Journal of the Indian Fisheries Association
20, 1990, 21-29

SOME ASPECTS ON GROWTH AND CONDITION INDEX OF *SACCOSTREA CUCULLATA* (BORN), *CERITHIUM RUBUS* (DESH) AND *TELLINA ANGULATA* GMELIN FROM BOMBAY COAST

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ABSTRACT

Size variation, growth, condition index and spawning periodicities of three species of molluscs were studied for a period of 15 months from a polluted and a relatively clean marine habitat near Bombay. Growth of *Saccostrea cucullata* was 1.2 times and of *Cerithium rubus* was 1.6 times higher in unpolluted habitat than the polluted water. Spawning was during premonsoon in *S.cucullata*, post monsoon in *C.rubus* and monsoon in *T. angulata*. Condition index and percentage edibility values were higher at less polluted stations.

INTRODUCTION

An understanding of growth rate, spawning periodicity and condition index is of importance in the evaluation of a species nutritive value and its suitable period of harvest. Information on these aspects in molluscs from coastal waters of Maharashtra is limited (Kasinathan & Govindan 1975; Kasinathan *et al.*, 1975; Nagabhushanam & Mane, 1975 and Talikhedkar *et al.*, 1976). The present work compares growth and condition of *Saccostrea cucullata*, *Cerithium rubus* and *Tellina angulata* inhabiting different environments.

MATERIAL AND METHODS

Three areas were selected along the coast of Bombay between lat. 18°55' and 19° 09' N and long. 72° 47' and 72° 59' E (Fig.1). Sites 1 at Bandra and 2 at Shivaji park were characterised by wide fluctuations of salinity, dissolved oxygen, biological oxygen demand and nutrients. Low levels of DO associated with high levels of BOD and nutrients indicated polluted conditions of these stations whereas at site 3 from Mudh high DO associated with low values of BOD and normal levels of nutrients indicated prevailing good water quality (Krishnakumari and Nair, 1984-85). Study organisms were collected in triplicate at monthly intervals for a period of fifteen months from March 81 to May 82 using 25 cm^2 quadrant.

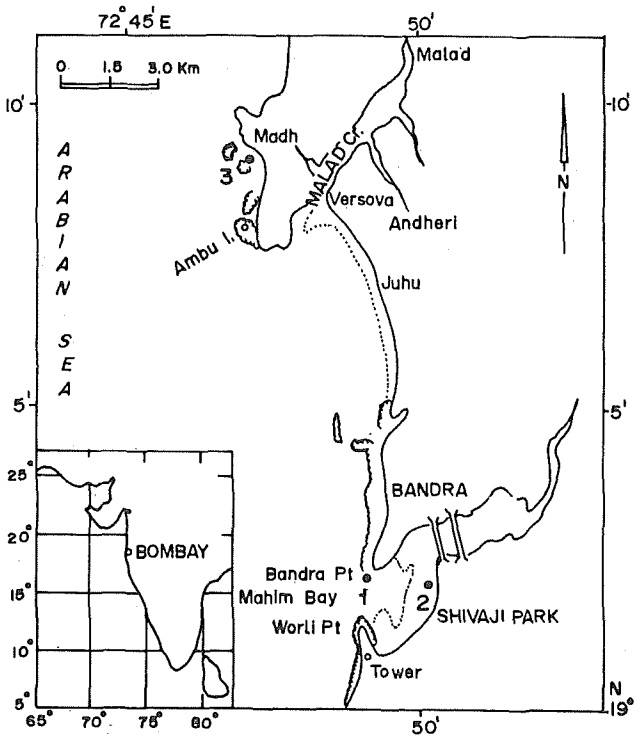

Fig. 1. *Station locations*

The size of *S.cucullata* ranged from 6.1 to 48 mm at site 1 and 15.1 to 51 mm at site 3. In *C.rubus* the size ranged from 5.1 to 24.5 mm and 15.6 to 27.5 mm respectively at sites 1 and 3 and in *T.angulata* from 10.1 to 50 mm. Sex was determined by microscopic examination of the gonad smear for *S.cucullata* and *T.angulata* and in *C.rubus* the gonad with bright orange colour was considered as male and pale yellow

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as female. Wet and dry wt (70°C) of the tissue was recorded. For size frequency analysis grouping was done at an interval of 3 mm for *S.cucullata*, 1.5 mm for *C.rubus* and 2.5 mm for *T.angulata*. Breeding periodicity was calculated based on monthly percentage occurrence of mature gonads and also the spent gonads (indeterminates) in the sample. Condition index and percentage edibility were also determined according to Walne (1974) and Krishnakumari, Rajagopal and Sumitra-Vijayaraghavan (1977).

