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Research Article

Biochemical composition of freshwater zooplankton (*Brachionus calyciflorus*, *Mesocyclops luekarti* and *Moina micrura*)

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Abstract

The present study aims to describe the significance of biochemical composition of freshwater zooplankton species (*Brachionus calyciflorus*, *Mesocyclops luekarti* and *Moina micrura*) from Upper Dudhana dam (19°55' 11.8"N to 75° 41' 39.9"E). The carbohydrate was estimated by methods of De Zwaan and Zandee (1972), protein by Lowery *et al*. (1951) and lipid by Lehtonen (1996). The obtained resultdepicted thatcarbohydratewas maximum in *Moina micrura* (19.6±0.4%) followed by *Brachionus calyciflorus* (17.5±0.32%) and minimum in *Mesocyclops luekarti* (2.53±0.07%).Total protein was maximum in *Mesocyclops luekarti* to the given species of zooplankton are enormously used as live feed in an aquaculture. It is concluded that the experimental species of zooplankton are boon for fishery.

INTRODUCTION:

The role of zooplankton in the ecosystem is to process energy and organic matter in food webs. Zooplankton has a marked impact on other plankton communities. Thus, zooplankton can affect the entire ecosystem through their trophic relationships. Itrepresents the channel of transmission of the energy flux from the primary producers to the top consumers.Success in aquaculture is based on various criteria, in which selection of a suitable feed and its potential use is important.Zooplankton is considered an important compartment of aquatic ecosystems and plays the important role in thefood web. It represents the channel of transmission of theenergy flux from the primary producers to the top consumers (Nicoletta and Monica, 1999). The large number of studies about the changes of zooplankton composition and abundance in response to tropic gradients, there are only few studies that take into account the zooplankton biomass dynamics (Nimbalkar *et al.*, 2013).

The experimental species were selected from three different zooplankton groups (*Viz.*Rotifera, Copepoda and Cladocera). *Brachionus calyciflorus* belongs to the group 'rotifera'. Rotifers have been widely used as essential food source in raising freshwater larvae due to its unique characteristics of fast reproduction and short life span (Lubzens, 1987; Dhert, 1996). *Mesocyclops luekarti*from 'copepoda' and it is successfully cultured and proved to be rich in energy source. *Moina micrura* is always recorded by many researchers for its high lipid contents from 'cladocera'. Hence there is need to study the biochemical composition of the zooplankton for better understanding of their biochemical cycles.

MATERIAL AD METODS

Study site

Dudhana dam is on the river Dudhana near Somthana village, Tq. Badnapur, Dist.Jalna. This dam is located at 19°55' 11.8" N to 75° 41' 39.9" E from Jalna district of Maharashtra. This is an earthfill dam and has a height of about 18m and 2.46 km in length, where the width is 2 km.

The zooplankton species (*Brachionus calyciflorus*, *Mesocyclops luekarti* and *Moina micrura*) samples were collected from laboratory monoculture by filtering with Whatman filter paper no.1. Then collected samples were gently washed with distilled water. The partially wet sample was transferred over Lyophilizer machine for drying (at –20°C). The weight of sample was determined with digital balance. The dried sample was used for estimation of carbohydrate, protein and lipid. Water content was also determined by evaluating difference between initial wet weight and final dry weight of the zooplankton sample. The estimation of carbohydrates, proteins and lipids were done by using methods of De Zwaan and Zandee (1972), Lowery *et al.* (1951) and Lehtonen (1996) respectively.

RESULTS AND DISCUSSION

The biochemical composition (Carbohydrates, Protein and Lipid) as well as moisture contents of the zooplankton species, *Brachionus calyciflorus, Mesocyclops luekarti and Moina micrura* was estimated during the present investigation. The results obtained after estimation of biochemical composition are depicted in Table.1 and Figure.1.

Table.1 Biochemical composition of zooplankton species *Brachionus calyciflorus* (Pallas, 1776), *Mesocyclops luekarti* (Claus, 1853) and *Moina micrura* (Eriksson, 1934).

Parameters / Zooplankton species	Carbohydrate %	Protein %	Lipid %	*Water content %
Brachionus calyciflorus	17.5 ±0.32	65.7 ±0.01	16.66 ±0.09	89.4 ±0.23
Mesocyclops luekarti	2.53 ±0.07	81.3 ±0.12	20.8 ±0.2	85 ±0.09
Moinamicrura	19.6 ±0.4	20.65 ±0.007	8.7 ±0.14	87.9 ±0.1

Values are average of triplicate samples (Mean ± SD), * Wet matter basis.

