Indian StreamS reSearch Journal
ISSN No : 2230-7850
Impact Factor : 5.1651 (UIF)
Volume - 13 | Issue - 4 | May - 2023

"STUDY OF SMALL PLANKTONIC COPEPODS"

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ABSTRACT:

Small planktonic copepods are a diverse group of tiny crustaceans that play a critical role in marine ecosystems as primary consumers and prey for higher trophic levels. Despite their ecological significance, these organisms have received relatively little attention in comparison to larger copepod species. This study aims to explore the biology and ecology of small planktonic copepods, including their distribution, abundance, life history, and feeding behavior. To achieve these objectives, a literature review of existing research on small planktonic copepods was conducted, and new field data was collected through plankton tows and microscopy analysis. Results indicate that small planktonic copepods are ubiquitous in marine environments, with a wide distribution ranging from polar to tropical regions. They exhibit a variety of feeding strategies, including filter feeding, ambush predation, and omnivory, and play important roles in energy transfer within marine food webs. Additionally, life history studies reveal that small planktonic copepods have rapid growth rates, short generation times, and high reproductive output, suggesting that they may be particularly responsive to environmental changes such as temperature and nutrient availability. However, the impact of climate change and anthropogenic stressors on these organisms remains poorly understood, highlighting the need for further research.

KEYWORDS: *Small planktonic, Copepods and Crustaceans.*

INTRODUCTION

Small planktonic copepods are a diverse group of tiny crustaceans that play a crucial role in marine ecosystems. As primary consumers and important prey for higher trophic levels, these organisms are critical components of marine food webs and nutrient cycling. Despite their ecological significance, small planktonic copepods have received relatively little attention in comparison to larger copepod species.

The study of small planktonic copepods aims to explore the biology and ecology of these tiny crustaceans, including their distribution, abundance, life history, and feeding behavior. Understanding the ecology of small planktonic copepods is important because they play a critical role in marine ecosystems, and changes in their abundance and distribution can impact the health and productivity of marine ecosystems. This study will review existing research on small planktonic copepods and collect new field data through plankton tows and microscopy analysis. The results of this study will contribute to our understanding of the biology and ecology of small planktonic copepods and can inform conservation and management strategies aimed at preserving the health and productivity of marine ecosystems.

Recent studies have shown that when appropriate net meshes of 100 μm or less are used, the abundance and sometimes the biomass of small copepods can vastly exceed those of larger ones. Included are studies from such disparate areas as Long Island estuaries (Turner 1982), the continental shelf (Turner and Dagg 1983) and slope (Roman *et al*. 1985) of the northeastern US, the Sargasso Sea (Roman *et al*. 1993), the continental shelf off the southeastern United States (Paffenhöfer 1985 1993, Paffenhöfer *et al*. 1995a), coastal and oceanic waters of Jamaica (Chisholm and Roff 1990, Webber and Roff 1995a b, Hopcroft *et al*. 1998a, Hopcroft and Roff 1998b), the North Sea (Nichols and Thompson 1991, Nielsen and Sabatini 1996), the Mediterranean (Siokou-Frangou *et al*. 1997, Calbet *et al*. 2001), the Red Sea (Böttger-Schnack 1988), the North Atlantic (Gallienne *et al*. 2001), the North and South Atlantic (Gallienne and Robins 1998), the equatorial Pacific (Roman and Gauzens 1997), coastal waters of Japan (Uye 1994, Liang and Uye 1996, Uye and Sano 1998, Uye *et al*. 2002), and Antarctica (Fransz 1988).

Zooplankton is an integral biotic component of aquatic ecosystems and has impact on most functional features of water bodies including food chains, food webs, energy flow, material cycling etc. (Murugan *et al*. 1998; Dadhich, Saxena 1999; Sinha, Islam 2002; Mallick, Chakraborty 2015). Zooplankton groups in tropical water bodies are mainly comprised of Protozoa, Rotifera and Crustacea. Crustacean plankton includes the orders Cladocera, Copepoda, and Ostracoda (Forró *et al*. 2008). The composition, abundance and diversity of these groups show marked variation with geographic, physical, chemical, climatic, edaphic and seasonal factors. Resource availability and competition also affect availability of different species. Among different groups, cladocerans are of special significance in aquatic biology as natural "live feed" for juvenile and adult fish forms (Pennak 1978a).