RESULTS AND DISCUSSION

Figs. 2-4 represents the size frequency distribution of *S.cucullata*, *C.rubus* and *T.angulata*. In *S.cucullata* monthly growth rate fluctuated from 2-3 mm (av : 2.65 mm) at site 1 and 1-6 mm (av : 3.09 mm) at site 3 (chart 1 a&b). Irrespective of sites maximum growth was recorded during April-June months.

Monthly growth in *C.rubus* at site 1 varied from 0.56-0.75 mm and at site 3 from 0.75-1.5 mm (chart 1 c&d). Mean for the entire period of study was 0.7 mm at site 1 and 1.1 mm at site 3.

In *T.angulata* growth rate fluctuated from 2.08-2.14 mm with an average monthly growth of 2.11 mm per month (chart 1e).

Length-weight relationship of *S.cucullata* and *C.rubus* is given in Fig.5. Calculated weight against length was derived by applying the formula $W = a \times L^n$ (Rao, Krishnakumari and Dwivedi, 1975). The derived equations for *S.cucullata* and *C.rubus* are given in Fig.5. The obtained length-weight relationship in *T.angulata* was $Wt = 0.0166 \times L^{2.56}$.

The density of *S.cucullata* varied from 124-348/m² (av.244/m²) and 96-300/m² (av.196/m²) respectively for site 1 & 3. In *C.rubus* the numerical abundance ranged from 84-572/m² (av.210/m²) at site 1 and 96-268/m² (av.160/m²) at site 3. Thus the density of the species was higher in polluted areas than at relatively clean marine habitat.

The study on sex ratio of the different species gives the following information. In *S.cucullata* on an average male represents 31.3%, female 56.9% and indeterminates 11.8% at site 1 and 34.6%, 48.5% and 16.9% at site 3 respectively. Seasonally postmonsoon sustained maximum number of mature male whereas female dominates during premonsoon. Peak spawning extends from January-May at both the stations.