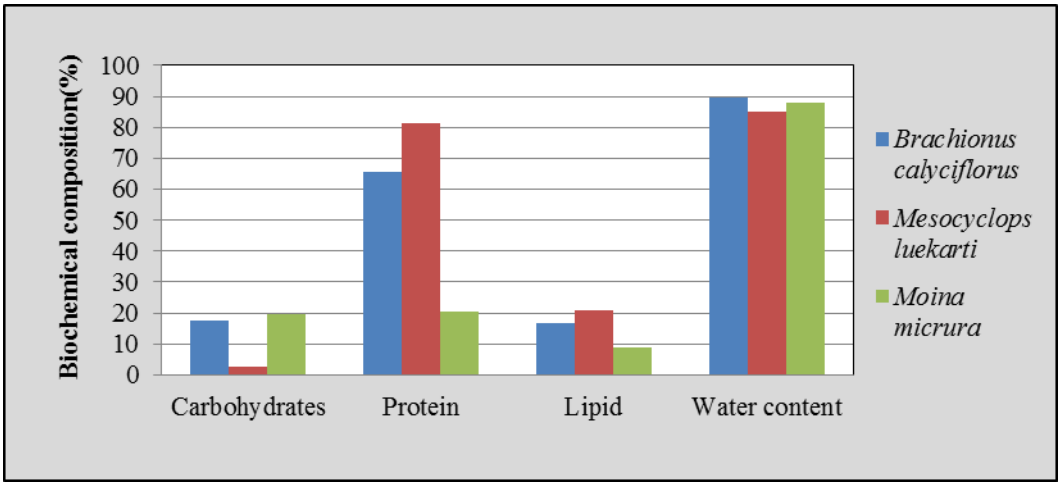

Figure.1 Biochemical Composition of *Brachionus calyciflorus, Mesocyclops luekarti* and *Moina micrura.*

In the present study total glycogen content was maximum in *Moina micrura* (19.6±0.4%) followed by *Brachionus calyciflorus* (17.5±0.32%) and minimum in *Mesocyclops luekarti* (2.53±0.07%).In *Brachionus calyciflorus* a female bearing total number of eggs about 8% of the total biomass was carbohydrate; in females bearing one egg, 15% carbohydrate was found. (Guisande and Serrano, 1988). Glycogen content of *Mesocyclops luekarti* was 2.53% obtained in the present study. Carbohydrate value recorded by Perumal *et al.,* (2009) from wild copepod, *Acartia spinicauda*4.1 to 7.98%. The lower value of glycogen has been reported earlier by many authors such as, Prabhu *et al.,* (2005) and Rajkumar *et al*. (2008) in different species of zooplankton. This might be due to direct oxidation of glycogen by zooplankton and fats oxidized on need or stored as principal reserve food.

Total protein content was maximum in *Mesocyclops luekarti* (81.3±0.12%) followed by *Brachionus calyciflorus* (65.7±0.01%) and minimum in *Moina micrura* (20.65±0.007%). Arak and Mokashe (2014) stated that *Brachionus calyciflorus* had 77.8% protein content which was due to the influence by the type of feed given to the rotifer. The protein content of *Daphnia species* was reported to be 49.70% (Yurkowski and Tabachek, 1979; Watanabe *et al.,* 1983) whereas for *Moina species* it varies between 59.00 and 77.85% (Tay *et al.*, 1991).

Total lipid was highest in *Mesocyclops luekarti* (20.8±0.2%) followed by*Brachionus calyciflorus* (16.66±0.09%) and least in *Moina micrura* (8.7±0.14%) in the present study. The *Mesocyclops hyalinus* contained 10.8% total lipid. Blazka (1966) recorded 6% lipid in *Cyclops vicinus* whereas Vijverberg and Frank (1976) reported 18.5% lipid in *Cyclops sphacricus.* Macedo and Pinto-Coelho (2001) reported the total lipid level of the cladocerans studied varied as a function of the diets offered, ranging from 11.1% to 22.1% for *Daphnia laevis* and from 11.4% to 19.9% for *Moina micrura*.

Generally, the moisture contents of zooplankton were similar to moisture levels of living organisms, i.e. about 90% of the wet weight (Ovie *et al.,* 1993). In the present study water content was maximum in *Moina micrura* (87.9±0.1%) followed by *Mesocyclops luekarti* (85±0.09%) and minimum in *Brachionus calyciflorus* (89.4±0.23%).

Overall study indicated that the selected species of the zooplankton has great amount of carbohydrate, protein and lipid.

CONCLUSION:

The given species of zooplankton (*Brachionus calyciflorus, Mesocyclops luekarti* and *Moina micrura*) are found to be rich in carbohydrate, protein and lipid source. These are ecofriendly source of biochemical composition so used as live feed in the field of aquaculture.

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