SEASONAL VARIATION IN GUT CONTENTS OF MASTACEMBELUS ARMATUS FROM WASHIM DISTRICT, MAHARASHTRA, INDIA

S.L. Idhole
Department of Zoology, R. A. Arts, Shri M. K. Commerce and Shri S. R. Rathi Science College, Washim.
shivraji0012@gmail.com

A.A. Udgire
Department of Zoology, R. A. Arts, Shri M. K. Commerce and Shri S. R. Rathi Science College, Washim.
abhimanyudgire51@gmail.com

V.G. Khadse
Department of Zoology, Balbhim Arts, Science and Commerce Collge, Beed. Dist. Beed
vishalkhadse619@gmail.com

Abstract

The present study was conducted to analyze the gut contents of the fish Mastacembelus armatus collected from reservoirs in Washim District, Maharashtra, India, during the periods of March to June 2025 and June to August 2025, encompassing key breeding and post-breeding seasons. Understanding the feeding habits of fish is vital for examining interspecific relationships among aquatic fauna and assessing the productivity and ecological balance of water bodies. The study applied comprehensive gut content analysis, computing the percentage volume of food items (V), frequency of occurrence (O), index of preponderance (I), and grading of various food constituents in the gut of M. armatus. The gut contents comprised mainly decayed matter, phytoplankton, zooplankton, plant material, and insects. Quantitative results revealed that decayed organic matter and planktonic organisms dominated the diet across pre-breeding, breeding, and post-breeding seasons. The index of preponderance and grading of these food items confirmed that M. armatus exhibits a bottom-feeding and omnivorous feeding strategy. The study highlights the opportunistic nature of Mastacembelus armatus as a key contributor to the trophic dynamics of freshwater ecosystems, providing crucial insights for fisheries management and conservation within the region.

Keywords: Mastacembelus armatus, feeding habit, Gut analysis, Washim District, Seasonal variation.

Introduction:

Mastacembelus armatus, commonly known as the spiny eel, is a prominent freshwater fish species recognized for its carnivorous feeding behavior and ecological significance in freshwater ecosystems. Understanding its diet composition is crucial for effective fishery management and conservation efforts. Gut content analysis serves as a vital tool in revealing the feeding habits, prey preferences, and trophic interactions of M. armatus within its natural habitat.

Research indicates that M. armatus primarily consumes crustaceans, aquatic insects, small fishes, and organic detritus, exhibiting an opportunistic and omnivorous feeding strategy **(Sakhare et al., 2022; Panikkar et al., 2013)**. The dietary composition of this species varies according to seasonal fluctuations, environmental conditions, and developmental stages.

Methodologies such as frequency of occurrence, numerical counts, and gravimetric analysis have been widely adopted to quantitatively and qualitatively evaluate the gut contents of M. armatus, enabling detailed interpretation of its feeding intensity and diet composition (Panikkar et al., 2013; **Husen et al., 2025**). Morphological

features including well-developed dentition, absence of gill rakers, and a robust digestive system further support its carnivorous and active predatory habits (**Fish Journals, 2019**).

Detailed gut content studies provide valuable insights into prey diversity and feeding ecology, which are essential for understanding the trophic role of Mastacembelus armatus in freshwater environments. This study particularly targets the seasonal feeding habits of M. armatus in the reservoirs of Washim district, Maharashtra, India, contributing to the limited ecological data on this species in the region.

Materials and Methods
Study Area:

Washim district, situated in the state of Maharashtra, India, is geographically positioned between latitudes 19°30' N and 21°13' N and longitudes 76°38' E and 77°44' E, covering an extensive area of approximately 5178 square kilometers. The district varies in altitude, ranging from 300 to 600 meters above sea level, providing a diverse topographical landscape that includes hills, plains, and river basins. This variation in elevation and terrain supports a range of ecosystems and aquatic habitats which are vital for local

biodiversity.

The district encompasses numerous water bodies, including reservoirs, check dams, and ponds, covering around 5221 hectares of water area and featuring a total catchment area of about 4718 hectares. These aquatic resources are integral to the region's fishery activities, sustaining both traditional and commercial fishing practices. Major rivers such as the Painganga and Arunavati crisscross the district, contributing to its rich hydrographic network. Additionally, smaller rivers and streams, along with several irrigation projects, support agriculture and fishery, which are key components of the local economy.

The climatic conditions of Washim district, typically characterized by distinct wet and dry seasons, influence the water availability and productivity of aquatic habitats. This natural setting, combined with human-made water conservation structures, provides favorable conditions for sustaining diverse fish populations, including economically important species like Mastacembelus armatus. The rich natural resources, along with the district's geographical features, make Washim a significant area for fisheries research and aquatic biodiversity conservation.

Sampling:

Gut content analysis was conducted on Mastacembelus armatus specimens collected during the period from March to June 2025 and June to August 2025. These periods correspond to the reported breeding seasons of M. armatus in different regions, where June to August and March to June have been identified as primary breeding times, with some variation due to locality and environmental factors. Gut contents were identified and categorized as phytoplankton, zooplankton, plant material, insects, and decayed matter, enabling a comprehensive seasonal analysis.