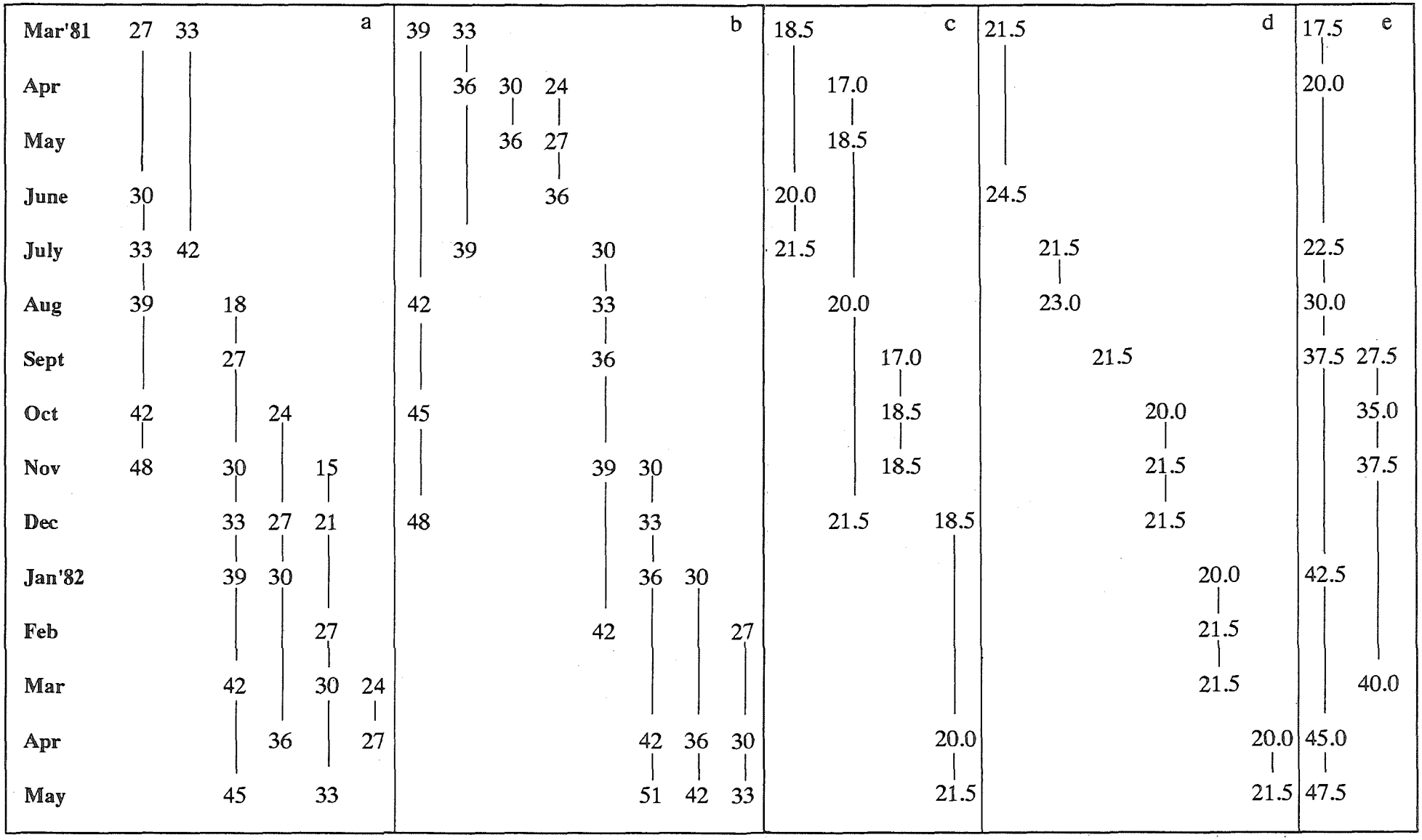
In *C.rubus* from site 1 male accounted for 28.1%, female 65.5% and indeterminates 6.4%. At site 3 the corresponding values were 36.6%, 52.7% and 10.7%. Spawning period extends from October to January. However in both the species *S.cucullata* and *C.rubus* percentage contribution of female was higher than male and in *T.angulata* male (50.8%) dominates female (18.95%). Spawning period in *T.angulata* was noticed from June-August.

Condition index of oyster *S.cucullata* ranged from 63.13-98.45% with an average value of 77.64% at site 1 and 90.32-116.08% (av.99.96%) at site 3 (Table 1). Percentage edibility of *C.rubus* varied from 7.64 to 8.72% (site 1) and 12.04 to 15.08% (site 3). Non-spawning period sustained high values in both the species.

Maximum growth of 6 mm/month in *S.cucullata* during April-June corresponds with the observation of Rao and Nair (1956). Walne (1958) reported a decrease in growth rate as the organism increases in size. Spawning periodicity of *S.cucullata* agrees with the earlier reports of Nagabhushanam and Bidarkar (1977) and that of *C.rubus* as in other gastropod species of Bombay (Kasinathan and Govindan, 1975; Kasinathan *et al.*, 1975). Observation of spawning in monsoon in *T.angulata* agrees with that of Harkantra (1975).

The trend in population density observed in the present study agrees with the earlier report (Gajbhiye and Desai, 1981) with maximum

Chart. 1 : *Shifting of modes in S.cucullata from sites 1 & 3 (a & b) and C.rubus from sites 1 & 3 (c&d) and T.anqulata from site 2(e)*



