



## COMPOSITION AND OCCURRENCE OF ZOOPLANKTON FROM UNIVERSITY OF MANDALAY CAMPUS, MAHAAUNGMYAY TOWNSHIP, MANDALAY REGION, MYANMAR

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### ABSTRACT

Zooplankton plays a central position in the pelagic food web, transferring carbon and energy from primary producers to higher trophic levels, and potentially suppressing the abundance of phytoplankton. The composition and occurrence of zooplankton from the pond in front of Main Building of University of Mandalay Campus, Mahaaungmyay Township, Mandalay Region were investigated. A total of 15 genera and 28 species was observed. The highest number of individuals was recorded in April and the lowest in March while the highest number of species, *Polyarthra vulgaris* was recorded and the lowest number of species, *Lepatella triba* was observed. The highest composition of zooplankton species was recorded in order Ploima (82%) and the lowest in Flosculariacea and Bdelloida (3.5% each). It can be concluded that zooplankton was necessary for feeding of fish culture pond to achieve a suitable growth and better quality of fish. Zooplankton involved a vital role on live food for aquaculture.

**KEYWORDS:** Composition, University of Mandalay Campus, Zooplankton.

### Introduction

The freshwater ecosystems are generally classified into two major groups as, lentic and lotic ecosystems. The term lentic ecosystem means standing water bodies or still water bodies. The lentic ecosystem includes of all standing water bodies like lakes, ponds, swamps or bogs. The term lotic ecosystem is given as the flowing water bodies. The lotic ecosystems include all flowing water bodies like rivers, springs and creeks [1].

The zooplankton community investigated was characterized by common freshwater groups, the crustacean cladocerans and copepods (Cyclops and Calanoids) and rotifers. Microzooplanktons are made up of the smallest organisms consisting of rotifers. Mesozooplankton is composed of cladocerans and

macrozooplankton of copepods or (cladocerans and copepods) [2].

Zooplankton plays a central position in the pelagic food web, transferring carbon and energy from primary producers to higher trophic levels, and potentially suppressing the abundance of phytoplankton. Zooplanktons constitute an invaluable source of protein, amino acids, lipids, fatty acids, minerals and enzymes and are therefore an inexpensive ingredient to replace fishmeal for cultured fish [3].

Zooplanktons are very sensitive to environmental variation, as a result change in their abundance, species diversity or community composition can support important indication of environmental change or disturbance. These communities often respond rapidly to

environmental change because of their short life cycle [4].

Therefore, the characterization and investigation of zooplankton community is a fundamental tool for the verification of environmental conditions and water quality of an aquatic ecosystem, as well as providing data on biological diversity [5].

As in light of above mentioned facts, the species composition and occurrence of zooplankton in Mandalay University pond was conducted with the following objectives: to identify and record the zooplankton communities, to access the species composition and occurrence of zooplankton in the study area and to examine the monthly distribution of zooplankton during the study period.

## Materials and Methods

### Study area

The pond in front of Main Building of University of Mandalay Campus in Mahaaungmyay Township, Mandalay Region was selected as the study area. The pond situated in University of Mandalay Campus is located at 21° 58.01'N Latitude and 96°05.01'E Longitude. The water in the Mandalay University pond flows from Mandalay University water distribution branch. This pond water is clean and unpolluted. In this pond, a giant group of fry and fingerlings were predominant. The four corners of this pond were selected as sampling sites.

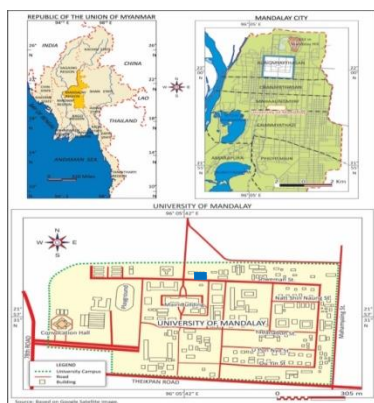


Fig. 1 Map of the study area, Mahaaungmyay Township, Mandalay Region

(Source: Based on Google Satellite Image)

### Specimen collection and preparation

Samples were collected monthly from four corners of the pond during the study period. Zooplankton samples were collected by using nylon plankton net with a mouth diameter of 30 cm and 75 cm length and 30 µm mesh size.

For each sampling horizontal hauling of 300 ml of water per sampling was adopted. For each sampling, the surface water temperature and pH were recorded. The final volume of the filtered sample 30 ml for each was preserved with 5% formalin solution for further analysis.

### Specimen examination and identification

Samples were examined by using a compound microscope (DP 12 Olympus BX43, U-LHLED C Japan) under various magnification: general screening of the specimen was made under the magnification of the x40, the whole specimen was viewed under x100 and the detailed part of the specimen which are taxonomically important were examined under the magnification of x400. The specimens were photographed by using Olympus Microscope digital camera DP12 (U-TVO-5XC-3). Specimen identification was followed by [6], [7] and [8].

