

Seasonal Variability in the Condition of the Wedge Clam, *Donax incarnatus* (Gmelin)

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Abstract

Variations in the condition of *Donax incarnatus* (Gmelin) inhabiting Panambur beach sand were followed for one year. The highest condition indices were in March (9.4) and September (8.9) and the lowest in January (3.5). Seasonal fluctuations in condition were probably related to cycles of gonadal growth and spawning. Based on the data, the best period for commercial exploitation appears to be during March and September.

Introduction

Relatively large variations in meat content occur in bivalve molluscs depending upon their physiological condition and variations in environmental parameters. In most bivalves, gonad development and growth prior to onset of spawning result in fattening and increased meat yield. Since such variations in meat yield are of importance in timing of harvesting and utilization of commercial species of bivalves, a study on the meat content and its temporal variations forms an important aspect of bivalve biology. From the Indian waters, seasonal cycles in condition have been studied in species of *Crassostrea* (Venkataraman and Chari, 1951; Durve, 1964; Rao, 1967; Joseph, 1979 and Joseph and Madhyastha, 1986), species of *Meretrix* (Abraham, 1953; Durve, 1970; Durve and George, 1973 and Krishnakumari *et al.*, 1977), species of *Donax* (Nayar, 1955, Alagarwami, 1966; Ansell *et al.*, 1972; Ansell *et al.*, 1973; Nagbhusanam and Talikhedkar, 1977 a, 1977 b and Balasubramanian *et al.*, 1979), *Paphia laterisulca* (Nagabhusanam and Dhamne, 1957 and Mane and Nagabhusanam, 1979), *Katelysia opima* (Mane, 1974); *Perna viridis* (Ramachandran, 1980) and *Villorita cyprinoides* (Reddy, 1983). In this paper we present the results of the study on the annual variability in the condition of the wedge clam, *Donax incarnatus* (Gmelin) inhabiting the beach sand at Panambur near Mangalore.

Material and Methods

Donax incarnatus specimens (sample size ca. 100) were collected at monthly intervals from the intertidal beach sand at Panambur near New Mangalore Port (12°57' N; 74°48' E) during Mar. 1984 - Feb. 1985. Shell length and oven dried meat weight were recorded individually. Shell cavity volume was determined using xylene. From these data condition index (CI) of each clam was calculated. A total of 1156 specimens were examined for this study.

Results and Discussion

Monthly mean values of C.I. varied from 3.5 (Jan.) to 9.4 (Mar.) Fig. 1). Three peaks were distinct in March, June and September when C.I. values > 9.0 were recorded. Peaks were followed by periods of sudden decline. Build up of condition took about two months from the periods of decline. Data on the frequency distribution of various class groups of C.I. during the 12 months period are presented in Fig. 2. During March, June and September > 50% of clams were in condition > 8.0. Their proportions in the population ranged from 62% in September to 75% in March and 79% in June. During July and November-January, 100% of clams were in condition < 8.0.

In bivalves, gonadal growth, somatic growth, tissue irregation and parasitic castration are chief intrinsic factors responsible for apparently fattened appearance (Joseph, 1979). In most bivalves, gonadal growth prior to spawning results in increasing the total bulk as gonad forms the major part of the visceral mass. In such animals variation in index of condition reflects the reproductive status. Accumulation of gametes in follicles and resultant bulkiness of the gonad result in increased condition while release of gametes from the follicles and corresponding shrinking of gonadal mass result in lowering of condition. Whether this is true in *D. incarnatus* can be verified only from a study of its gonadal histology. Often, indirect evidence such as fresh spatfall and larval swarms in plankton are available for drawing conclusions. A study on the population ecology of *D. incarnatus* from the same habitat (Thippeswamy, 1985) indicated that juveniles of size less than 1.0 mm. shell length settle at the site of study in very large member (> 39446 clams/m²) during May and November-January. This suggests prior spawning in the population. However, we do not have any evidence at hand to suggest spawning in June-July although the condition indices of clams in June was high. Breeding in the estuarine

and marine bivalves of the Mangalore region commences only after the cessation of the southwest monsoon and in most bivalves, gonads are in a state of sexual quiescence during the low saline monsoon period (Joseph and Joseph, 1986). It is reasonable to believe that this holds good in the present instance also as indicated by the first appearance of spat in November. Settlement of spat in January and May is suggestive of prolonged breeding season. The present data suggest a close relationship between breeding season and condition.