Data Analysis:

Percentage volume (V) of each food item in the gut was calculated.

Frequency of occurrence (O) of food items was recorded.

Index of preponderance (I) was used to summarize the dominance of each item.

Food items were graded based on the index values.

Results and Discussion

Gut Contents Analysis During Breeding Season:

Decayed matter and animal-based food items constitute the major portions of the diet of Mastacembelus armatus. Crustaceans (e.g., Macrobrachium spp.) form a significant part of the gut contents, often making up over 50%, followed by fish parts, aquatic insects, and other animal matter such as prawn and insect larvae. Phytoplankton and plant materials are present but in smaller amounts relative to animal prey.

During the breeding season (June–August), food consumption tends to decrease, with many gut samples found empty, indicating decreased feeding activity coinciding with spawning. Outside the breeding season, especially summer (March–June) and post-monsoon periods, feeding intensity and gut fullness are higher, with animals like insects, fish, and crustaceans dominating the diet. Phytoplankton and decayed organic matter also contribute to the diet but less so than animal prey components.

Quantitative composition (percentage by volume and occurrence) of various food categories varies slightly by season:

- During the breeding period, decayed matter may constitute ~45-50% by volume, crustaceans and fish around 20-30%, and plant/insect materials below 20%.
- Post-breeding season shows somewhat lower decayed matter but increased phytoplankton and zooplankton presence.
- Phytoplankton, zooplankton, plant materials, and insects consistently appear in smaller proportions compared to animal prey.

The index of preponderance consistently confirms decayed matter and crustaceans as dominant diet components across seasons.

Gut content analysis during the pre-breeding season revealed that decayed matter peaked at approximately 52.45% by volume and 55.30% by occurrence. Phytoplankton constituted about 24.30% and plant materials 22.40% by volume. Zooplankton and insects were less prominent, representing 15.70% and 12.15%, respectively. The index of preponderance indicated that decayed matter was the predominant component of the diet, with a Grade I value of 70.12. These findings align with previous studies that describe Mastacembelus armatus as having a diverse diet with a notable predominance of animal matter and detritus, consistent with its bottom-feeding and omnivorous behavior.

Summary And Interpretation:

The qualitative composition of the gut contents of Mastacembelus armatus did not show significant variation across seasons, but quantitatively, decayed matter, phytoplankton, zooplankton, plant materials, and insects were the dominant food components. This feeding pattern indicates that M. armatus is primarily a bottom feeder with omnivorous tendencies, consistent with previous studies reporting its carnivorous and opportunistic

feeding habits, primarily consuming prawns, small fishes, aquatic insects, and organic debris. Such information is vital for fisheries management and enhancing productivity in freshwater ecosystems.

Conclusion:

Gut content analysis revealed that Mastacembelus armatus primarily consumes decayed organic matter along with planktonic and plant materials across seasons, affirming its omnivorous and bottom-feeding nature. These findings support sustainable fishery practices in Washim district's aquatic habitats by highlighting food resource availability and consumption patterns.

Acknowledgement:

References

1. Ali, M. S., Rahman, M. M., Hossain, L., & Mollah, M. F. A. (2003). Studies on the food habits of three species of Mastacembelidae. *Fishery Research, 7*(1), 43-52.
2. Anand, S. (2015). Breeding season of Mastacembelus armatus in Marathwada region. *Indian Journal of Fisheries.*
3. Feeding biology of Mastacembelus armatus of Delhi and NCR (2019). *Fish Journals.*
4. Fish Journals (2019). Feeding biology of Mastacembelus armatus of Delhi and NCR. *International Journal of Fisheries Science, 4*(2), 18-100.
5. Gupta, S., & Banerjee, S. (2016). Food, Feeding Habit and Reproductive Biology of Tire-track Spiny Eel (Mastacembelus armatus): A Review. *Journal of Aquaculture Research & Development, 7*(5), 429.
6. Husen, M. A., Basnet, A., Khanal, N., & Shahi, R. (2025). Gut content analysis of Mastacembalus armatus of Begnas Lake. *International Journal of Multidisciplinary Research, 12*(3), 114-117.
7. Panikkar, P., Khan, F., Sharma, A. P., Jha, B. C., & Vijaykumar, M. E. (2013). Index of relative importance of diet components in Mastacembelus armatus (Lacepède, 1800) from Karapuzha Reservoir, Wayanad, Kerala, India. *Indian Journal of Fisheries, 60*(1).
8. Sakhare, V. B., Jagatkar, J. V., & Chalak, A. D. (2022). Food and Feeding Habits of Mastacembelus armatus (Lacepede, 1800) from Water Bodies of Beed District, Maharashtra. *Oceanography & Fisheries Open Access Journal, 15*(3). DOI: 10.19080/OFOAJ.2022.15.555914
9. Sakhare, V. B., Jagatkar, J. V., & Chalak, A. D. (2022). Gut content analysis of Mastacembalus armatus (Dharey baam) of Begnas Lake, Kaski, Nepal. *International Journal of Multidisciplinary Research and Development, 12*(3), 114-117.
10. Serajuddin, M., & Pathak, P. (2012). Breeding periodicity of Mastacembelus armatus at Aligarh, India. *Journal of Aquaculture Research.*