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SEASONAL DISTRIBUTION OF *SACCOGLOSSUS* SP. IN RELATION TO ABIOTIC PARAMETERS IN THE MANGROVE SWAMPS OF SUNDARBANS, WEST BENGAL, INDIA

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ABSTRACT

This communication deals with the seasonal distribution of *Saccoglossus* sp. in the mangrove swamps of deltaic Sundarbans. Some physico-chemical factors of the habitat have been studied and correlated with the hemichordate population. Significant relation was found with dissolved oxygen and burrow temperature.

INTRODUCTION

HEMICHORDATES commonly known as acorn or tongue worms are predominantly marine, but few brackishwater forms have been also recorded from different estuarine habitats. Occurrence of hemichordate worms in Indian Coast has been reported by several workers (Menon, 1904; Ramanujan, 1935; Kuryan, 1949; Rao, 1953; 1955 a, b, c; Balasubrahamanyan, 1959; Singh and Choudhury, 1984). Singh and Choudhury (1984) reported the occurrence of an enteropneust hemichordate worm from the mangrove swamps of Sundarbans. Singh (1988) studied the ecobiology of this new acorn worm naming it as *Saccoglossus sundarbanensis.*

Different aspects of biology of hemichordate worms have been studied by many workers whose findings have been reviewed by Hyman (1959) and Barrington (1965), but works on the hemichordate ecology are scarce. Ismail and Najib (1975) reported on the ecological aspects of *Ptychodera flava* from Krusadai Island. This is a first report on the population and seasonal distribution of a saccoglossid worm from any mangrove environment.

MATERIAL AND METHODS

The specimens of *Saccoglossus* sp. (Fig. 1 a) were collected on every full moon and new moon spring low tide from the intertidal mudflats of Prentice Island of deltaic Sundarbans. For sampling, five quadrates (1 m^2) were used. The worms were spotted by their characteristic faecal castings (Fig. 1 b) on the exposed mudflats and the soil was removed by hand following the inner zig-zag tunnels nearly 20 to 40 cm deep. The associated macrobenthos were also collected by hand picking. Simultaneously with *Saccoglossus* sampling the abiotic parameters like salinity, dissolved oxygen, pH and temperature, etc. of the interstitial water were recorded following standard methods of Strickland and Parsons (1968). The temperature was recorded with a centigrade thermometer. Soil texture was analysed by international pipette method as modified by Robinson (Piper, 1950) whereas soil pH was measured by Elico pH meter model WIO with glass electrode using soil water suspension in ratio of 1 : 2.5 (Jackson, 1973).

RESULTS AND DISCUSSION

Physiography of the area : Prentice Island, a fractional component of the typical virgin mangrove ecosystem of Sundarbans, is located between 21° 42′ 42″ N and 21° 45′ 50″ N and 88° 17′ 30″ E and 88° 18′ 42″ E. It is bordered on all sides by Saptamukhi River and experiences tidal interplay twice in twentyfour hours with a maximum of 5 to 5.9 m of tidal amplitute, inundating the deeper part of the island's forest floor. Dense vegetational cover of the island is dominated by *Avicennia marina* and *Avicennia alba* on the foreshores followed by *Acanthus ilicifolius, Sonneratia caseolaris, Bruguiera gymnorhiza* and *Cereops decandra* in the ridges. Exposed mudflats of the island is sparsely occupied by *Suaeda maritima, Suaeda nudiflora* and a saline grass *Poterasia coarctata* upto the low tide mark.

The marginal mudflats named by the authors as the *'Saccoglossus* zone' are very extensive with gradual slope only being covered with a thin sheet of algal mat or simply by ever shifting deteritus materials. Very sparsely distributed *Porterasia* grass, few saplings of *Avicennia* sp. or *Acanthus* sp. are occasionally found on these apparently barren mudflats.

Saccoglossus sp. is a detritivore hemichordate which lives in the same biotope as *Protankyra similis, Macoma birmanica, Anadara granosa, Telescopium telescopium, Solen* sp., nemertines, variety of polychaetes, crabs and shrimps, etc. The tongue worms spend their entire life completely burried in soft muddy bottoms. These worms when removed from its burrow and placed on top of the mudflats begin to dig in immediately.

Hydrolgical features of the habitat are largely influenced by the interaction of sea and riverine freshwater freshets, annual precipitation and surface drainage. A marked difference in hydrological variables in different seasons were documented. A marked temperature oscillation through seasons was a distinct annual features. The salinity regime was complex and influenced by the periodical freshwater efflux, tidal interplay and surface evaporation.

The interstitial water showed higher salinity (28.32 ‰) during the postmonsoon period, because of the evaporation of the mudflats during that period, whereas low salinity (19.92 ‰) was recorded during monsoon due to leaching of excess freshwater. The concentration of dissolved oxgen in the interstitial water showed an oscillation range of 0.9 ml/l to 2.9 ml/l. pH maintained almost a uniformity with a variation range of 0.7 (7.2 to 7.9). The percentage composition of substratum texture throughout the year was as follows : sand particles 5.4-12.4%; silt 51.9-56.01%, clay 36.51 to 39.33%, the soil pH 7.3 to 8.3 throughout the year (Table 1). Organic carbon remains more or less constant (0.64% to 0.69%) with a variation of 0.05.

