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Potential of Fresh Water Rotifer, *B.calyciflorus* as Live Feed

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Abstract: ***Rotifers are the most commonly used fresh zooplankton as live feed for fish larvae cultures and an ideal feed source for large quantity fish cultivation. Where in the rotifers are the proper live feed for the early larviculture cause it guarantees faster growth rates, better health and higher survival rates in fish in the later stages of growth and after their release. The freshwater rotifer, Brachionus calciflorus, in the ideal size range of 180-220 microns and with a high potential for reproduction appears to be an ideal live food for several freshwater species. Brachionus calciflorus is one of the strong against environmental stress and to be able to ingest and survive on a diet of toxic Microcystis aeruginosa. Their successful production is hindered by many factors including adequate supply of food at early larval stages which require live food in good quality and quantity. This paper attempts to review the principles and procedures involved in the culture of the freshwater rotifer, Brachionus calyciflorus as starter food for most freshwater fish fry. There are several strains of different sizes of this rotifer, thus making them suitable for fry of a variety of sizes. This rotifer can be isolated, continuously produced by batch culture and 'feed back' culture systems. It can be fortified with diets containing highly unsaturated fatty acids (HUFA) for high survival and overall high growth and performance in several fish species including endangered and some problematic species. In spite of attempts to replace rotifer with more accessible formulated diets they will probably maintain their role as food organism for fish larvae of various species.***

Keywords: Rotifer, Biochemical composition, Live feed and *Brachionus calyciflorus.*

1. Introduction

In the natural food web, zooplankton constitutes a major part of the diet for fresh and marine fish larvae. In the wake of the significance of the fishes as the cheapest source of protein for human consumption, efforts are being made all over the world to increase the production of the fish. Rotifers along with other small invertebrates, such as cladocerans and copepods, form a large part of fish food (Tucker, 1988; Rho *et al*., 1988; Bok, 1989; Sarma, 1991; Dominguez *et al*., 2002).The importance in estimating the energy available to higher trophic levels which in turn can be used to estimate harvestable fishery resources. Much of the available information about the biochemical composition and nutritive value of zooplankton is from estuarine, coastal, inshore and offshore waters of India (Krishna and Goswami 1993; Nageswara and Ratnakumari 2002; Jagadeesan et al., 2009). The food webs, starting from algae cause bigger and indirect routes of carbon leading to fish (Stockner and Shortreed 1989; McCormick and Cairns 1991).Similarly, the fatty acid composition in marine and fresh water zooplankton varies under different environmental conditions (Sargent and Falk-Petersen 1988). It is generally believed that copepods and rotifers can meet the nutritional requirements of fish larvae. In any rotifer culturing procedure, where the maximum number of individuals is desired, parthenogenetic (amictic) reproduction must be optimized and conditions avoided which cause sexual (mictic) reproduction, this produces smaller males and resting eggs. A number of factors are known to alter the ratio of mictic to amictic females; these are species composition and crowding (Gilbert, 1963), temperature, and the quantity and quality of algal food (king,1965) and salinity (Ito, 1960). The nutritional value of rotifers for larval fish depends on the rotifers' food source. Highly unsaturated fatty acids (HUFA) are essential for the survival and growth of fish larvae (Whyte and Nagata,1990). Rotifer feeds containing DHA (Docosahexaenoic acid, 22:6n-3), and EPA (Eicosapentaenoic acid, 20:5n-3) can be valuable for marine and freshwater fish larvae. Depending upon their food source, rotifers are composed of about 52 to 59% protein, up to 13% fat and 3.1% n-3 HUFA (Awais, 1992; Oie and Olsen, 1997). High nutritional value of rotifers is of major importance for survival and growth of the fish larvae, and several cultivation techniques, including feeding with different algae, baker's yeast and artificial diets are used to improve their nutritional quality. The chemical composition of rotifers is similar to that of the algae upon which they feed (Ben Amtoz et al., 1987) According to Dabrowski and Rusiecki (1983) from all live feed animal groups only rotifers meet the essential Amino acid (EAA) of fishes.