### Analysis of Data

The species composition was calculated by the standard formula given by [9].

$$\text{Species composition} = \frac{\text{Total no. of species in each order}}{\text{Total no. of species in observed orders}} \times 100$$

## Results

A total of 28 species belonging 2558 individuals with 15 genera, 11 families and four orders were observed. Among these 25 species representing 12 genera, 9 families and three orders under rotifer group were recorded. Under the Cyclopoida, three species with three genera and two families were observed in the pond located in front of Main Building of Mandalay University Campus, Myanmar (Table I).

### Composition and Occurrence of Zooplankton Species recorded

During the study period, the composition of zooplankton was found to be the highest in order Ploima (82%) with 23 species. The orders Flosculariacea and Bdelloida (3.5% each) were represented by one species each. In order Cyclopoida (11%) was observed three species (Table II and Fig. 2).

The total number of 2389 individuals in rotifers and 169 individuals in copepods were observed. The highest total number of 708 individuals was recorded in April and 24 species in June during the study period. The lowest total number of 170 individuals in March and 14 species in July was observed. The highest number of species, *Polyarthra vulgaris* was found in June but this species was not recorded throughout the study period. Under the rotifer group, *Brachinous angularis*, *Notholca accuminata*, *Lepadella patella*, *Lecane bulla*, *Vanoyella globosa*, *Horaella brehmi* and *Philodina roseola* were observed throughout the study period. *Brachinous murphyi* and *B. quadridentatus* were found twice of the studied period. *Brachinous nilsoni*, *B. plicatilis*, *Lepadella triba*, *Lecane nana* and *L. rugosa* were found only once but in lowest number throughout the study period. In Copepod, the highest species was *Microcyclops* sp. and the lowest in *Oithona* sp. was represented. *Polyarthra vulgaris* was dominant in all studied sites except in site IV. *Horaella brehmi* was dominant at site IV. *Lepadella triba* and *Lecane nana* were recorded at each site and these species were rare species throughout the present study. The species *Brachinous nilsoni* was observed only at site II and site IV (Fig. 3 and 4).

### Environmental Parameters

The value of pH range (7.01-7.08) was recorded during the study period. The water temperature was measured (27°C-29°C) and the air temperature was recorded (27°C-30°C).

## DISCUSSION

A total of 28 zooplankton species confined to 15 genera, 11 families and four orders were classified. Among them, 25 species of rotifers and three species of copepods were included. Under the three zooplankton groups, no cladoceran was recorded from the pond during the study period. It might be due to the sample collection was the short duration of time. The planktivorous fishes select larger zooplankters and eliminate large cladocerans from the study area.

The highest number of zooplankton individuals was recorded in April. In this month, water temperature (27°C) and the value of pH 7.08 were measured. Water temperature was an extremely important environmental factor affecting the growth, development, community composition and quantity change of zooplankton [10]. Hence the reason for zooplankton peaked in this month attributed to the suitable temperature, which accelerated the egg development and hatching rate of most zooplanktons such as rotifers.

In the present study, among the various groups of zooplanktons, the most dominant one was rotifers

representing (89%) of the zooplankton. [11] has also reported rotifers (78%) to be the dominant group of zooplankton in freshwater systems. The present result was agrees with that the above author.

In this pond, *Polyarthra vulgaris* dominated total overall rotifer abundance during the study period and was not found at all stations. This finding was coincided with [12]. The dominance of this species due to its high reproduction rate and habitat preference since their food such as phytoplankton or plant detritus are highly available.

[13] studied zooplankton from Myit Nge River segment between Myitlaung and Paleik, Mandalay Region, Myanmar. She reported that 65% of Ploima, 4% of Flosculariacea, 11% of Cladocera and 4% of Copepoda. In the present study, 82% of Ploima, 3.5% of Flosculariacea, 3.5% of Bdelloida and 11% of Copepoda were observed. It could be due to these differences in the composition of zooplankton communities between the two study areas appeared to be the mainly attributed to differences in nutrient concentrations.

In the comparison with the record of [14] stated that a total of 32 zooplankton comprising 24 species of rotifers, five species of cladocerans and three species of copepods in the lower Sakarya river basin (Turkey). In the present study, four species rotifers: *Brachinous plicatilis*, *Lepadella patella*, *Platylabus quadricornis* and *Polyarthra vulgaris* was consistent but the rest species were different with the author. These variations attributed due to the trophic status of the water and ecological structure of the aquatic systems.

In the present study, three species under copepods were observed from both ponds. Copepod not only remained as the most dominant group but also appeared in large numbers at all sampling sites. *Oithona* sp. was not seen every month. The dominance of Cyclopoida over others was due to their continuous breeding, quick larval development and adaptation to a wide range of environmental conditions.

