International Journal of Engineering Science Invention
ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726
www.ijesi.org ||Volume 4 Issue 4 || April 2015 || PP.28-33

Ecology and feeding behavior of *Sanguinolaria acuminata* (Reeve, 1857) (Bivalve: Psammobiidae) from South Sagar sandflats,Sagar Island, Sundarbans, India

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ABSTRACT: *The ecology and feeding behavior of Sanguinolaria acuminata in the marine mangrove sandflats of South Sagar, Sagar Island, Sundarbans is described during the period of January2014 to December2014.The surface air temperature,flood water temperature, salinity, dissolved oxygen(DO),hydrogen ion concentration(pH) and interstitial water temperature, salinity, dissolved oxygen(DO),hydrogen ion concentration(pH) have been studied.*

Key Words: *Ecology,Behavior, Sanguinolaria acuminata,Community,Siphon*

I. INTRODUCTION

Sanguinolaria acuminata is the most common and dominant shallow infaunal bivalve in the marine mangrove sand flats of Sagar Island,Sundarbans. It is found burried in the lower littoral sand substratum of exposed flat generally at depths 10-15 inches below the surface but the burrows are deeper than that normally. Antiobiotic properties of the tissues in Sanguinolaria diphos (R,Seshardri et al., 1966); in exploitative competition of suspension-feeders, the growth of Sanguinolaria nuttalli was reduced by 80% when these clams were confined with two other deep-dwelling bivalves (Wilson Herbert H, 1991); the distribution and population dynamics of the molluscs of Leschenault Intet estuary (V.Semeniuk and PAS Wurm, 2000); levels and chemical speciation of arsenic in Sanguinolaria acuminata (Fattorini, D. et al.,2013) have been described. The present study investigates the ecology and behavior of this ecologically important species of this sandy beach environment.

II. MATERIALS AND METHODS

Experimental design

Study site : Sagar Island is surrounded by river Hooghly in the north and north-western side and river Mooriganga in the eastern side. The southern part faces the open sea Bay of Bengal. Sagar Island lies between latitude $21^{o}62$" to $21^{o}87$" N and longitude $88^{o}04$"to $88^{o}17$" E. Both the rivers are perennial in naturally bringing large quantities of water and sediment from the upstream of Bhagirathi. South Sagar sandflats lies between latitude 21°62" to $21^{o}66$" N and longitude $88^{o}04$"to $88^{o}10$" E.

Field sampling of associated macrobenthos : The ecology and feeding behavior of *Sanguinolaria acuminata* was studied in the field and in aquaria set up in the laboratory. *Sanguinolaria acuminata* and other macrobenthos in association with this bivalve in the lower littoral zone of South Sagar sand flats were collected during the period of January 2014 to December 2014.Collection of macrobenthos was carried out along the sea shore of South Sagar at random during each season of investigation. The observations were based on monthly collection during low tide, when the lower littoral zone was accessible for proper investigation.The bivalve and other associated fauna retained in the sand were carefully sorted out on a polythene sheet and counted by hand picking method. Fresh materials have been taken in trays.

Analytical measures : Flood water and interstitial water have been collected to observe the following physical and chemical parameters: temperature, salinity, dissolved oxyge (DO) and hydrogenion concentration (pH).Temperature (surface air) and rainfall (1700 mm/year) data have been collected from Meteorological Department, Alipore, Kolkata and S.D. Marine Biological Research Institute, Sagar Island.Surface air temperature,flood water temperature and interstitial water temperature were recorded right from the field during the period of sampling with the help of digital thermometer. Water samples were collected on each visit in a water sampling bottle. The salinity of each water sample was measured with a salinity meter (model EES15-35). Samples of flood water for the estimation of dissolved oxygen content were collected from the

bottom with insulated bottle and was analysed using the modified Winkler's method (Wright,1981). The pH of the water sample was determined with a Philip conductivity meter (model PW 405). Five grab hauls were taken from the five selected spots of the study site.Each haul was sieved in the field with a 0.5 mm mesh sieve and preserved in 4% formalin and taken to the laboratory where the samples were washed and sorted into taxonomic groups. The top portion of the sediment from the respective station have been analysed to measure the characteristics and nature of sand substratum where the animals (i.e., study materials) inhabit.

Photographs : All the photographs of the field and macro anatomy of the animal species illustrated in this paper have been taken by a digital camera (Olympus Imazing Corp., Model No.FE-15).

