*Uttar Pradesh Journal of Zoology*

***Volume 45, Issue 15, Page 261-267, 2024; Article no.UPJOZ.3679***
***ISSN: 0256-971X (P)***

# Comparative Account of Biochemical Analysis of *Katelysia opima* Along Mumbai Coast, India

**Shivani Maurya [a*] and Gore B.M. [a]**

*[a] Department of Zoology, M.M. College of Arts, N.M. Institute of Science; H.R.J. College of Commerce, Bhavan's College (Autonomous), Andheri West, Mumbai, India.*

***Authors' contributions***

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

***Article Information***

DOI: https://doi.org/10.56557/upjoz/2024/v45i154242

**Open Peer Review History:**
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://prh.mbimph.com/review-history/3679

***Original Research Article***

***Received: 06/05/2024***
***Accepted: 09/07/2024***
***Published: 10/07/2024***

## ABSTRACT

The present study aimed to analyze the biochemical composition of *Katelysia opima*, and compare it with the *Tilapia Mossambica* and *Mystus vittatus*. *Katelysia opima* is a common bivalve rich in protein, serving as a major nutritional source for people. Protein analysis revealed a protein amount of 12.4% in *Katelysia opima*, while *Tilapia mossambica* and *Mystus vittatus* exhibited 13.76 % and 12.85%, protein content respectively. Additionally, lipid content was found to be significantly higher in *Katelysia opima* (4%) compared to *Tilapia mossambica* and *Mystus vittatus,* which showed lipid contents of 2.86% and 2.25%, respectively.

Conversely, carbohydrate content was highest in *Katelysia opima* (5%) compared to *Tilapia mossambica* and *Mystus vittatus*, which contained 2.3% and 2.7% carbohydrates, respectively. Overall, *Katelysia opima* exhibited high lipid and carbohydrate content, whereas protein content is comparable to *Tilapia mossambica* and *Mystus vittatus*.

---

**Corresponding author: Email: mauryashivani2002@gmail.com;*

***Cite as:*** *Maurya, Shivani, and Gore B.M. 2024. "Comparative Account of Biochemical Analysis of Katelysia Opima Along Mumbai Coast, India". UTTAR PRADESH JOURNAL OF ZOOLOGY 45 (15):261-67. https://doi.org/10.56557/upjoz/2024/v45i154242.*

*Keywords: Bivalve; Katelysia opima; biochemical analysis; Mumbai coast.*

## 1. INTRODUCTION

Shellfish fishery is a very vital part of the Indian economy with clams, oysters, and mussels harvested from marine waters serving as popular food choices. Bivalves along the coastline serve as vital food and raw materials for village industries and traditional medicine. They are a cost-effective food source for coastal communities [1,2]. These bivalves are very rich in protein content, fulfilling the nutritional needs of coastal communities [3]. *Katelysia opima* is also called surf clam, prevalent edible bivalve readily accessible in the local market spanning from Mumbai to Ratnagiri in the Konkan region [4,5]. This study aims to compare and quantify the biochemical composition of *katelysia opima* alongside *Tilapia mossambica* and *Mystus vittatus* which hold distinct niches and commercial importance and are radially cheaper. Focusing on key biochemical components such as protein, lipid, and carbohydrate, this research provides a comprehensive framework for understanding the biochemical adaptation and ecological significance of *katelysia opima* compared to *tilapia* and *Mystus vittatus*.

## 2. MATERIALS AND METHODS

A Random sample of *Katelysia opima* was collected in December 2023 from the local fishermen of Malad. The specimen was brought to the laboratory washed thoroughly with fresh water and shells were opened to remove the mussle tissue. This mussle was then homogenized with a suitable extraction buffer which led to the separation of supernatant and pellet. The supernatant is used for further biochemical studies such as protein estimation, carbohydrate, and lipid estimation. The total estimation of proteins in the tissue was conducted by the Lowrys method  And protein was expressed as a percentage. Lipid extraction, followed by the Folch method, involves chloroform-methanol extraction. Carbohydrate was estimated by the phenol-sulfuric acid method by taking optical density using a spectrophotometer at 420nm expressed in percentage.

