



## STUDIES ON LIPID CONTENT AND DISTRIBUTION PATTERN IN EDIBLE FRESHWATER CRAB, *BARYTELPHUSA CUNICULARIS* IN RELATION TO REPRODUCTION

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### ABSTRACT:

Studies on the seasonal variation in the lipid content of body tissues of, *Barytelphusa cunicularis* a locally available freshwater crab, of dams near Pathardi were conducted for a period of one year. The lipid content in gonad, hepatopancreas, muscle, body and claw meat was studied during different reproductive stages. Study showed that during maturation, lipid content increased in the gonads and decreased in hepatopancreas. During preparatory phase lipid were higher in gonad and hepatopancreas. Remarkable variation in the lipid content of different tissues has been observed during the study period. Changes in the lipid content in all the tissues were observed to be statistically significant ( $P < 0.05$ ).

**Key Words:** *Barytelphusa cunicularis*, reproductive stage, lipid content, gonads.

### INTRODUCTION:

In crustaceans the somatic growth and gametogenesis are two high-energy consuming physiological events. Lipids play important roles in the biochemistry, metabolism and reproduction of decapod crustaceans. The freshwater crabs constitute a great food potential for human. While studying the seasonal changes in organic composition, the lipid content exhibited the most pronounced seasonal changes (Lubzens et al., 1995). Lipids play important role during the development of decapods crustaceans, not only as energy source, but also as essential nutrients (Kanazawa et al., 1985). In crustaceans, the hepatopancreas is generally regarded as a major lipid storage organ. The utilization of hepatopancreatic lipid has been documented for somatic growth. In the case of female crustaceans, ovaries also contain higher levels of lipid than other organs and this suggests that lipids are important for maturation of crustacean ovaries. (Priya Manhas et al., 2013, Ando et al., 1977 and Teshima and Kanazawa, 1983). Lipids play significant role during gonadal growth, maturation and development of decapods crustaceans. They are very important food reserves in the oocytes (Gallager et al., 1986; Le Pennee et al., 1988). During reproductive seasons lipids along with some other biochemical are channeled towards the gonads to meet the cost of active gametogenesis in crustaceans. The origin of lipids reaching the ovary is not fully understood. Teshima et al., (1986a, b) showed that female shrimps double their food consumption, indicating that lipids accumulating in the ovaries

must originate from the food. It is not known whether these lipids pass via the metabolic junction in the hepatopancreas or are taken up directly from the gut. Lipids stored in the hepatopancreas have been shown to be transported to the ovary during vitellogenesis (Teshima et al., 1988; Castille and Lawrence, 1989; Harrison, 1990). However, the amount of lipids accumulated within the ovaries is greater than that stored in the hepatopancreas (Castille and Lawrence, 1989).

In freshwater crabs, studied so far, Kengar, (1998) and Ansari (2001) in *Barytelphusa guerini* and *Barytelphusa cunicularis* lipid appeared to be the major reserve during, reproductive cycle. The present investigation has therefore been carried out to study the variation in the quantity of lipids in different tissues of *Barytelphusa cunicularis*. The data may lead to the better understanding of the relative importance of the lipids during reproductive cycle and during different seasons of a year. It is of great importance to know the seasonal variations of the lipids content of *Barytelphusa cunicularis*, a local freshwater crab.

### MATERIALS AND METHODS :

Freshwater crab, *Barytelphusa cunicularis* of uniform size were procured from local market twice a month for a period of one year from January to December 2013. Gonads, Hepatopancreas and Muscle were dissected out from these crabs. The total lipid content of the tissue was estimated by Chloroform: Methanol method (Wen et al., 2001) using

spectrophotometer with 620-nm wavelength. The results are expressed in % of dry weight tissues. Tissue (50 mg) was homogenized in 5 ml folch's mixture. The test tube containing this solution was kept in boiling water bath for 5 minutes (continuous shaking). It was cooled at room temperature and centrifuged at 4000 rpm for 10 minutes. The supernatant was taken and evaporated on boiling water bath for dryness. After that 1 ml conc. H<sub>2</sub>SO<sub>4</sub> was added and boiled for 15 minutes on boiling water bath. Then it was cooled rapidly under tap water. To make volume 1 ml different quantities of conc. H<sub>2</sub>SO<sub>4</sub> was added to stock solution. To this sample solution 5 ml vaniline reagent was added. After waiting for 15 minutes, the O.D. was measured at 660 nm. The O.D. versus stock solution was plotted and lipid content was obtained from standard graph. Statistical Analysis: The data was analyzed on personnel computer to calculate correlation by Pearson's correlation method, ANOVA to test the level of significance with the help of Microsoft Excel 2003 and SPSS (12.0 Version, Chicago, USA) and mean compared by using Duncan's multiple range test taking  $p < 0.05$  as level of significance (Duncan, 1955).

#### RESULT & DISCUSSION :

Total lipid content in different tissues of crab *Barytelphusa cunicularis* shows variations from season to season. The highest lipid content in *Barytelphusa cunicularis* ovary was found in the month of May (11.75%) and lowest was found in the month of July (8.05 %). In testis, higher lipid content was found in the month of May (8.4%), and lowest was found in the month of July (5.98 %). whereas in hepatopancreas highest and lowest lipid content was found in month of January (21.75%) and May (13%) respectively.