2. Materials and Methods

Biochemical Analysis:

The samples of *Brachionus calyciflorus* Then collected samples were washed with distilled water. The partially wet sample was kept on filter paper for surface drying. The wet weight of sample was determined with digital balance and sample was transferred into glass petri dish and kept into oven at 700ºC for drying. The dried sample was used for estimation of total protein, lipid and Glycogen (carbohydrate).

Estimation of total proteins was done by (Lowry et al. 1951), similarly estimation of Lipid was done by (Lehtonen, 1996) and estimation of Glycogen (De Zwaan and Zandee 1972)

Determination of water content was calculated by

The percentage of water was calculated as follows:

Water content (%) = Wet weight-dry weight × 100 Wet weight

Biopotential assessment of rotifer and copepod using fry of *Channa gachua.*

As experiment was set up to assess biopotential utility of *Brachionus calyciflorus and* as feed to growing fry of *Channa gachua.* 15 fry of equal size were taken in small aquarium containing 5lit. of water which was filtered with 45µm mesh size bolten silk cloth. *Brachionus calyciflorus* were used as feed separately in two such aquariums. 2ml of feed was given twice in a day for all the 15 days. The assessment was done before start of the experiment and then on 5th day, 10th day and 15th day, taking 4 fry's from each of the aquarium. On every assessment data was collected regards to the length and width of the fry and total protein, lipid and carbohydrate was estimated.

3. Results

The biochemical composition of the *Brachionus calyciflorus. **Brachionus calyciflorus**:-*

In the present study total protein content was found to be maximum i.e. (77.8±1.6). The lipid value was found to be (15.7±7.5) and the total glycogen was found to be (27.8±0.7) wherein the total water content showed (71.2±3.1). The results obtained for the bio potential assement was depicted in and the length and width of the fry in. The assessment was done on 5th day, 10th day and 15th day. The initial readings of fry showed the total protein content of *Channa gachua* was 52.2 % and after fed by *Brachionus calyciflorus* the fry showed 65.1%.Whereas, *Brachionus calyciflorus* showed 11.6% showed 6.4% lipid content. Accordingly, the initial readings of the fry showed 13.2% carbohydrate wherein in *Brachionus calyciflorus* showed 22.4%. The initial length of the fry was 2.1mm and width was 1.5mm. Where in, after fed by *Brachionus calyciflorus* the fry showed increase in the length on 5th day i.e. 6.2mm and width was 3.1mm, on 10th day the growth was 6.3 mm in length and width was 3.2mm. Where as, the fry growth was raised on 15th day showing 6.4mm in length and 3.3mm in width. *B.calyciflorus* fed fry showed higher in length and width.

4. Discussion

Biochemical studies on zooplankton are important for understanding their metabolism, nutritive value and role in aquatic food chain (Goswami et al., 1981). Assessment of biochemical constituents like protein, lipid and glycogen in *Brachionus calyciflorus.* Protein, lipid and carbohydrate functions as the metabolic reserve in zooplankton. As they are necessary for reproduction, growth and development of the cellular membrane structure. In the present study the *B.calyciflorus* had showed 77.8% protein content which was due to the influence by the type of feed given to the rotifer. Ben Amotz et al., 1987 has stated that a much wider range of crude protein of rotifer *B.plicatilis* has been studied where the protein values ranged between 28.8% to 78.3% with the feed. Similar results are reported by (Millamena et al., 1990; Frolov et al., 1991; Lie et al., 1997; Nhu,2004; Srivastava et al., 2006 and Kudnar ,2014). *B.calyciflorus* showed (15.7%) of lipid content this may be due to the algae fed to the rotifers would have alter the lipid composition of the rotifer. Similar observations have been studied by several authors James and Rezeq (1988) showed that lipid synthesis in rotifers depends on the quality of the algal species or diets used in the culture system (Caric etal., 1993; Scott and Baynes, 1978; King et al., 2002; and Jeeja et al., 2011). In the present study, the carbohydrate (CHO) content of rotifers samples were examined which was 27.8%. This may be due to the combined diet given to the rotifer. Frolov and Pankov (1992) stated that the biochemical composition of rotifer was due to the *I.galbana* algal diet which was fed this lead to the values range to 17.4% and 26.8%. Similar observation have been studied by several authors (Frolov et al., 1991; Cheng ,2004; Dhert et al., 2001, Fielder et al., 2000).