**Observation:** The dietary habitat of *T. mossambica*, *Mystus vittatus* varies as documented by [6] as *Tilapia* feed on herbivores, and *Mystus vittatus* prefers a carnivore diet. whereas the *Katelysia opima* is found in an intertidal zone of marine water. Therefore, depending on the feeding habit the biochemical composition also differs. Conversely lipid content was also highest in *Katelysia opima* 4% in comparison to both in that which type of lipid can be studied further.

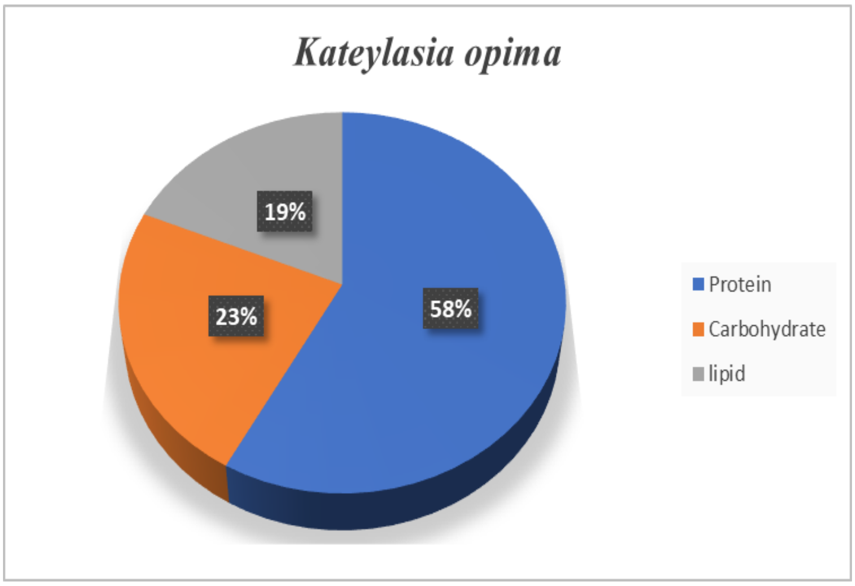


**Fig. 1. Proximate composition of *Kateylasia opima***

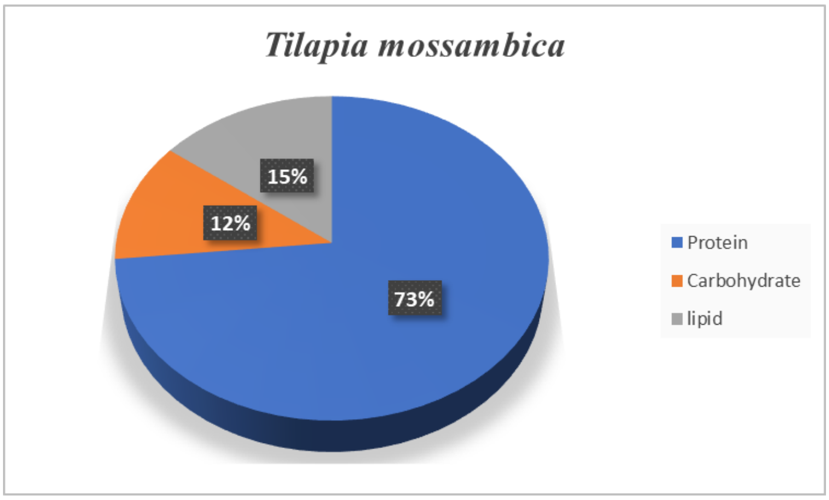


**Fig. 2. Proximate composition of *Tilapia mossambica***

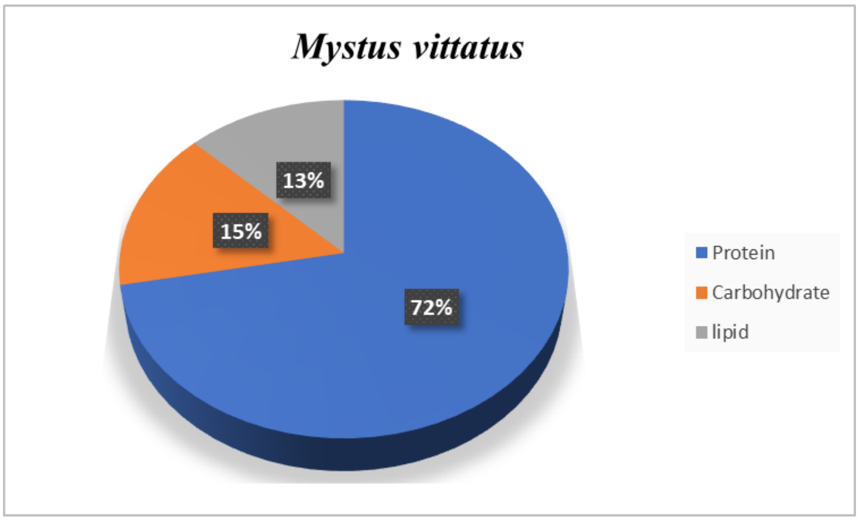


**Fig. 3. Proximate composition of *Mystus vittaus***

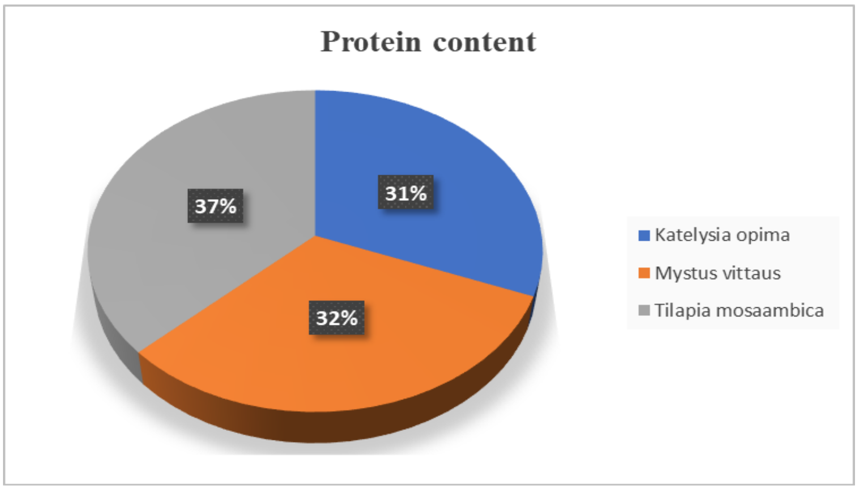