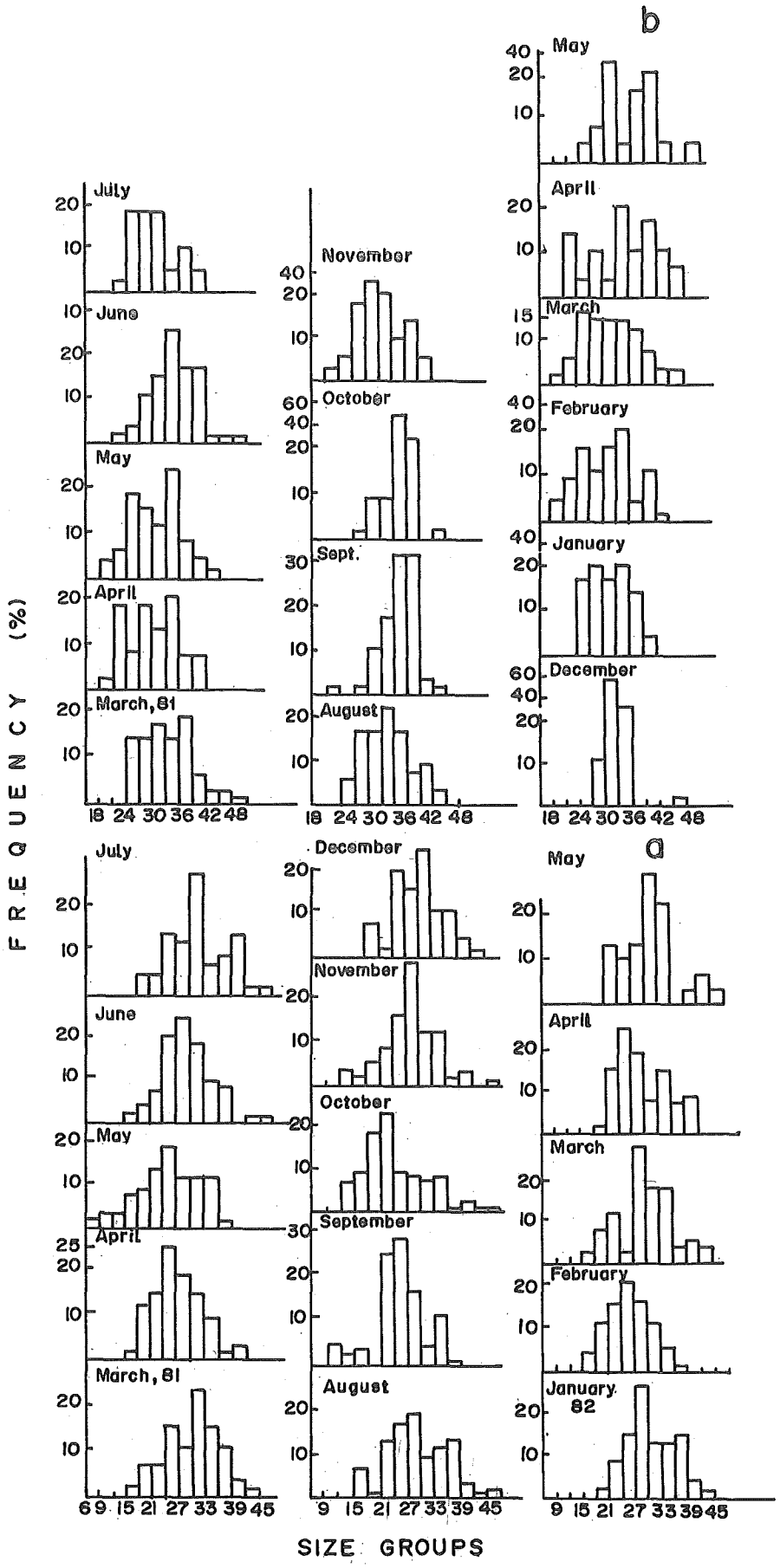


Fig. 2. Size frequency histogram for S.cucullata from sites 1(a) and 3(b)