III. RESULTS

Ecology

Physical variables : The temperatures of surface air and flood water and interstitial water recorded during the investigation period showed a more or less parallel trend of change through the seasons. The maximum and minimum temperatures recorded for surface air and flood water temperature were 35.5°C, 22°C and 31.5°C,19°C ˙The flood water temperature were high and remained relatively stable throughout the period of observation, which may indicate that water temperature has no effect on the ecology of *Sanguinolaria acuminata* The salinity of flood water is the lowest 6ppt.in the month of October and highest in the month of May 28ppt. The maximum and minimum dissolved oxygen content in the flood water were 3.8 mg/l. and 2.5mg/l in the months June and January respectively.The hydrogen ion concentration (pH) varies between 8.4 to 7.6 during the period of observation. The study site exhibited alkaline properties in the most of the months.

In interstitial water, the maximum and minimum temperatures were 26°C, 14°.The salinity of interstitial water is the lowest 12 ppt.in the month of October and highest in the month of May 34 ppt. The maximum and minimum dissolved oxygen content in the interstitial water were 2.8 mg/l. and 1.5 mg/l in the months June and January respectively. The hydrogen ion concentration (pH) ranges between 7.5 to 7 during the period of observation.

Feeding pattern : *Sanguinolaria acuminata* is a typical benthic infauna bivalve, living deep in the sand (10-15inches). It can extent the white colour inhalant siphon during suspending feeding in the low tide. The apical opening of siphon contains tentacles which help in their suspension feeding and excretion as the the exhalant siphon is morphologically fused.

Population structure : Population of *Sanguinolaria acuminata* have been observed in 10 /m².

Macro benthic community structure : Gastropod: *Amalda amalda*, Cnidarians: sea anemone, *Pennatula sp*., *Paracondactylis ramunii*

IV. DISCUSSION

The temperatures of surface air and flood water recorded during the investigation period showed a more or less parallel trend of change through the seasons. The maximum and minimum temperature recorded for surface air and flood water temperature were 35.5^0C, 22^0C and 31.5^0C, 19^0C respectively.The temperature was recorded high in the premonsoon and low during postmonsoon seasons and have in annual bimodal temperature oscillation seemed to be a characteristic phenomenon in this ecosystem. Two maxima, one in the premonsoon and other in the monsoon.It is usually a known fact that salinity in the open marine environment does not show any conspicuous fluctuation. The factors affecting salinity are minimum compared to its vast water masses. But in the estuarine environment the salinity is affected tremendously by the additional fresh water freshets from the upstream river and surface run off during monsoon every year. The maximum and minimum salinity recorded for flood water were 28‰ and 6% respectively.The maximum value was recorded in the month of May whereas the minimum value was found during in the month of October.The pattern of salinity regime through seasons around Sagar Island environment is as follows:maximum in the month of May which accounts no rain but higher temperature, and was minimum in the month October was affected by South-West monsoon winds accompained by heavy rains. The post monsoon period (November to February) may be considered a mixed period because the water is somewhat diluted with the just over seasonal rains, followed by the winter months with minimum records of temperature and precipitation. The values of dissolved oxygen recorded as maximum in June and minimum in January.The study site exhibited the hydrogen ion concentration (pH) as maximum in March and minimum in November.The study site exhibited alkaline properties in the most of the months.

In interstitial environment physical environmental factors showed lower value in interstial water temperature and dissolved oxygen but salinity showed higher value.Interstitial water temperature maximum in May and minimum in January.Salinity is maximum in May and minimum in October and November;dissolved oxygen maximum in July and minimum in January and hydrogen ion concentration maximumin January and August and minimum in March,April and November respectively. *Sanguinolaria acuminata* exibits suspension feeding with exhalant siphon. Due to absence of typical exhalant siphon both feeding and excretion occur with exhalant siphon. The population structure of *Sanguinolaria acuminata* have been observed in 10 /m².Gastropod and sea anemone are the major community species of *Sanguinolaria acuminata.*

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[5]. Fig.1. *Sanguinolaria acuminata*

[6]. Fig.2.A. Sandflats habitat of *Sanguinolaria acuminata*

[7]. Fig.2.B. Burrow opening of *Sanguinolaria acuminata*

[8]. Fig.3.Exhalant siphon of *Sanguinolaria acuminata*

[9]. Fig.4.Exhalant siphon of *Sanguinolaria acuminata*

[10]. Table1. In average physical and hydrological parameters of surface environment of South Sagar sandflats during January 2014 to December 2014.

[11]. Table2. In average physical and hydrological parameters of interstitial environment of South Sagar sandflats duringJanuary 2014 to December 2014.

[12]. Graph 1. Surface air temperature,flood water temperature and interstitial water temperature.

[13]. Graph 2. Salinity of flood water and interstitial water.

[14]. Graph 3. Dissolved Oxygen of flood water and interstitial water.

[15]. Graph 4. pH of flood water and interstitial water.