**Fig. 4. Protein content of different sample species**

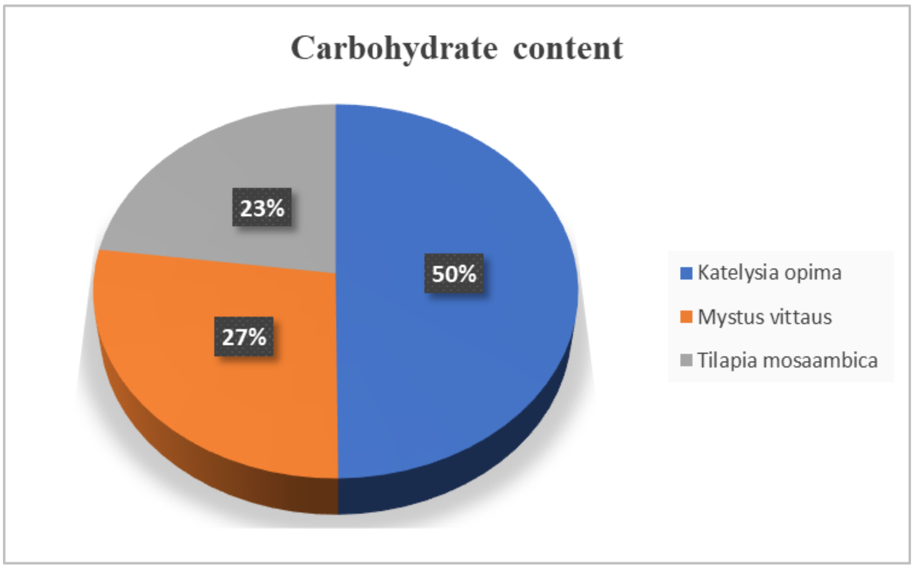


**Fig. 5. Carbohydrate content of different sample species**

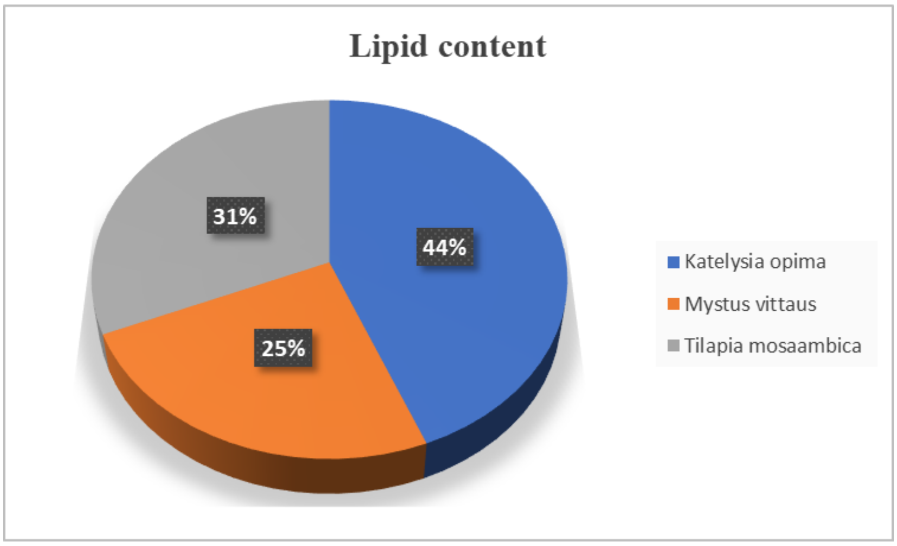


**Fig. 6. Lipid content of different sample species**

As shown in Fig. 1, *Katelysia opima* contains a substantial 58% protein, 23% carbohydrate, and 19% lipid, with variations influenced by seasonal changes, habitat, feeding habits, and spawning periods. Its marine habitat and biochemical profile suggest its suitability for human consumption, especially in coastal areas where it is abundant. Figs 2 and 3 illustrate the typical composition of tilapia and mistus vittatus. Notably, *Katelysia opima* boasts a high lipid content, making it an attractive choice for those seeking healthy fats, as depicted in Fig. 6. Conversely, further research is needed to explore other aspects. Additionally, its carbohydrate content surpasses that of other species, as indicated in Fig. 5. While its protein content is comparable to both, there are minimal differences observed.

## 3. RESULTS

The comparative analysis of macronutrient content among different species of aquatic organisms provides valuable insights into their nutritional ecology, physiological adaptations, and ecological roles within their respective habitats. The result shows the intricate relationships between protein, carbohydrate, and lipid content in *Katelysia opima*, *Tilapia mossambica*, and *Mystus vittatus*, giving importance of these findings for human consumption, ecosystem dynamics, and conservation management practices.

