

Effect of Water Parameters on the Reproduction of Mud Crab, *Scylla serrata*

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ABSTRACT

The present study describes the effect of water on reproduction of the mud crab, *Scylla serrata* from Dahanu creek of Palghar district. The man-made activities such as addition of sewage, suspended solids, heavy metals affect adversely the ecosystem. These manmade activities as well as changes in environmental parameters, apart from sources of thermal discharge and radioactive substances, affect the balance of ecosystem. Seasonal variations in the sea water parameter viz. pH, salinity, TDS, BOD and DO etc. affect biotic community. Water compositions have great influence on the supply of nutrients to the aquatic animal which ultimately affect the growth and reproduction phenomenon. Effluents released by thermal power station and industrial area affected the productivity of economically important crustaceans. Therefore, efforts were made to understand the study of effect of physico-chemical parameters of water on the reproduction of mud crab *Scylla serrata* by using standards method. The pH values were fluctuating throughout the period of study. Salinity, TDS, BOD, and DO also showed variation throughout the year. The calculations of Mean and Standard Deviation and Correlation coefficient were done using MS-Excel 2007 and used for interpretation of data. It was observed that salinity (33.22 gm/kg), temperature (27 °C) and dissolved oxygen (5.82 mg/l) were responsible for maturation of gonads.

Key words: Dahanu, Mud crab, *Scylla serrata*.

Introduction

The pH of any aqueous system is suggestive of the acid base equilibrium achieved by various dissolved compounds. The pH proved to be an ecological factor of major importance in controlling the activities and diversity pattern of aquatic flora and fauna (Husain, 1967 and Verma and Shukla, 1970;) Salinity is the amount of inorganic material dissolved in seawater expressed, as weight in grams per kilogram of seawater. Kannupandi *et al.* (1997) studied the effect of salinity on the larvae of an edible estuarine crab, *Thalamita crenata*. (Ali 1992; Rath 1993; Bradbury and

William, 1997). Decapod crustaceans such as prawn, crab and lobster are commercially important due to their high nutritional contents. The success of species, depends on the viability of eggs and rate of development of eggs. Of course a variety of environmental factors such as temperature, rainfall, photoperiod, salinity, dissolved gases and chemicals in seawater in combination with these factors are closely related to species survival. But the effluents released by thermal power station in this area affected by productivity of economically important crustaceans therefore, efforts are made to understand study on physicochemical parameters of

Dahanu coast. Hence it is essential to study the physico chemical parameters.

Materials and Method

Decapod crustaceans were collected from Dahanu creek during the year 2015-2016. For analysis of various physico chemical factors, water samples were collected in 2 litre sample bottle at early hours of a day. Sample collection was done twice in a month. The reading for temperature and pH etc. were measured on the spot. The samples were analyzed to determine pH, salinity, biochemical oxygen demand (BOD), dissolved oxygen on same day to avoid long storage. For analysis of water samples the methods are adopted from standard method APHA (1985), Trivedy and Goel (1986).

Results

Scylla serrata species show breeding throughout the year with maturation peaks when high Gonad Somatic Index (GSI) was noted. *Scylla serrata* showed two peaks of female maturation in May and June, as minor peak and October to January, as major peak. In May-June GSI was 8.5 ± 1.5 and in October to January it ranged between 5.8 ± 1.6 and 8.86 ± 1.45 (Table 1). male *Scylla serrata* GSI varied between 4.5 ± 0.71 and 3.28 ± 0.67 for both maturity peaks. The data of physical inorganic constituent of water such as pH, salinity, alkalinity, total dissolved solids, biological oxygen demand and dissolved oxygen were recorded in the Table 1. The pH values did not show much variation throughout the year. The high value

of pH recorded in April and May 2016-2017 was 8.12 and lowest in June 2016-2017 was 6.12 respectively. Temperatures during the year were found to be maximum in the month of May 2016-2017 was 32.4°C Maximum TDS was recorded in the month of April 2016-2017 was 4.72 ppm and lowest was 0.46 ppm in July. 2016-2017 maximum DO was 6.08 ppm in September and lowest in Jan 5.3 ppm BOD recorded year 2016-2017 maximum BOD was 2.21 ppm in April and lowest in June 1.1 ppm Year 2016-2017 maximum Salinity was 35.12 ppm in April and lowest in June 28.3 ppm Salinity, TDS, BOD, and DO also showed variation throughout the year. The calculations of Mean and Standard Deviation and Correlation coefficient were done using MS-Excel 2007 and used for interpretation of data. It was observed that salinity (33.2 ppm) temperature (27°C) and dissolved oxygen (5.82ppm) and moderate alkalinity were responsible for maturation of gonads.

