

# Population Study of Amphipods in Pulicat Lake on Two Different Habitats

Anita Pearline Esther<sup>1</sup> & J. Logamanya Tilak<sup>2</sup>

<sup>1</sup>Dept. of Zoology, SRM Arts and Science College, Kaatankulathur, Chennai, India.

<sup>2</sup>Dept. of Zoology, Madras Christian College (Autonomous), Tambaram, Chennai, India.

## Abstract

Amphipods are small crustaceans which are found abundant in Pulicat Lake. They are found to occupy many habitats in the lake including algae, seagrass, under sediments, among oysters and other substrates. The choice of habitat is based on protection against predation and desiccation. The importance of amphipods in the lake is considered as vital because it is an important link in the food chain of the lake. Many invertebrates and fishes and birds prey on the amphipods. The preference of habitat, natural and artificial, was experimented and analyzed to find out the reason of colonization in the preferred habitat across seasons. A distinct variation in the population density was observed between the two habitats and also across the seasons. The artificial habitat was preferred by the amphipods especially during the monsoon season in contrast to the very low number of amphipods on the seagrass during that season. Even among the tiles, the amphipods were found to be seen on the concave side than the convex side of the roof tile confirming the fact that protection is predominant in the choice of habitat.

**Key words:** Amphipod, substrates, habitat preference

## Introduction

Crustaceans are the most dominant and successful group of arthropods in any aquatic ecosystem. Their diversity and adaptability to various ecological niches make them a very important part in an ecosystem. They are part of the chief food chains of the ecosystem. One such contributor to the energetics of the lake is the amphipods. Amphipods are diverse group of Anomurans which include over 7000 described shrimp-like crustaceans ranging from 1 to 140 mm in length. Most amphipods are marine, although there are few representative species in freshwater and terrestrial ecosystems. Marine amphipods may be pelagic or benthic. Terrestrial amphipods usually called sand fleas can be seen amongst the sand or under debris. Amphipods are worldwide in distribution and are restricted by competition and predation. They are found to

inhabit a variety of habitats. The most common being found amongst the seagrass and among any substrate that would offer protection.

This important group of anomurans are seen in abundance in Pulicat Lake, the second largest brackishwater lake in India. Pulicat Lake is spread between two states, Tamilnadu and Andhra Pradesh with a water spread area of about 365 sq. kms, with an average depth of about 0.8 meters. Three rivulets that drain freshwater into the lake and a narrow mouth which connects the lake into the Bay of Bengal establish Pulicat Lake into an Estuary. The lake serves as a nursery for fisheries leading to a very rich biodiversity in the lake ranging from plankton to migratory birds including a variety of mollusks, crustaceans and fishes of commercial importance. Amphipods play a vital role in the energetics of the lake and hence this study was designed to identify the habitat preference of amphipod, through the population density of amphipods in a natural habitat and an artificial habitat.

### **Materials and Methods**

Two sites were selected for the study, one being a natural habitat, seagrass and the other being an artificial reef, roof-tile battery that was introduced into the lake. The natural habitat was the seagrass, *Gracillaria edulis* and the tile battery is a made of roof tiles stacked in such a way that the concave sides of the tiles alternately face each other. About 15 tile batteries were deployed into the selected area in the lake for this purpose. The sites of collection of amphipods were visited twice every month and the population density was studied for a period of six months from October 2012 to March 2013.

For collection of amphipods, seagrass was scooped into a trough. Chloroform was added into the water and gently shaken to dislodge the amphipods on to the trough. The amphipods thus collected were individually counted. The same way the tile battery was taken into a trough and untied to expose every tile. Amphipods were counted individually on each surface of the tile to see the preference of area. A table is constructed recording the number of amphipods present on the concave and convex surface of the tile in the battery. The population was tabulated and studied for its abundance with regard to its habitat.

## Result

The population density of amphipods among the seagrass showed a seasonal variation. The population density was high October- November (premonsoon) and less in the months of December and January (monsoon). After January the population again increased.



**Seagrass**



**Tile battery**

In the pre-monsoon season there were 237 and 164 amphipods in the month of October and November, respectively. The population drastically dwindled down to 52 and 39 in December and January and after which there is a rise in the number in the post monsoon months February and March at 108 and 208, respectively.

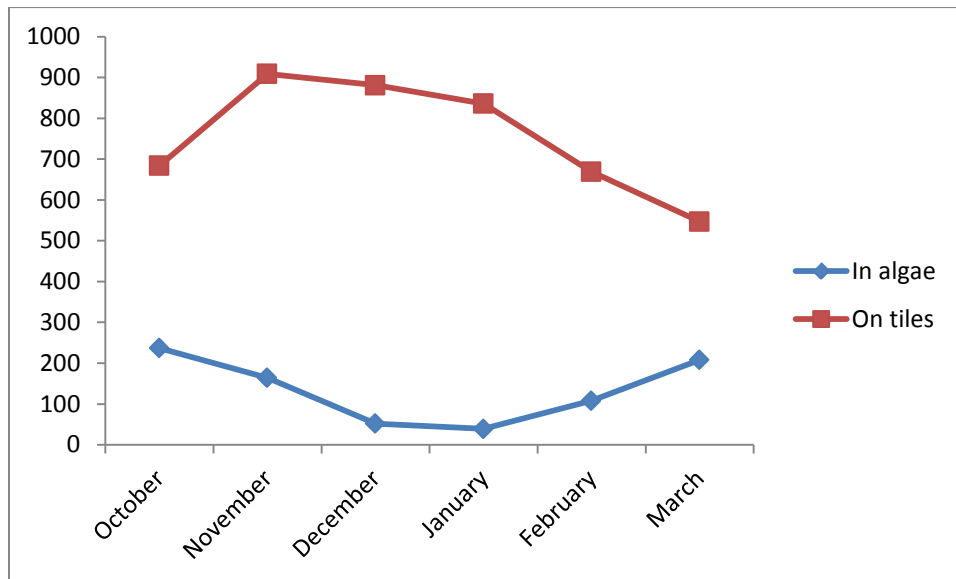
**Table 1. Amphipod population in different months from the natural habitat, Seagrass.**