According to analysis, the protein content is 12.4% in *Katelysia opima* whereas in *Tilapia mossambica* 13.76% and *Mystus vittatus*12.85%. The carbohydrate content is significantly higher in *Katelysia opima* 5% another side *Tilapia mossambica* and *Mystus vittatus* contain carbohydrate content of 2.3% and 2.7% respectively. Carbohydrates serve as a source of energy and play a crucial role in metabolism and cellular function. The higher carbohydrate content observed in Katelysia opima is attributed to its filter-feeding behavior, which allows it to capture and ingest a diverse range of organic particles suspended in seawater, including carbohydrates derived from phytoplankton and algae. Same as a carbohydrate the lipid content is also high in *Katelysia opima* containing 4% as compared to both *Tilapia mossambica* and *Mystus vittatus*.

## 4. DISCUSSION

The recent examination of *Katelysia opima* highlights its significant carbohydrate and lipid composition, with protein levels remaining relatively consistent across different samples, subject to seasonal variations and feeding habits. In a study by Chandra B. Maurya [4] in Mumbai, the protein concentration of *Katelysia opima* ranged from 1.1 mg/ml to 2.35 mg/ml. The lowest concentration was noted in October, while the highest was observed in November 2015. Interestingly, October 2015 and March 2016 exhibited more protein bands.

In a study of Taware *et. al* [2] states that the behavioral response of Katelysia opima under osmotic stress is closely linked to its biochemical composition, particularly proteins, lipids, and carbohydrates. Proteins, especially those involved in metabolic and stress response processes, help the clams adapt to varying salinity levels. Lipids provide essential energy reserves and maintain cell membrane integrity during osmotic fluctuations. Carbohydrates, mainly glycogen, supply the necessary energy for physiological activities like shell valve closure and osmoregulation. Seasonal variations in these biochemical components influence the clams' ability to cope with osmotic stress, with lower reserves post-monsoon leading to increased stress sensitivity, while more stable reserves in winter and summer allow for better stress management.

The study done by Kamble [7] states that *K. Opima* has higher protein content in winter and monsoon seasons while low in summer, as our study states 12.4% protein content in December. Investigation by Laxmi Latha [8] in Kerala focused on surf clam, indicating fluctuations in meat content throughout the year. The average meat content was 23.2%, varying from 15.2% to 26.7%. Meat content peaked from January to March, decreased during April and May, and rose again in July and August [9-12]. These fluctuations correlated with the gonadal condition of the clams, with meat content being lowest during April and May when clams were spent and highest during periods of maturation, such as January to March and August.

In the study done by Mukadam and Kulkarni (2013), it was observed that protein content changes according to season, physiological status of the clam and artificial environmental stress. In LC50 group, hepatopancreas exhibited high protein content in monsoon and winter. In chronic group of clams, significant increase in protein content was observed.

Another study conducted by K. Rao delved into the general characteristics and growth patterns of *Katelysia opima.* Through observations on monthly random samples collected near Madras, several key findings emerged: The study concluded that the lifespan of *Katelysia opima* is approximately three years [13-15]. In the first, second, and third years of life, the clams typically reach average lengths of 22.5 mm, 31.5 mm, and 40.5 mm, respectively.

Chinnamma *et al.* (1986) noted that several factors influence the composition of a fish species, including food availability, spawning cycle, spawning migration, and age. The significant variations observed in composition values are attributed to seasonal changes.

## 5. CONCLUSION

The comparative analysis of the biochemical composition of *Katelysia opima*, *Tilapia mosambica,* and *Mystus vittatus* shows the potential significance of *Katelysia opima* as a food source. While *Kateylasia opima* exhibits slightly lower protein concentration compared to *Tilapia mosambica*, its higher carbohydrate and lipid content make it a valuable dietary option. Carbohydrates are an important energy source, while lipids provide essential fatty acids and contribute to nutritional value. The findings of this comparative analysis highlight the nutritional potential of *Katelysia opima* as a food source, emphasizing its importance in diversifying dietary options and promoting sustainable food practices.