Biochemical parameters of the establishment of hatcheries and inducement of spawning of economically important aquatic animals like fishes by hormone injection greatly hold promises for enhanced propagation of most fish species whose larvae can be maintained by feeding with rotifers. The live food organism used to feed the fish can have their HUFA content increased by feeding them with micro algae containing the desirable HUFA. Freshwater larviculturist will avail themselves with the findings reported in this study in order to improve larval performance, increase yield and facilitate breeding of new fish species. In the present study, fry of *Channa gachua* fed with the *Brachionus calycliflorus* as a live feed showed an overall increase in growth, survival and specific growth rate. It showed the protein content up to the level of 65.1%, 11.6% of lipid content and 22.4% of carbohydrate. Similar observations have been reported by (Mourente et al., 1993).Turner and Harell (1992) (Watanabe et al., 1989). Fruit et al., 1996a,b); Jones et al.,1984) with *Artemia* fed on gelatin acacia microcapsules containing either cod oil or Pollack oil which significantly supported greater growth rate and survival in post larval gobies than enriched *Artemia*. However this study revealed that *Channa gachua* has grown better with rotifer and has a marked potential to act as live feed for the larval growth of *Channa gachua* and may be for other organisms.

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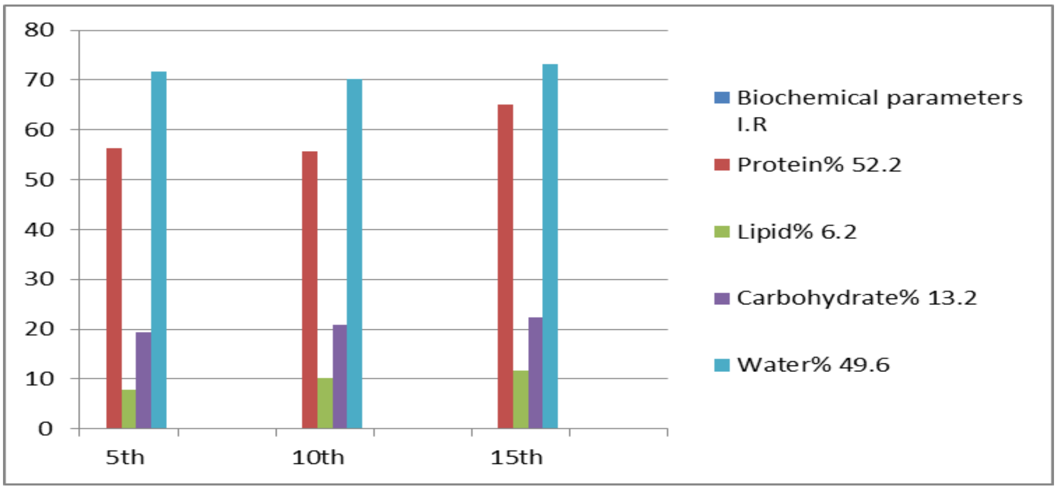
Table 1: Biochemical composition of *Brachionus calyciflorus.*

Biochemical Parameters	*Protein %*	*Lipid %*	*Carbohydrate %*	*Water %*
Brachionus calyciflorus	77.8±1.6	15.7±7.5	27.8±0.7	71.2±3.1



Graph showing: Growth of channa gachua after fed with the *Brachionus calyciflorus*.

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