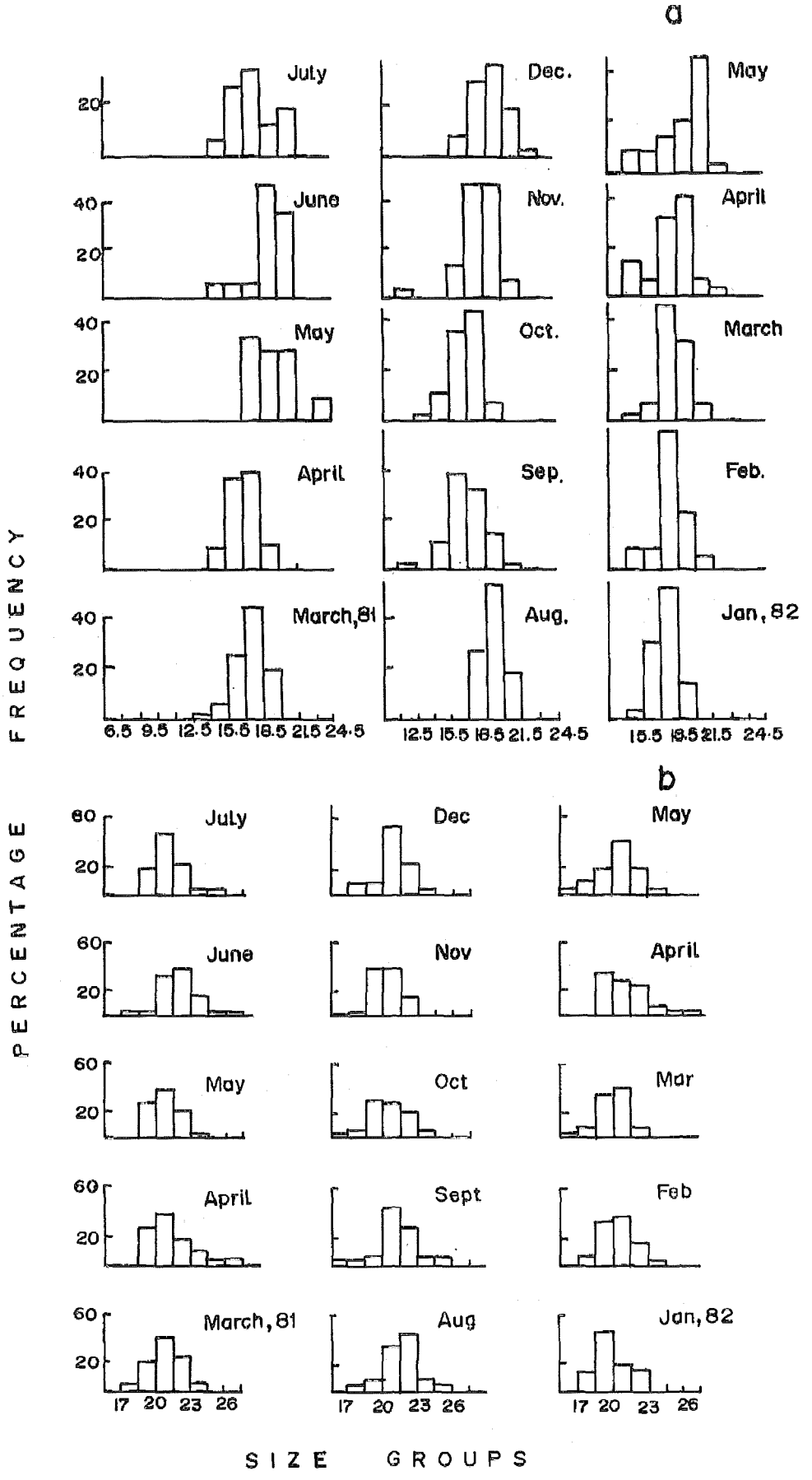


Fig. 3. Size frequency histogram for C.rubus from sites 1(a) and 3(b)

