Vol 3 Issue 5 Nov 2013

Impact Factor : 1.9508 (UIF)

ISSN No :2231-5063

# Monthly Multidisciplinary Research Journal

# *GoldenResearch Thoughts*

**IMPACT FACTOR : 1.9508 (UIF)**

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**RNI MAHMUL/2011/38595** **ISSN No.2230-7850**

Indian Streams Research Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial Board readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

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Golden Research Thoughts
Volume-3, Issue-5, Nov-2013
ISSN 2231-5063

Available online at www.aygrt.isrj.net

# SEASONAL IMPACT ON NUTRIOTNAL CONTENT IN MARINE MOLLUSCA FROM MID COAST OF RATNAGIRI DISTRICT.

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**Abstract:**Seasonal variations play an important role in nutritional content (protein, glycogen and lipid) in mollusc. Environmental factors like temperature, salinity changes as change in seasons which affects on consumption and availability of molluscan food. Besides this, their various physiological processes are concerned respective to season like reproduction. Heavy rainfall is one of the responsible factor for nutritional content in mollusc. Variation in protein, glycogen and lipid with spawning in marine gastropod molluscs. Giese (1969) had emphasized that mollusc lack discrete nutrition storage depots such as the vertebrate liver, the subdermal and mental adipose tissue of mammals and lipid of lower invertebrate. Therefore nutrients storage occurs primarily through production of new cellular elements, seasonal shifts in protein, lipid and glycogen level are merely reflections of their relative rates of synthesis and degradation.

**Key words:**Nutriotnal Content , Mid Coast , Environmental factors . physiological.

## INTRODUCTION:

Various man-made activities are directly responsible for varying population density of intertidal animals. Tourism development programme have assumed greater important over last decade as they destroying intertidal coastal zone. Construction of tourism huts nearby intertidal zone increasing, ultimately affecting on molluscan sandy habitats. Government has undertaken projects to refresh or modernize sea beaches which in future attract number of tourism. This will cause disturbance to intertidal molluscan habitats impacting population density. Fish catch landing is also one of disturbing activity to intertidal molluscan habitats. Forward-backward movement of fishing boats to get safe area for landing destroy different bivalve and gastropod beds. Considering such as problems main objectives of various workers was directed to follow the progress in study of variation in population density.

More species of mollusc are known from marine environment than of any other animal phylum. The need to popularise the mollusc as a food is great and is one of most palatable, nutritive seafood. Apart from these they are used as bait for fishing and shells for multiple uses like preparation of toys, ornaments, utility articles and also in lime, cements and paint industries. Considering the immerse scope of molluscan fishery and for scientific basis of management decision, the application of research data for the benefit of the fishery has been considered worthwhile. It has been repeatedly stressed by many investigators that the local environment play an important role in the development of molluscan fishery and the later is dependent on the ecological and physiological status of the species under consideration. on the mid west coast of Maharashtra, molluscan like bivalve and gastropods are abundant among bivalve oysters (Saccostrea, Crassostrea), mussels (Perna viridis) and clams (Meretrix meretrix, Katelysia opima) are predominantly occurring.

Various coastal lines are polluted due to industrial waste or effluents which comes along with waste water of different industries, which is one of cause to change population density as well as nutrient content (reference to flesh quality) of intertidal mollusc. Above discussed problems i.e. Tourism development, fishing activities also continuously disturbing molluscan habitat; ultimately overall impacting on molluscan world of mid west coast. One of newly ongoing project i.e. Ratnagiri power house at Dabhol creek might be affecting on population density and nutritional content.

Seasonal variations in population density and nutritional content have been studied by many workers from known region of west coast of Maharashtra. However, comparatively little data is available from interior mid west coast; which is supposed to be untouched regarding research activities due to remote area and ghat sections. So far more intentionally this area was selected for study.

Molluscans are second largest group in animal kingdom. Among which bivalve and gastropods are most economical classes. Molluscans especially bivalve and gastropod are abundant throughout the world which includes oysters, mussels, clams and various species of gastropods on the mid west coast of Maharashtra. Perna viridis, Crassostrea cuculata, Katelysia opima, Meretrix meretrix as such bivalve and Natica picta, Babylonia spirata (edible gastropods), Planaxis salcata, Geranium narrator as like gastropods species are predominantly occurring which forms major

intertidal mollusca. These are a great source of human food in various parts of worlds in India too. Now a day certain molluscs are processing for export along east coast. Due to lack of abundance and interest mollusc of west coastal zone are up to local market only. Therefore in the present situation there is an acute necessity to increase bivalve population in ecosystem and awareness about content as well its seasonal variation (For seasonal harvesting ) among local people hence the present work was need to carried out.