The water entering to this pond flows from Mandalay University water distribution branch. This pond water is clean and unpolluted. In this pond, fry and fingerlings were predominant so planktivorous fish are the main source to decrease the zooplankton population during the study period.

## Conclusion

It can be concluded that zooplankton was necessary for feeding of fish culture pond to achieve a suitable growth and better quality of fish. Zooplankton involved a vital role on live food for aquaculture.

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Phylum	Class	Order	Family	Species
Rotifera	Monogononta	Ploima	Brachionidae	<i>Anuraeopsis fissa</i>
				<i>Brachionus angularis</i>
				<i>B. murphyi</i>
				<i>B. nilsoni</i>
				<i>B. plicatilis</i>
				<i>B. quadridentatus</i>
				<i>B. rubens</i>
				<i>Notholca accuminata</i>
				<i>N. caudata</i>
				<i>Platyias quadricornis</i>
			Colurellidae	<i>Lepadella patella</i>
				<i>L. triba</i>
			Epiphanidae	<i>Microcodidies chlaena</i>
			Lecanidae	<i>Lecane aculeata</i>
				<i>L. bulla</i>
				<i>L. furcata</i>

Table I List of zooplankton species collected from the pond in front of Main Building of Mandalay University Campus during the study period



				<i>L. lunaris</i>
				<i>L. nana</i>
				<i>L. rugosa</i>
				<i>L. rutteni</i>
			Notommatidae	<i>Vanoyella globosa</i>
			Synchaetidae	<i>Polyarthra vulgaris</i>
			Trichocerca	<i>Trichocerca inermis</i>
		Flosculariaceae	Trochosphaeridae	<i>Horaella brehmi</i>
	Digononta	Bdelloidea	Philodinidae	<i>Philodina roseola</i>
Arthropoda	Crustacea	Cyclopoida	Cyclopoidae	<i>Microcyclops sp.</i>
				<i>Mesocyclops leckurti</i>
			Oithionidae	<i>Oithona sp.</i>

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1	Ploima	10	23	82
2	Flosculariacea	1	1	3.5
3	Bdelloida	1	1	3.5
4	Cyclopoida	3	3	11
Total		15	28	

Table II Composition of zooplankton species in different orders from the pond in front of Main Building of Mandalay University Campus

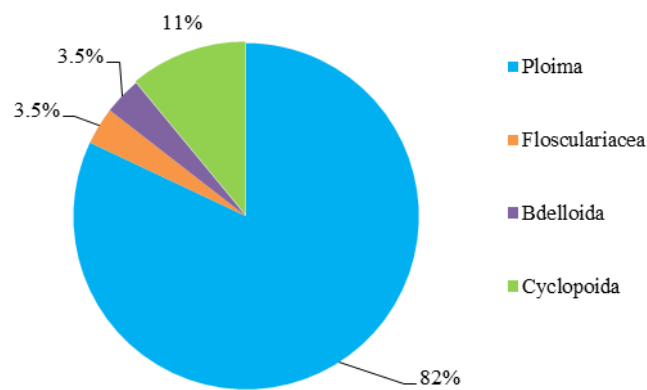


Fig.2 Relative percentage of zooplankton in different orders recorded from the pond in front of Main Building of Mandalay University Campus during the study period

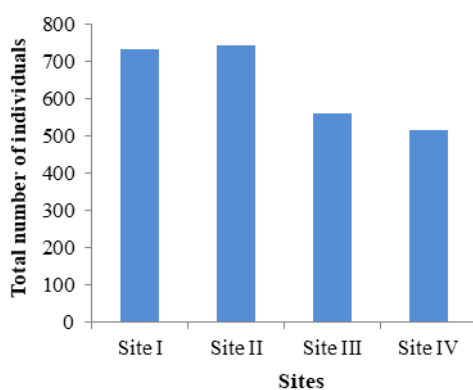


Fig. 3 Comparison on the total number of individuals of zooplankton in four studied sites

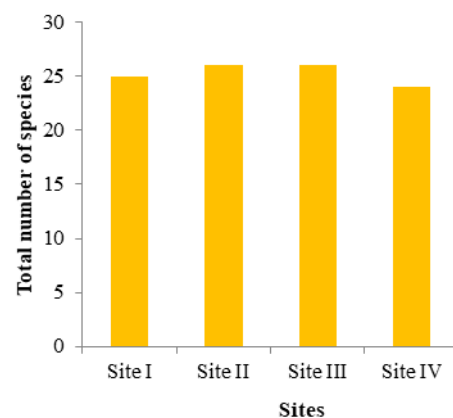


Fig. 4 Comparison on the total number of zooplankton species in four studied sites

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