TABLE 1. *Seasonal variation of different soil parameters in Prentice Island*

Period of soil collection	Sand (%)	Silt (%)	Clay (%)	pH	Organic Carbon (%)
Dec. '88 to Feb. '89	5.42	55.19	39.33	7.3	0.64
Mar. '89 to May '89	6.22	56.01	37.77	7.3	0.69
June '89 to Aug. '89	12.4	51.09	36.51	8.2	0.68
Sept. '89 to Nov. '89	9.83	52.77	37.41	8.3	0.64

The average hemichordate population per square metre in the study area was registered as 1.84 during monsoon period, 3.99 during postmonsoon and 3.1 during premonsoon period.

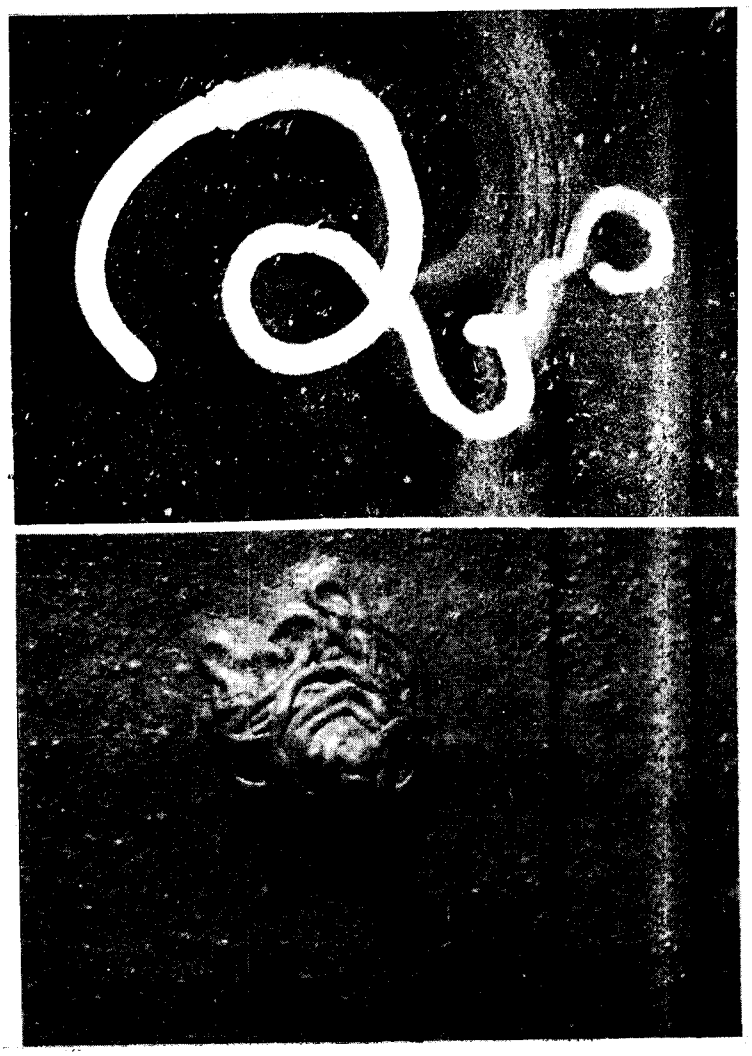

FIG 1 a. ***Saccoglossus sundarbanensis*** **collected from the mangrove swamp of Sundarbans and b. Casting of** *Saccoglossus sundarbanensis* on the mudflat and a pore beside it through which proboscis is protruded.

Correlation coefficient between *Saccoglossus* population and different abiotic parameters was evaluated. Dissolved oxygen and burrow temperature showed significant relationship with *Saccoglossus* population whereas salinity, pH and water temperature showed insignificant relation (Table 2). ANOVA showed variations of *Saccoglossus* population insignificant over years (Table 3).

TABLE 2. *Correlation coefficient (r) between* Saccoglossus *sp. population (no./m^2) and different hydrological parameters*

	Water temp. (°C)	Burrow temp. (°C)	pH	DO (ml/l)	Salinity (‰)
Saccoglossus sp.	-0.363	-0.404*	0.018	-0.499**	0.202

* *Significant at 5% level.* ** *Significant at 1% level.*

Saccoglossus sp. is found in moderate numbers in the mid-littoral zone of Prentice Island of Sundarbans. It displays sharp fluctuation in its population count through seasons with the change of hydrological parameters as well as its habitat substrates due to alternate erosion and deposition. Hydrological documentation of salinity, dissolved oxygen, pH and temperature of the intertidal water environment through the year indicates that this hemichordate exhibits wide range of tolerance to the seasonal fluctuation of the abiotic parameters and its osmoregulatory ability seems to be well devised in accommodating the gradual environmental changes. Distribution of the present hemichordate worm in Prentice Island is localised and sparse instead of being gregarious. Similar pattern of distribution of *Saccoglossus* sp. as observed in some other islands .of Sundarbans *viz.* Sagar Island, Chandanpiri, Bhubaneswari, Nethidophani, Jhakhali, etc. seemed also to be sparse and scanty.

TABLE 3. *ANOVA for* Saccoglossus *sp. population*

S.V.	D.F.	S.S.	M.S.	'F' value
Month	11	33.50	3.05	7.44**
Year	1	0.31	0.31	0.76
Error	11	4.48	0.41	
Total	23	38.29		

** *Significant at 1% level.*
S.V. = Source of variation
D.F. = Degree of freedom
S.S. = Sum of squares
M.S. = Mean of squares

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