In the present study the values of index of condition varied from 3.5 to 9.4. The present data suggest a close relationship between the gonadal growth and fattening cycle and the condition indices. It is also evident that the ideal period for commercial exploitation of *D. incarnatus* from the Mangalore area is during March and September when the meat yield is the highest.

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References

- Abraham, K.C., 1953. Observations on the biology of *Meretrix casta* (Chemnitz). J. Zool. Soc. India, 5(2):163-186.
- Alagarwami, K., 1966. Studies on some aspects of biology of the wedge clam, *Donax faba* Gmelin from Mandapam coast in the Gulf of Mannar. J. mar. biol. Ass. India, 8(1):56-75.
- Ansell, A.D., Sivadas, P. and Narayanan, B. 1973. The ecology of two sandy beaches in South West India: 4. The biochemical composition of four common invertebrates. In: Special publication dedicated to N.K. Pannikar, Mar. Biol. Asso. India, 333-348.
- Ansell, A.D., Sivadas, P., Narayanan, B. and Trevallion, A., 1972. The ecology of two sandy beaches in south west India. 3. Observations on the population of *Donax incarnatus* and *Donax spiculum*. Mar. Biol., 17(4):318-332.
- Balasubramanian, T., Vijayaraghavan, S. and Krishnakumari, L., 1979. Energy content of the wedge clam, *Donax incarnatus* Gmelin. Indian J. mar. Sci., 8(3):193-195.
- Durve, V.S., 1964. On the percentage edibility and the index of condition of the oyster, *Crassostrea gryphoides* (Schlotheim). J. Mar. biol. Ass. India, 6:128-134.
- Durve, V.S., 1970. On the growth of the clam, *Meretrix casta* (Chemnitz) from the marine fish farm. J. mar. biol. Ass. India, 12(1&2):125-135.
- Durve, V.S. and George, K.V., 1973. Some observations on the index of condition of the clam, *Meretrix casta* (Chemnitz) in relation to mud and water qualities. Indian J. Fish., 20(2):326-332.
- Joseph, M.M., 1979. Studies on the biology of the Indian backwater oyster *Crassostrea madrasensis* (Preston) Ph.D. thesis, Univ. Mysore, Mysore, 350 pp.
- Joseph, M.M. and Joseph, P.S., 1986. Bivalves in estuarine and coastal environment: Reproductive responses related to the environmental in six species. In: R.C. Dalela, M.N. Madhyastha and M. Mohan Joseph (Editors). Environmental biology: Coastal ecosystem. The Academy of environmental biology, India, pp. 109-116.
- Joseph, M.M. and Madhyastha, M.N., 1986. Environmental effects on the condition and edibility of the oyster, *Crassostrea madrasensis* (Preston) in a tropical estuary. In: R.C. Dalela, M.N. Madhyastha and M. Mohan Joseph (Editors). Environmental biology, India, pp. 183-188.
- Mane, U.H., 1974. Growth and breeding habits of clam, *Katelysia opima* in the Kalabadevi estuary at Ratnagiri, Indian J. Fish., 21(2):386-398.
- Mane, U.H. and Nagabushanam, R., 1979. Studies on the growth and density of the clam, *Paphia laterisulca* at Kalabadevi estuary, Ratnagiri on the west coast of India, Malacologia, 18(1-2):297-313.
- Nagabushanam, R. and Dhamne, K.P. 1957. Seasonal variations in biochemical constituents of the clam *Paphia laterisulca*. Hydrobiologia, 54(3):209-214.
- Nagabushanam, R. and Thalikhedkar, P.M., 1977 a. Reproductive biology of the wedge clam, *Donax cuneatus*. Indian J. mar. Sci., 6(1):35-38.
- Nagabushanam, R. and Talikhedkar, P.M., 1977 b. Seasonal variations in proteins, fat and glycogen of the wedge clam, *Donax cuneatus*. Indian J. Mar. Sci., 6(1):85-87.
- Nayar, K.N., 1955. Studies on the growth of the wedge clam *Donax (Lantana) cuneatus* Linnaeus. Indian J. Fish., 2:325-348.
- Ramachandran, K., 1980. Studies on the biology of the green mussel, *Perna viridis* (Linnaeus). M.F.Sc. Thesis, Univ. Agril. Sci., Bangalore, 219 pp.
- Rao, K.S., 1967. Annual reproductive cycle of the wedge clam, *Donax cuneatus* Linnacus. J. mar. biol. Ass. India, 9(1):141-146.
- Reddy, D.K.N., 1983. Studies on the population ecology and reproductive biology of the clam, *Villorita cyprinoides* (Gray). M.F.Sc. thesis, Uni. Agril. Sci., Bangalore, 100 pp.
- Thippeswamy, S., 1985. Some aspects of the biology of the wedge clam, *Donax incarnatus* (Gmelin), M.F.Sc. Thesis. Uni. Agril. Sci., Bangalore, 140 pp.
- Venkatraman, R. and Chari, S.T., 1951. Studies on oysters and clams: Biochemical variations. Indian J. Med. Res., 39:533-541.