Month of Collection	Number of Amphipods
October	237
November	164
December	52
January	39
February	108
March	208

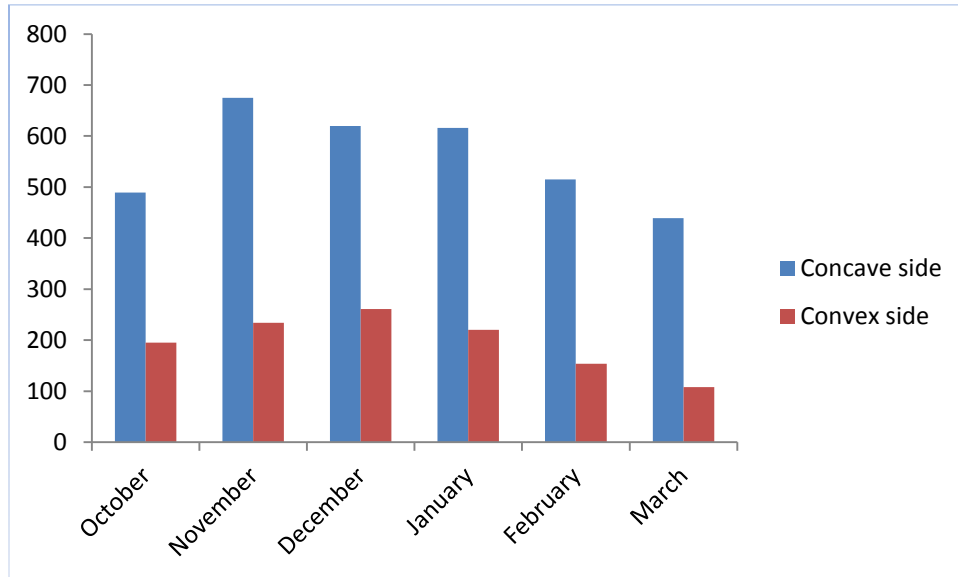
The population density in artificial reefs was very high when compared to seagrass. Among the tiles, the amphipods were seen in plenty in the concave side of the tile than the convex side. The population of amphipods were high on the roof tiles during the monsoon season and relatively lesser during the pre-monsoon and post monsoon season.

**Table 2. Amphipod population in different months from the artificial reef, tile battery.**

Month of Collection	Number of Amphipods		
	Concave side	Convex side	Total
October	489	195	684
November	675	234	909
December	620	261	881
January	616	220	836
February	515	154	669
March	439	108	547



**Fig 1. Population of amphipods on seagrass and roof tiles across seasons**



**Fig 2. Preferential distribution of amphipods in the roof tiles.**

### Discussion

There is a remarkable seasonal variation in the population density in the natural habitat of the amphipods. The population density was maximum during the pre-monsoon season (October & November) and minimum in the monsoon season (December & January). This corresponds to the work of Ermelinda and Francesca, 2006. The population again increased in the month of February. The increased population in the pre-monsoon is a natural phenomenon of recruitment, while the decrease in population during the monsoon season is mainly due to the seagrass providing very little protection to the amphipods against the higher flow of water during the monsoon season.

The population of amphipods is directly dependent on the biomass of seagrass which is very high during pre-monsoon and very low during monsoon season. The seagrass also gets washed off because of rain and new colonization on new seagrass occurs. The newly established seagrass accommodates only to its strength. After the monsoon the amphipods increase in number on the seagrass thereby an increase in the population density.

The seasonal difference in the colonization and abundance of macroalgae in the intertidal zones is also dependent on the grazers and the differential influence of the physico-chemical parameters of the ecosystem (Timothy et al., 1996). In natural conditions, many small

invertebrates choose seagrass as their preferred habitat. They prefer highly complex habitats (Stoner, 1980). These structures provide animals like amphipods with protection against predators, zones for foraging and feeding, sites for courtship and mating, nurseries for rearing the juveniles.

In the artificial habitat, the number of amphipods on the concave side of the tiles was very high throughout the study period irrespective of the season. The amphipods mostly select and inhabit substrates with space that gives more protection from predators (Samuel and Eisuke, 2001). The preference of the amphipods to choose the concave side to the convex side is that there is more protection and also because there is many other organisms which provide encrusted on the tiles which provide cracks and crevices for the amphipods to take refuge in them. The increase in the number during the monsoon season is because the tiles were heavy and could withstand the flow of water unlike the seagrass which gets washed away periodically. The amphipods that inhabited the seagrass would have preferred the tiles for more protection from the water current. The preference in the side of the tile was out of instinctive behavior for more protection and security.

Thus this study shows the preferential distribution of amphipods with regard to the habitat and season in which we see a remarkable variation in the population in natural and artificial habitat and also the preference during the various seasons. The artificial reefs seem to provide a continuous safe habitat for the amphipods from the season and from the predators. The preference in the place of hiding also is very obvious in the study that the amphipod population is more in the concave side of the tile than the convex side.

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