**MATERIALAND METHODS:**

Harne, Burondi and Dabhol are small coastal villages having rocky, sandy coastal lines which offers fish landing suppose to small fish port. These villages are at remote with ghat section and extreme interior so untouched from research activities are situated 150km from Ratnagiri and 150 km from Mumbai. Topographical distance between selected area i.e. Harne to Burondi 05 km and Burondi to Dabhol 05 km.Harne is one of heavy economic zone due to fish catching and landing activities; similar importance of Burondi and Dabhol. Dabhol is additional important for study because "Ratnagiri Power House" is situated in this region which may be affecting population density and flesh quality of intertidal mollusc.

Present investigation was carried out during the period of June 2009 to May 2010.The selected areas were visited at peak of each season i.e. July 2009 for monsoon, Nov 2009 for winter and April/May 2010 for summer season. Each study areas were visited one after another for to record population density as well as molluscans are collected, dried for estimations of biochemicals.

**1) Estimation of total protein-**

Folin-phenol reagent method of Lowery et.al (1953) was followed for the estimation of total protein in the whole body of mollusca.

100 mg of dry powder was prepared with10% TCA and centrifuged at 4000 rpm. The precipitate was dissolved in 0.1n NaOH to which 4 ml C solution, (made up of 2% Na2CO3 in 0.1 ml NaOH and 0.5 % alkaline copper sulphate was added).The samples were shaken well and kept at room temperature for 30 minutes. The colour developed was read at 540 nm in UV-VIS spectrophotometer. Average of three determinations was taken into consideration and values obtained were checked against a standard solution of Bovine-Albumin and expressed as mg/100mg of dry tissue.

**2) Estimation of total Glycogen-**

Total glycogen content in whole body of different molluscan species were estimated by the method of Dezwaan and Zandee (1972),100mg of dry powder was prepared with 1 ml of 30% potassium hydroxide and kept in boiling water bath at 50oC for 3 to 5 min. Then cooled rapidly, added 2 ml of 2% sodium sulphate (Na2So4) and 5 ml of absolute alcohol and kept in refrigerator for overnight. After this centrifuged at 3000rpm for 15 minutes, discarded the supernatant and dried residue for 30 minutes, dried residue prepared with 10 ml distilled water and kept in boiling water bath for 5 to 7 minutes. In 0.1 ml of boiled sample 0.9 ml of distilled water and 5 ml of freshly prepared Anthrone was added, kept in boiling water bath for 10 minutes, cooled to room temperature and colour developed was read at 620 nm against the blank prepared with distilled water and anthrone in the UV-VIS spectrophotometer.

The amount of total glycogen in the sample was calculated using glucose standard and expressed in mg/100 mg of dry tissue.

**3)Estimation of total Lipids:**

Total lipids in the whole body of mollusc estimated following the method of Barnes and Bradstock (1973).100 mg of dry powder dissolved in 10 ml of 2:1 chloroform:methanol.1 ml of the above solution was pipette out in to another tube and kept for drying at room temperature. After drying1 ml of concentrated H2SO4 was added to the tube, boiled in hot water bath (5 min) and cooled to room temperature from this 0.2 ml of solution was taken to which 5 ml of freshly prepared vanillin reagent was added, incubated for half an hour at room temperature and colour developed was read to 540 nm on UV-VIS spectropho tometer. The amount of lipid present was calculated using a cholesterol standard and the values are expressed as mg/100 mg of dry tissue.

The values of the estimates from the replicates of three different estimates from each sample were subjected for calculation. for each biochemical composition of the whole body of all mean values of the estimates were subjected to statistical analysis of variance multirange tests for comparison of the means (Campbell,1975).

**RESULT AND DISCUSSION:**

Considering edibility and availability on west coast. Following molluscans were selected for estimation of biochemical i.e. protein, glycogen and lipids in different seasons i.e. monsoon, winter and summer).Studied biochemical's expressed in mg/100 mg dry wt.

**Babylonia spirata (Harne) :** Protein was found to 74.20 in monsoon, moderate in winter i.e. 66.48 while decreased in summer i.e.42.40.Glycogen was found to 8.75 in mansoon,9.20 in winter while decreased in summer i.e. 5.40.Lipid was found 6.62 in monsoon ,5.20 in winter where as decreased as 4.28 in summer.

**Natica picta ( Harne) :** Protein was reported 84.00 in monsoon while decreased as 72.48 in winter ,still decreased in summer i.e.54.20.Glycogen was found to 9.96 in monsoon ,increased in winter i.e.10.36,remarkable decreased in summer i.e.4.45.Lipid was reported 7.95 in monsoon while decreased in winter 6.65 and still decreased in summer i.e.5.30.

**Planaxis sulcatus (Dabhol):** Protein was found to 52.34 in monsoon decreased as 46.62 in winter while still decreased as 35.00 in summer season .Glycogen was reported 6.42 in monsoon ,increased in winter i.e.8.20 and decreased in summer i.e.4.70.Lipid was found to 3.15 in monsoon ,decreased in winter i.e. 2.80,still decreased in summer i.e.2.10.