Fig.1. *Sanguinolaria acuminata*

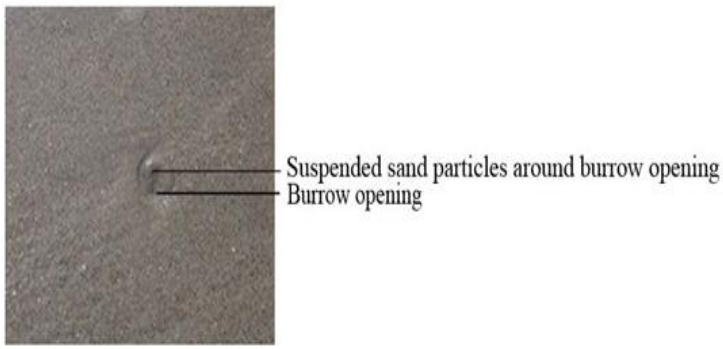


Fig.2A. Sandflats habitat of *Sanguinolaria acuminata*

Fig.2B. Burrow opening of *Sanguinolaria acuminata*

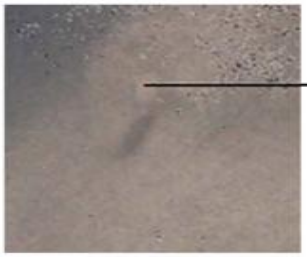


Fig.3. Exhalant siphon of *Sanguinolaria acuminata*

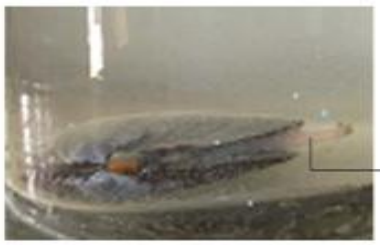


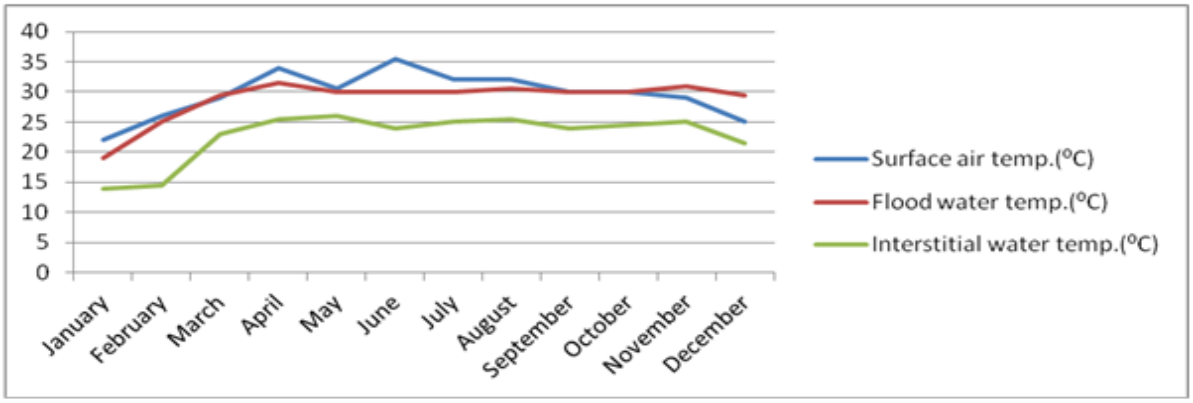
Fig.4. Exhalant siphon of *Sanguinolaria acuminata*

Months	Surface air temp.(^{0}C)	Flood water temp.(^{0}C)	Flood water Salinity (ppt.)	Dissolved Oxygen of flood water (mg/l)	pH of flood water
January	22	19	20	2.5	8
February	26	25	21	3.5	8.1
March	29	29	22	3.5	8.4
April	34	31.5	24	3.5	8.3
May	30.5	30	28	3.5	8.4
June	35.5	30	27	3.8	8.2
July	32	30	18	3.5	8.3
August	32	30.5	10	3.7	8.3
September	30	30	9	3.4	8.1
October	30	30	6	3.2	7.7
November	29	31	7	3.5	7.6
December	25	29.5	14	3.5	7.7

