and sand deposit in the bar mouth. Average monthly catch in the year 2000 was estimated to be 0.99 t, 0.75 t in 2001 and 5.74 t in 2002. Peak fishing was in October. Total effort during 2000-2002 ranged from 256 to 921 with an average of 482. Catch per effort was between 4 to 44 kg with an average of 10.94 kg. Maximum

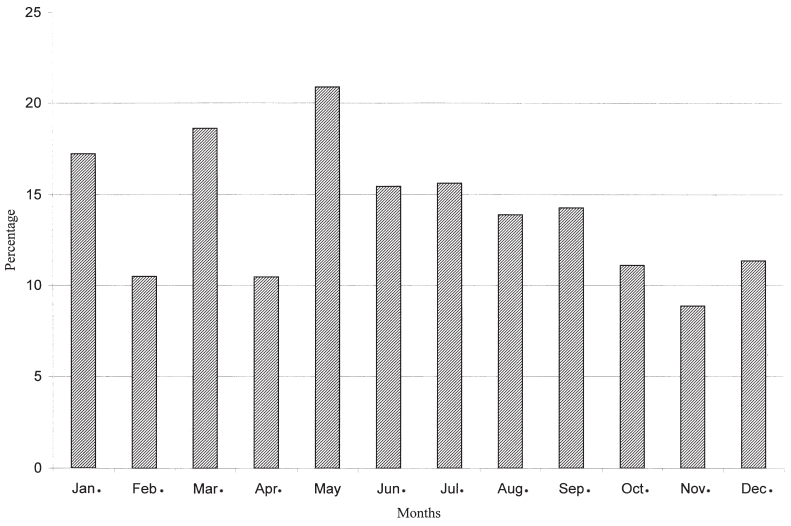

Fig. 2. Percentage edibility of *P. malabarica* from Dharmadom Estuary during 2002

catch per effort of 44.4 kg was estimated in November. Minimum catch rate of 0.81 t was estimated in March (Fig 1). The dominant size in commercial catch ranged from 34 to 40 mm.

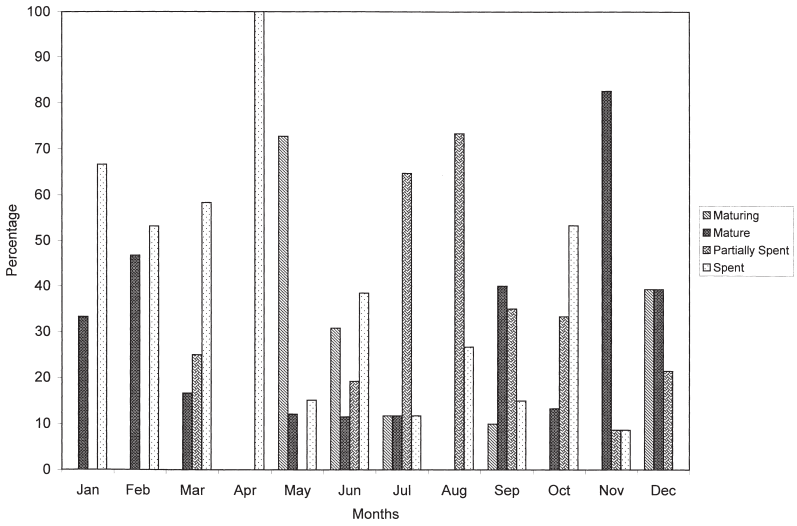

Fig. 3. Maturity stages of *P. malabarica* from Dharmadom Estuary during Jan.- Dec. 2002

There is no organized fishery for this species and fishing is still in subsistence level. The clam is sold in the local market at a price of Rs. 15-20/- per Kg of meat. The shell along with the other dead shells collected from the estuary is sold to lime industry.

Males outnumbered (50.97%) females except in January (24%), August (40%) and November (34.8%). The indeterminate occurred during January (40%), February (24.39%), March (33.33%) and May (13.16%). The percentage edibility of *P. malabarica* ranged between 8.86 to 20.88. Maximum value of 20.88 was observed in May and minimum of 8.86 in November (Fig 2). Females in the mature phase were found in all the months except in April. Females in maturing phase dominated in May and December. Partially spent females were observed in all months except in January, April and May. In April all the females observed were in spent condition.

Seasonal changes in the male gonadal phase were similar to that observed in female. The developing or maturing classes were observed in May, June July and December. A high proportion of ripe males were observed from September to November. Percentage of mature clam was found to be high during November to February indicating spawning period in these months with peak spawning in November-December (Fig. 3).

Clam fishery at Dharmadom estuary is still in subsistence level. In 2000, fishery was only during the first five months and in 2001, fishery was restricted to May and October to December. Regular fishery was observed only in 2002. The reasons are attributed to siltation and red tide. In Ashtamudi estuary even though there is fluctuation in catches, there is regular fishing for this species (Appukuttan, 1993).