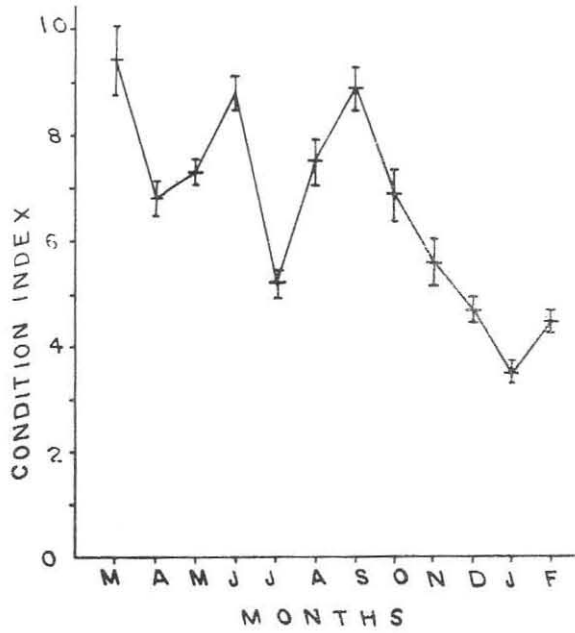


Fig. 1. Monthly variations in mean condition indices in *Donax incarnatus*.

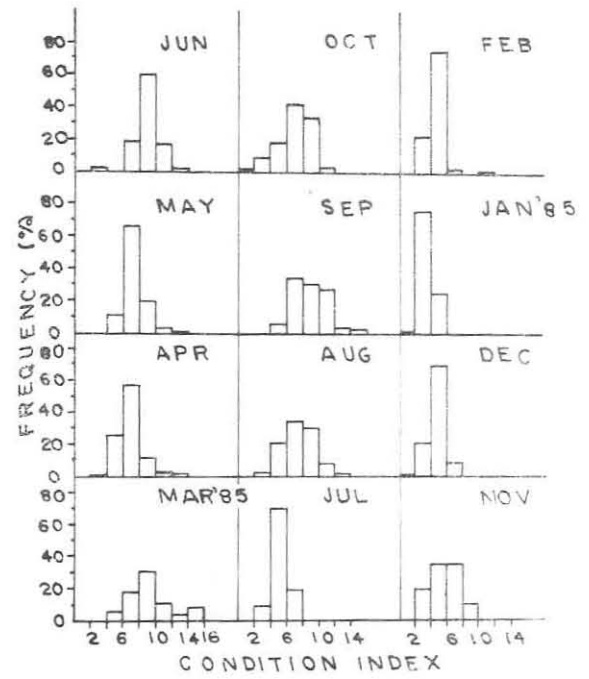


Fig. 2. Temporal variations in condition indices in *Donax incarnatus*.