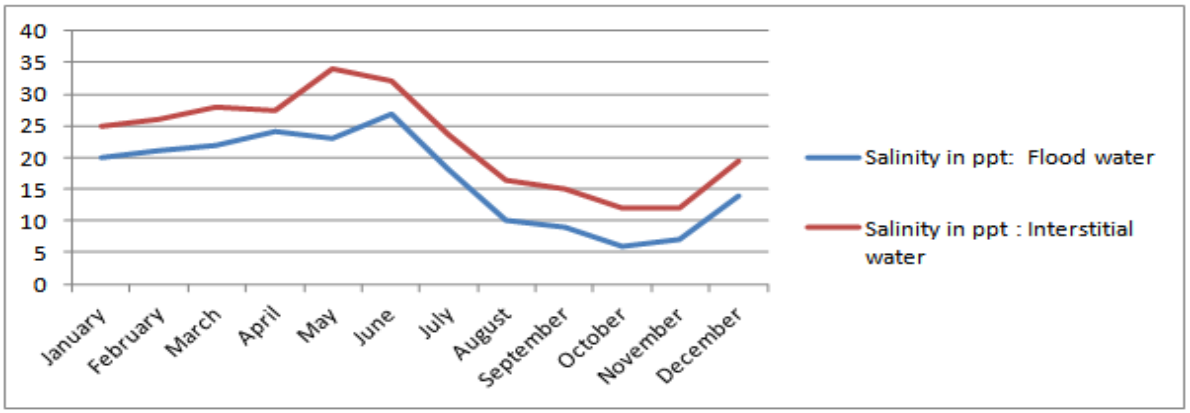
Table: 1.

Months	Interstitial water temp.(^{0}C)	Interstitial water Salinity (ppt.)	Dissolved Oxygen (mg/l.) of Interstitial water	pH of Interstitial water
January	14	25	1.5	7.5
February	14.5	26	2.5	7.4
March	23	28	2.5	7
April	25.5	27.5	3	7
May	26	34	3	7.5
June	24	32	2.6	7.2
July	25	23.5	2.8	7.2
August	25.5	16.5	2.5	7.5
September	24	15	2.5	7.3
October	24.5	12	2.5	7.3
November	25	12	2.5	7
December	21.5	19.5	3	7.2

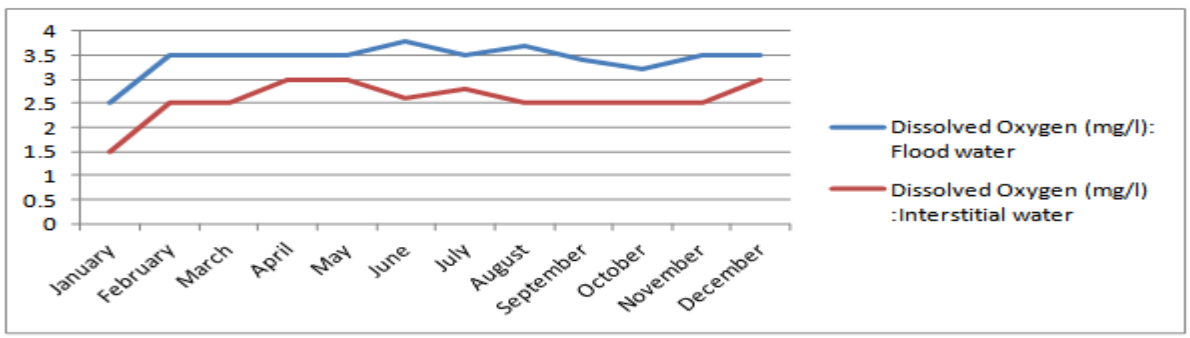
Table: 2.



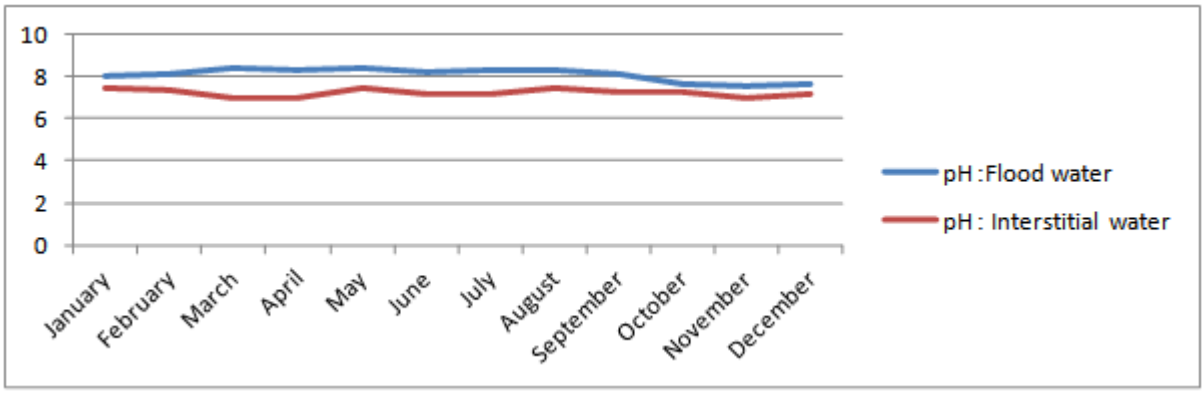
Graph: 1



Graph: 2



Graph: 3


10
8
6
4
2
0
January
February
March
April
May
June
July
August
September
October
November
December
pH :Flood water
pH : Interstitial water

Graph: 4