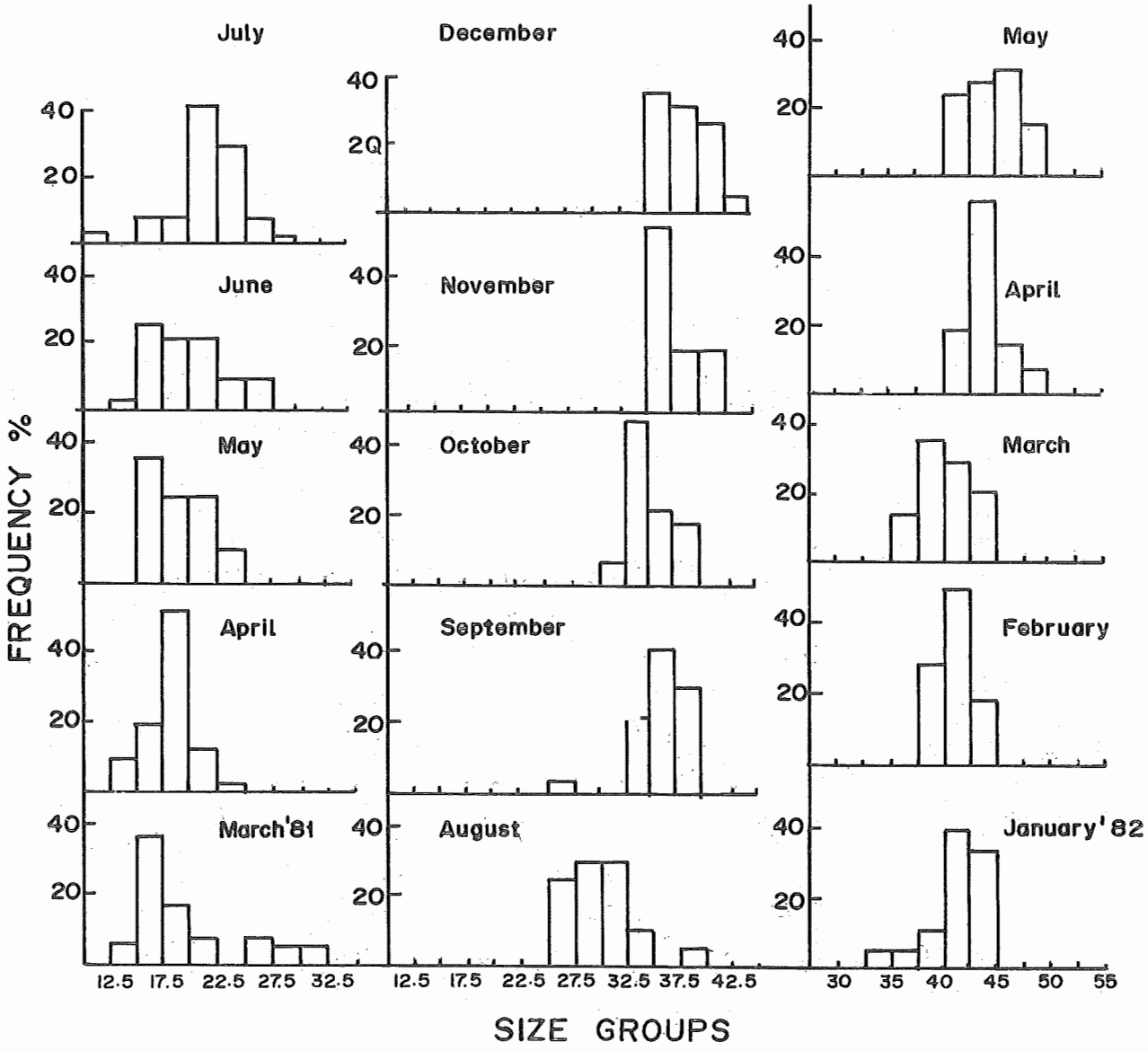


Fig. 4. Size frequency histogram for T.angulata .