Furthermore, incorporating *Katelysia opima* into the diet provides an opportunity to diversify nutritional intake and explore alternative food sources. Its unique flavor and texture can enhance culinary experiences and inspire creativity in cooking. By embracing *K. opima* as a food option, individuals can broaden their palate, support local economies, and contribute to sustainable food systems. Overall, the affordability, sustainability, and nutritional benefits of *K. opima* underscore its potential as a valuable addition to the diet. which also enriches culinary traditions and promotes dietary diversity.

## CONFERENCE DISCLAIMER

Some part of this manuscript was previously presented and published in the conference: An International Conference on Coastal and Marine Conservation CMC-2024 dated from 1st and 2nd March, 2024 in Mumbai, India. Web Link of the proceeding: https://mithibai.ac.in/wp-content/uploads/2024/02/CMC2024-CONFERENCE-brochure..pdf

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES


1. Babu A, Venkatesan V, Rajagopal S. Biochemical composition of different body parts of *Gafrarium tumidum* (Roding, 1798) from Mandapam, South East Coast of India. African Journal of Biotechnology. 2012;11(7):1700-4.
2. Taware SS, Muley DV. Size-dependent seasonal variation in respiration in clam *Katelysia opima* (Gmelin) exposed to lower salinity ranges along Bhatye estuary, Ratnagiri (MS) India. J. Mar. Biol. Assoc. India. 2013 Jan;55(1):6.
3. Lakshmanan PT. Biochemical composition of the bivalve molluscs *Villorita cyprinoides* var. cochinensis (Hanley) and Meretrix casta (Chemnitz),. Indian J. Mar. Sci. 1981;9(1):63-67.
4. Chandra B. Maurya. Chemical Analysis of The Edible Clam *Katelysia opima*. Indian Journal of Research. 2016;5(16):50.
5. Madhura Mukadam AK. Histopathological and Biochemical studies of the hepatopancreas in *Katelysia opima* (Gmelin) exposed to Cypermethrin. Online International Interdisciplinary Research Journal. 2013;166.
6. Gore BM, BP. Analysis of diet and proximate composition of few creek fishes from vasai creek, Thane district (Maharashtra). Eco. Env. & Cons. 2014;1803-1808.
7. Kamble SP, Muley DV. Studies on the biochemical composition of estuarine clam, Katelysia Opima from Ratnagiri Coast, Maharashtra, The Ekologia. 2009;9(1-2):61 – 68.
8. Laxmi Latha P. Proximate composition of the surf clam *Mactra violacea* (Gmelin 1791. Indian J. Fish. 2009;56(2):147 - 150.
9. Abdel-Salam HA. “Protein and Electrophoretic Analysis of Edible Muscle of Commercially Important Crustaceans and Mollusks Species from Egyptian and Saudi Arabia Costs”. Animal and Veterinary Sciences. 2014;2(4):109 -117.
10. Folch AL. A simple method of isolation and purification of total lipids from animal tissue. J. Biol Chem. 1957;497-509.
11. KK. Nutritive Profile of Ivory Shell Babylonia zeylanica (Bruguiere). The National Academy of Sciences; 2013.
12. Lowery OR. Protein measurement with follin - phenol reagent. J. Biol Chem. 1951;192-265.
13. Muley KS. Studies on the biochemical composition of estuarine clam, Katelysia Opima from Ratnagiri Coast. The Ekologia. 2009;61-68.

14. Muthiah NS. Variations in gross biochemical composition in relation to the. Indian journal of fishery. 2010;57(1):53 – 59.

15. Upadhye MV, Jadhav U. Tissue specific protein profiling of freshwater pearly mussel Parreysia corrugata". Journal of Aquatic Biology; 2010.



*Peer-review history:*
*The peer review history for this paper can be accessed here:*
*https://prh.mbimph.com/review-history/3679*