The highest lipid content in body meat was found in the month of March (5.69%) and lowest was found in the month of December (4.1 %). In claw meat, higher lipid content was found in the month of April (4.1%), and lowest was found in the month of December (2.88 %). whereas in muscle highest and lowest lipid content was found in month of May (4.05%) and Feb (2.51%) respectively. The seasonal analysis of lipid content in different body tissues of *Barytelphusa cunicularis* is illustrated in fig- 1 and month wise analysis is illustrated in fig. 2 and 3.

The environmental factors influence and modify the pattern of accumulation of biochemical reserves. Tropical areas like India show distinct seasonal variations in environmental parameters.

These different seasons also govern the distinct pattern of breeding and reproductive cycle (Sayyad N R 2017). Lipid is a principal form of stored energy in most organisms. Lipid forms an important part of the protoplasm. Lipid content in various tissues of crab is obviously the cumulative effect of lipogenesis. These characteristics make fat storage a suitable means for providing energy when it is needed. Lipid analysis of the different tissues of crustaceans yielded interesting information on the exchange and movement of chemical substances between the various organs throughout the course of an annual reproductive cycle. The present research was conducted to investigate the variation in lipid composition during the ovarian maturation of the crab, *Barytelphusa cunicularis*. Increase in lipid content of the gonads during breeding period is related to its simultaneous decrease in hepatopancreas in *Barytelphusa cunicularis*. It was found that increase of lipid content in testis during breeding season is related to its simultaneous decrease in hepatopancreas in *Barytelphusa cunicularis*. In gametogenesis mobilization of lipid reserves occurs in hepatopancreas. Several workers suggested that the hepatopancreas is a labile organ for lipid storage (Kengar 1998 and Sutar 2002). Just as in the other crustaceans studied lipid appears to be the major energy reserve during reproductive cycle. Wen X et al., (2001), investigated the variation in lipid composition during ovarian maturation of the crab, *Eriocheir sinensis*. The ovarian lipid concentration increased steadily from stage II to IV but decreased at lower level after spawning (stage V). The hepatopancreatic lipid concentration increased with maturation of ovaries, reached maximum at stage III, and decreased during the subsequent period to spawning. In the crab, *Barytelphusa cunicularis* lipid is a major organic reserve. It is evident from the present results that lipid level increased in the gonads of crab, during the peak period of gonadal activity i.e. in summer, whereas at the same time there was depletion of these reserves in hepatopancreas. The results suggest the possible movement of hepatopancreatic lipids to the ovaries during the ovarian maturation. These results are in conformity with the conditions noticed in crabs, *Barytelphusa guerini* and *Barytelphusa cunicularis* (Kengar 1998 and Ansari 2001, Sayyad 2017).

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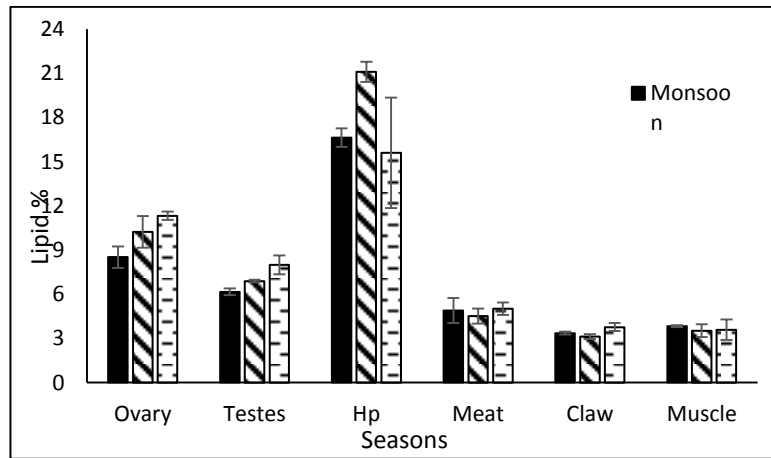


Figure: 1 Frequency histogram showing mean percentage of lipid content in different tissues of *Barytelphusa cucularis* for the period of three seasons.

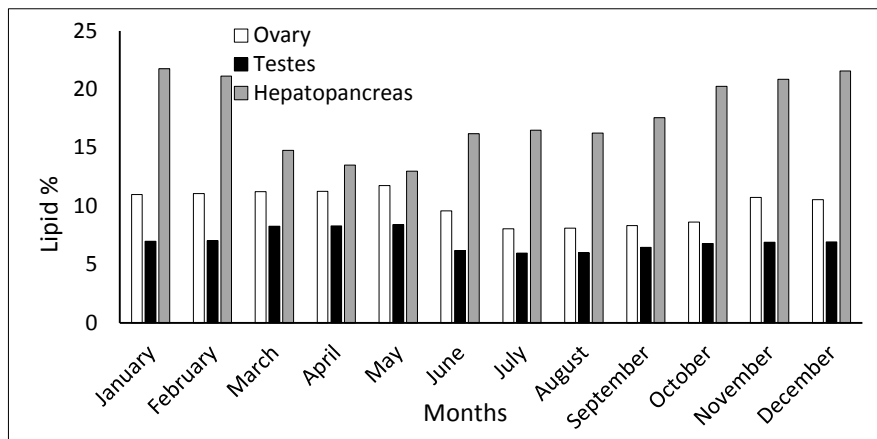


Figure: 2 Frequency histogram showing mean percentage of lipid content in gonads and hepatopancreas of *Barytelphusa cucularis* for the period January to December 2013



Figure: 3 Frequency histogram showing mean percentage lipid content in body meat, claw meat and muscle of *Barytelphusa cucularis* for the period January to December 2013