The length of clam ranged between 16 and 50 mm. During January, 16-18 mm size group dominated the catch. In February a shift in dominant mode was noticed at 20-22 mm followed by 30-32 mm in March. In April modes at 24-26 mm, 28-30 mm and 34-36 mm were observed. From May to October dominant modes were at 30-32 mm and 36-38 mm. Clams of length range 38-40 mm and 40-42 mm dominated in November and December.

It was observed that the rate of growth during January to August was about 4 mm and from September to December between 1.5 to 2 mm. Normally the rate of growth is expected to be very high in the early life of the clam (Newcombe, 1935). Abraham (1953) noticed the growth of 4.14 mm in length in one month in case of *Meretrix casta*. The growth rate is not uniform in all the months. Rao (1951) observed that the growth rate of *Katelysia opima* was not uniform in all the months. Similar observations were made in *Paphia laterisulca* at Kalbadevi estuary by Mane and Nagabhushanam (1979). Appukuttan *et al.* (1999) observed a length range of 17 mm to 35 mm in the Ashtamudi estuary with an average growth of about 3 mm. In Mulky estuary estimated growth (length) of *P. malabarica* is 36.3 mm in six months (Rao, 1988).

It was observed that the percentage of edibility was highest in May when maturing and mature classes were more. The percentage edibility was low during April and November when the spawning activity is high. Durve (1964) observed that percentage edibility drops considerably during spawning period. Spawning period of *P. malabarica* in Ashtamudi estuary is from October to January with peak during November and December (Appukuttan, 1993). While studying the reproductive cycle of *Paphia undulata* Zhijian *et al.* (1991) observed two spawning peaks in a year i.e. in the end of May and early October.

About 80-90% of clam meat exported from India is contributed by *P. malabarica* and of this about 80% is from Ashtamudi estuary (Appukuttan, 1993). Due to high value in export market, there is intensive fishery of this species from the estuary. But in the case of Dharmadom estuary, the fishery is still in the subsistence level and at present there is no export from the area. Detailed investigations are required for assessing the stock of *P. malabarica* in the estuary, its replenishing capacity and maximum sustainable yield for large scale exploitation.

Acknowledgement

The authors express their gratitude to Dr. K.K. Appukuttan, Head, Molluscan Fisheries Division for encouragement. The authors would also like to thank Dr. P.N. Radhakrishnan Nair, Scientist - in - Charge, Calicut Research Centre of CMFRI, for his support.

References

Abraham, K.C. 1953. Observation on the biology of *Meretrix casta* (Chemnitz). *J. Zool. Soc. India,* **5**(2): 163-190

Appukuttan, K.K. 1993. *Studies on the ecobiology and fishery of Paphia malabarica Chemnitz (Venerid, Bivalvia) from Ashtamudi estuary, Southwest coast of India.* Ph.D. thesis, University of Kerala: 185 pp.

Appukuttan, K.K., C.M. Aravindan, T.M. Yohanan and N.K. Balasubramanian 1999. Population dynamics of an exploited stock of the clam *Paphia malabarica* of Ashtamudi estuary (South India). *The Fourth Fisheries forum Proceedings,* 24-28 November, 1996. Kochi: 31-34

Durve, V.S. 1964. Preliminary observation on the seasonal gonadal changes and spawning in the clam *Meretrix casta* (Chemnitz) from the marine fish farm. *J. mar. biol. Ass. India,* **6**(2): 241-248

Krishnakumari, L. and K.V. Rao 1974. Lifecycle of the pea crab, *Pinnotheres vicajii,* infesting the clam, *Paphia malabarica. Indian J. Mar. Sci.,* **3**: 165-172

Mane, U.H. and R. Nagabhushanam 1979. Studies on the growth and density of the

clam *Paphia laterisulca* at Kalbadevi estuary, Ratnagiri on the west coast of India. *Malacologia,* **18**: 297-313

Narasimham, K.A. 1991. Present status of clam fisheries *J. mar. biol. Ass. India,* **38** (1&2) : 76-88

Nayar, K.N. and S. Mahadevan 1974. Edible bivalves: clams and others. In : *Commercial Molluscs of India. CMFRI Bulletin,* **25**: 40-53.

Newcombe, C.L. 1935. Growth of *Mya arenaria* L. in the Bay of Fundy region. *Can. J. Res.,* **13** D(6): 97-138.

Rao, K.V. 1951. Studies on the growth of *Katelysia opima* (gamelin). *Proc. Indo-pacific Fish. Coun. Sec.,* **II**:94 - 102.

Rao, G.S. 1988. Biology of *Meretrix casta.* (Chemnitz) and *Paphia malabarica* (Chemnitz) from Mulky estuary, Dakshina Karnataka. *CMFRI Bulletin,* **42**(1): 148-153.

Ropes, J.W. 1968. Reproductive cycle of the surf clam *Spisula solidissima* in offshore, New Jersey. *Biol. Bull.,* **132**(2): 349-365.

Zhao Zhijiang, Li. Fuxue and Ke Caihuan 1991. On the sex gonad development and reproductive cycle of clam *Paphia undulata. J. Fish. China,* **15**(1): 1-8