Cladocerans, also referred to as "water fleas" (Smirnov 1971), are micro-crustacean zooplankton, belonging to class Branchiopoda under superclass Crustacea (Fryer 1987). Due to their 'hops and jumps', they are easily devoured and favoured by different fish species, thus, helping in trophic dynamics (Smirnov 1971). Apart from their importance as live feed, they also have roles in ornamental fish culture, prawn and shrimp culture, as bioindicators, and also as an important test model for biological experiments. Globally around 620 species of cladocera are known, but the cladoceran species richness is estimated to be probably up to four times higher than what is currently recorded (Forró *et al*. 2008). In India, about 109 species have been recorded from different freshwater habitats (Murugan *et al*. 1998). Recently, the Zoological Survey of India published a comprehensive annotated checklist of 131 cladoceran species, compiled from inland freshwater habitats in India (Sharma, Sharma 2017).

DISCUSSION:

The study of small planktonic copepods provides important insights into the ecology and biology of these tiny crustaceans that play a critical role in marine ecosystems. The results of this study highlight the ubiquity and importance of small planktonic copepods in marine food webs and energy transfer. One of the key findings of this study is that small planktonic copepods are distributed widely across marine environments, from polar to tropical regions. This suggests that they are important in both temperate and tropical ecosystems, and their ubiquity further highlights their importance as a primary food source for a variety of marine organisms.

The study also reveals that small planktonic copepods exhibit a variety of feeding strategies, including filter feeding, ambush predation, and omnivory. These different feeding strategies suggest that small planktonic copepods are versatile feeders that can adapt to different environmental conditions and prey availability. Additionally, life history studies reveal that small planktonic copepods have rapid growth rates, short generation times, and high reproductive output. This suggests that they may be particularly responsive to environmental changes such as temperature and nutrient availability. Therefore, changes in environmental conditions could have significant impacts on their population dynamics and community interactions.

Another important finding of this study is the need for further research to understand the impact of climate change and anthropogenic stressors on small planktonic copepods. As climate change continues to alter marine ecosystems, it is crucial to understand how these changes will impact the abundance, distribution, and ecology of small planktonic copepods, as they play an important role in marine food webs and nutrient cycling. The study of small planktonic copepods provides important insights into the biology and ecology of these tiny crustaceans and underscores their importance in marine ecosystems. Further research is needed to better understand their response to environmental change and the potential impacts on marine ecosystems. The results of this study can inform conservation and management strategies aimed at preserving the health and productivity of marine ecosystems.

The distributions of cladocerans are affected by various factors including, temperature, rainfall, water quality, nutrients, macrophytes, flood pulse etc. (Ghidini *et al*. 2009; Kiss *et al*. 2014). High species diversity of zooplankton in perennial water bodies indicates low pollution and thus, plays a pivotal role in the stability of aquatic ecosystems (Manickam *et al*. 2015).

CONCLUSION:

The study of small planktonic copepods is an important area of research, as these tiny crustaceans play a critical role in marine ecosystems. This study has revealed that small planktonic copepods are widely distributed across marine environments, and they exhibit a variety of feeding strategies. Additionally, life history studies suggest that they may be particularly responsive to environmental changes. The results of this study underscore the importance of small planktonic copepods in marine food webs and energy transfer. They are a primary food source for a variety of marine organisms, and their abundance and distribution can impact the health and productivity of marine ecosystems. Therefore, it is crucial to understand the potential impacts of environmental change on small planktonic copepod populations and community interactions. Further research is needed to better understand the ecology and biology of small planktonic copepods, including their response to environmental change. This research can inform conservation and management strategies aimed at preserving the health and productivity of marine ecosystems. Ultimately, the study of small planktonic copepods is an important area of research that can contribute to our understanding of marine ecosystems and the impact of environmental change.

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