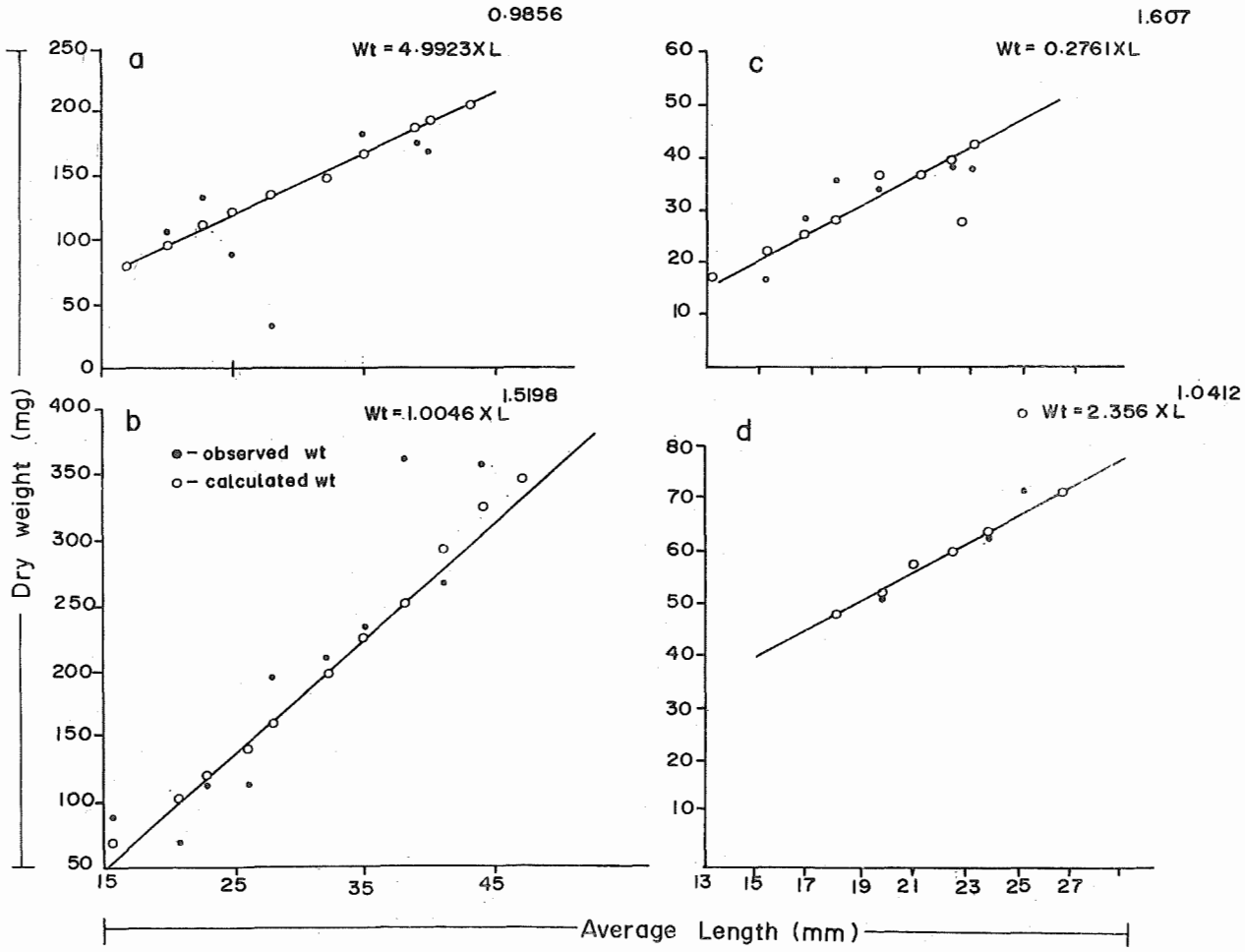


Fig. 5. Length-weight relationship - a & b for S.cucullata from sites 1 & 3; c & d for C.rubus from sites 1 & 3.

Table 1 : *Monthly variations in condition index of S.cucullata and percentage edibility of C.rubus from sites 1 & 3.*

	S.cucullata		*C.rubus*	
	Condition index		Percentage edibility	
Months	Site 1	Site 3	Site 1	Site 3
Mar 81	63.13	101.13	7.69	12.16
Apr	91.23	107.17	7.68	12.21
May	77.98	93.38	8.72	12.07
June	85.94	102.21	8.57	12.53
Jul	67.26	90.62	8.21	12.13
Aug	77.25	94.66	8.08	12.41
Sept	67.47	116.08	7.65	12.28
Oct	66.34	103.41	7.64	12.33
Nov	98.45	98.46	7.8	12.11
Dec	70.01	109.61	8.24	12.04
Jan'82	85.54	100.32	8.03	12.39
Feb	77.23	90.32	8.23	12.81
Mar	90.58	97.72	8.49	12.11
Apr	77.69	92.74	7.82	15.08
May	68.53	101.56	7.80	12.15

density at polluted environment. Condition index value of 120 has been recorded as healthy and between 70-80 as very poor (Walne, 1958). In the present study condition index and percentage edibility values were low in organisms from site 1. Deterioration of water quality at site 1 has been already reported (Krishnakumari and Nair, 1984-85) and hence the lower growth rate, condition index and percentage edibility of molluscs from site 1 could be attributed to the impact of such environmental deterioration. Although wave action plays a major role in the growth assessment of organisms from intertidal rocky shores (Tong, 1986), this factor is nullyfied since both sites 1 and 3 are characterised by similar degrees of wave exposure. Thus the intraspecific variations in populations of the two molluscs studied presently can be attributed mainly to the environmental pollution apart from other factors like wave action, food composition, breeding and body maintenance etc.

ACKNOWLEDGEMENTS

The authors are thankful to Director, National Institute of Oceanography, Goa, for facilities and encouragement.

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