Discussion

In the present investigation pH values showed variation throughout the year 2016 & 2017. Which was related to planktonic growth in this area. Alikumthi (1957) and Shreenivasan (1976) have demonstrated that the pH ranged between 6.5 to 8.5 will have impact on the productivity of the water. Tiwari and Nair (1998) observed that pH variation was in narrow range. Due to heavy rains and land drainage the pH may be high. The maximum pH values were recorded in summer season and the minimum was recorded in monsoon season. The maximum temperature was observed in May and

Table 1. Correlation between Physicochemical factors and gonadal index in crab, *Scylla olivacea* during the year 2016-2017.

Month	Gonad index		pH	Temp $^\circ\text{C}$	Salinity mg/l	BOD mg/l	DO mg/l	TDS mg/l
	Female	Male						
June	1.23 ± 0.12	0.47 ± 0.11	7.41	27	30.31	2.06	5.3	3.1
July	3.95 ± 0.30	0.46 ± 0.08	7.5	27.1	30.23	2.09	5.6	3.11
August	3.07 ± 0.12	0.42 ± 0.07	8.1	27.4	35.1	2.19	5.12	4.71
September	5.40 ± 0.15	0.19 ± 0.07	8.12	27.6	35.12	2.21	5.13	4.72
October	6.15 ± 0.33	0.18 ± 0.06	8.12	28	35.1	2.19	5.12	4.7
November	6.70 ± 0.40	0.19 ± 0.08	6.12	27	28.3	1.1	6.02	4
December	6.78 ± 0.55	0.26 ± 0.05	7.7	24	29.44	1.05	6.05	0.46
January	6.35 ± 1.75	0.17 ± 0.04	7.75	24.4	29.48	1.08	6.07	0.48
February	8.47 ± 1.57	0.20 ± 0.09	7.73	24.1	29.55	1.01	6.08	0.49
March	4.91 ± 1.5	0.22 ± 0.10	7.69	26	30.55	1.5	5.66	1.49
April	8.65 ± 0.15	0.26 ± 0.09	7.62	27	33.1	1.56	5.8	1.55
May	12.23 ± 1.2	0.69 ± 0.21	7.63	27	33.22	1.59	5.82	1.55

the minimal salinity was recorded on September Full moon and maximum salinity was recorded on May Full Moon. In the current pribe, salinity values decreased during heavy rainfall. Dilution by rain-water was resulted in low salinity. The total dissolved solids in water comprise mainly of inorganic salts and small amount of organic matter.

Total suspended solids ranging from 40.00 ppm to 560 ppm Chandanpura pond (Kaushik and Saxena, 1989); and 40.00 ppm to 1400.00 ppm in Viveknagaer pond (Kaushik *et al.*, 1991). In the present study the total dissolved solids were high during in summer season. Dhamija and Jain (1995), Mahajan and Kanhere (1995) and Wagh (1998) have observed similar phenomenon. biochemical oxygen demand (BOD) is very important parameter, which is used to characterize the state or health and quality of water. During summer BOD load were high and low in rainy season. The productivity of water was maximum during summer and followed by winter and rainy reasons. Similar observations were reported in *Callinectes denae* (Chacur *et al.*, 2001). Adholia and Vyas (1992) reported that the maximum species distribution of *Copepods*, *Cyclopes*, *Nauplius* and *Diatomus* were observed when pollution indicating parameters were low. In the present investigation it was observed that the total dissolved solids and BOD show high values at the initiation of reproductive phase. Other parameter such as pH, alkalinities were helpful in increasing plankton in surrounding water. Thus the availability of abundant food, favourable ecological and environment factors resulted on successful reproduction of *Portunus sanguinolentus*.

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