**Crossostrea (Dabhol):** Protein was found to 85.20 in monsoon ,decreased in winter i.e.73.44,still decreased in summer i.e.63.30.Glycogen was reported 8.10 in monsoon ,increased as 9.80 in winter while decreased in summer i.e.7.50.Lipid was found to 6.25 in monsoon ,decreased to 5.45 in winter while still decreased in summer i.e. 4.60

**Meretrix meretrix (Burondi) :** Protein was found to 85.20 in monsoon ,moderate in winter 78.33 while decreased in summer i.e. 56.20.Glycogen was found to 5.46 in monsoon ,increased in winter i.e.7.35 where as decreased in summer i.e. 4.35.Lipid was reported 6.10 in monsoon ,decreased in winter as 5.46 while still decrease in summer i.e. 4.44.

**Loligo duvacelli (Burondi):** Protein was found to 87.20 in monsoon ,decreased as 79.34 in winter while still decrease in summer i.e.67.70.Glycogen was estimated 8.80 in mansoon,9.20 in winter while remarkable decrease in summer i.e.5.90.Lipid was reported 7.40 in monsoon ,moderate in winter i.e.6.10 while decreased in summer i.e. 4.80.

In the present study it was found that protein and lipid increased during monsoon while decreased in summer where as glycogen found to increase in winter, decreased to summer in all studied mollusca.

In an earlier study on the biochemical change in Tellina teneuis, Ansell and Trevallin (1967) defined certain features characteristic of the seasonal activities of bivalve from the arboreal region in so far as they affected the seasonal cycle of gross biochemical composition. They include,(1) A period of inactivity in the winter months during which gametogenesis might proceed slowly and when reserve stored in various tissue might be drawn upon to supply reduced metabolic demands.(2) A short period following the renewal of activity in the spring when reserves were renewed, growth recommended, and there was rapid gametogenesis and gonad proliferation and (3) A reproductive period during the summer period when temperature rose above certain minimum and body as well as gonad growth and spewing might have proceeded together in response to environmental changes especially in the availability of food.

The seasonal study of body indices and of their biochemical components in Thais lamellose showed a fall in glycogen level during spawning (Giese,1969). Nagabhusganam and Kulkarni (1971) observed a peak of glycogen content in Laevicaulis alte in June.Stickle (1973,1975) observed seasonal variation in the biochemical components in relation to reproduction in the snails,T. Lamellosa and Fusitrition oregonesis.Bristransis (1976) observed the same pattern in Littorina irrorata .Blise and Stickle (1978) found seasonal variation in the body component levels which closely followed the reproductive cycle. In both the sexes of T. Haemostoma,a decrease in component indices occurred after April ,considering the high values for component indices occurred onchidium,C,iatricus showed decline in glycogen content of digestive gland ,which increases with ripening of gonads ,which suggests that glycogen is synthesized and utilized V.V.Hiwale(1986) in marine gastropod Gyrenium natator showed that the glycogen content reached to its peak period during the gametogenesis stage,(February to April).This content declined and reached to minimum during maturing to spawning stages 9September to October). Again it started to rise from cytolysis stage onward and gradually reached a peak once again in February to April.

In the present study all studied mollusc showed generally the biochemical component (protein ,glycogen and lipid) decrease in summer season, it due to spawning might probably occurs during this season ,similar fluctuations were reported by Nagabhushanam and Kulkarni (1971) in Laevicaulis alte.Patil (1977) In cellana rota and Rayudu (1980) in N.therssitus.Ansell and Trevallin (1967) reported that the reproductive period during the summer season when temperature rose above a certain minimum ,body as well as gonadal and spawning might have proceeded together in response to environmental changes especially in the availability of food .Increase in component found in both seasons ( monsoon and winter) this probably due to gonadal development (Rayudu,1980) and variation in gonadal development period from area to area it might be due to stimulus like tides ,temperature etc.(Orton et.al.1956)

The chiton resembles some of the echinoderms in respect to lipid reserve (Green Field et.al.1958).This suggests that lipid plays a much more important role in the over all economy of these animals than does glycogen. Since glycogen is always present and it may serve as an immediate reserve ,while lipids represents the reserves for the slower processes such as growth of organs .The digestive gland of molluscs has long been considered to serve as a storage organ ,since the presence of considerable amount of lipid in the digestive gland of chiton has been reported several times (Fretter 1937,Gabe 1949,Giese and Araki 1962,Nimitz and Giese 1964,Giese and Hart 1967) much more prominent as the storage material than glycogen is lipid, which in Katherina and Moplia reported by Thucker and Giese (1962)

**ACKNOWLEDGMENT:**

Thanks full to university grant commission for supporting financial assistant to this research work.

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