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ZOOPLANKTON OF FRY FISHPONDS IN THE SOUTH OF KARAKALPAKSTAN

Abstract

A detailed (samples were taken every other day (sometimes daily)) zooplankton succession of four fry fishponds in the farm “Super baliqlar” of the Turtkul district of Karakalpakstan was investigated. 30 species were recorded - 14 species of rotifers, 10 - cladocerans, 6 - copepods. All species are common for the hydrofauna of Uzbekistan. Crustacean plankton dominated quantitatively.

Rotifers- *Brachionus calyciflorus, B. quadridentatus, Hexartra mira, Asplanchna sieboldi* and crustaceans *Moina weismanni, Diaphanasoma macrophtalma, Phyllodiaptomus blanci, Thermocyclops taihokuensis, Acanthocyclops trajani* dominated. The succession of development dynamics of individual taxonomic groups of zooplankters has been determined. The maximum development of rotifers occurred on days 5-8 after filling the ponds, the maximum development of cladocerans on days 7-16, and the maximum development of copepods on days 10-16 after filling the ponds.

Keywords: *fry fishponds, zooplankton, succession, numbers, biomass, Turtkul region, Karakalpakstan, Uzbekistan*

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Qaraqalpağın cənubunda balıqyetişdirmə vətəgələrinin zooplanktonu

Xülasə

Qaraqalpağın Turtkul mahalındakı "Super baliqlar" fermasındakı dörd balıqyetişdirmə gölünün (nümunələr hər gün (bəzən gündəlik) götürülmüşdür) zooplankton nəticəsi araşdırılmışdır. 30 növ - rotiferlərin 14 növü, kladokeranların 10 növü, kopepodların 6 növü qeydə alınıb. Bütün növlər Özbəkistanın hidrofaunası üçün xarakterikdir. Krustas planktonu kəmiyyətcə üstünlük təşkil edir.

Rotiferlərin növləri- *Brachionus calyciflorus,* Dörddanlı Rotifer *(B. Quadridentatus),*Mira Rotifer *(Hexartra mira),* Sieboldi rotiferi*(Asplanchna sieboldi)* və xərçəngkimilər –Vaysman xərçəngkimiləri (Moina *Weismanni),* Büyük Gözlü Şəffaflı xərçəngkimiləri *(Diaphanasoma macrophtalma),* Blancın Yarpaqgöz xərçəngkimiləri *(Phyllodiaptomus blanci),* Tayhoku Thermosiklop *(Thermocyclops taihokuensis),* Trajan Tikanlı Siklop*(Acanthocyclops trajani)* üstünlük təşkil edir. Zooplanktların fərdi taksonomik qruplarının inkişaf dinamikasının uğurlu nəticəsi müəyyən edilmişdir. Riferlərin maksimal inkişafı 5-8-ci günlərdə gölməçələrin

dolmasından sonra, kladokeranların maksimal inkişafı 7-16-cı günlərdə, kopepodların maksimum inkişafı isə 10-16-cı günlərdə gölməçələrin dolmasından sonra baş verib.

Açar sözlər: *balıqyetişdirmə vətəgələri, zooplankton, varislik, saylar, biokütlə, Türtkül vilayəti, Karakalpakstan, Özbəkistan*

Introduction

Fish fry (juvenile) ponds are small ponds with an area usually of several hundred square meters, in which the larvae of pond fish are raised for 2-3 weeks. Empty fry ponds are filled with water and larvae are released into them after 1-2 days. The zooplankton of fry ponds practically was not studied even on a global scale. In Uzbekistan, only planktonic ciliates (Mirabdullaev, 1988:62-65) and higher plants (Bakhodirova, 1989: 18) of fry ponds in the Tashkent region have been studied in detail, and studies of metazoan plankton (rotifers, crustaceans) in fry ponds began (Mirzambetov, Mirabdullaev, 2021:29-34; Mirzambetov, Mirabdullaev, 2022: 56-62).

Material and methods. In May-June 2022, the zooplankton of four fry ponds of the "Super baliqlar" farm in the Turtkul region of the Republic of Karakalpakstan was studied. Zooplankton samples were taken every other day with a bucket from 10 points of the pond, filtered through a conical plankton net made of a nylon sieve (No. 76) and fixed with formaldehyde to a final concentration of 2-3%. The water temperature was measured: the minimum water temperature was observed in the morning at 7-8 a. m., and the maximum at 2-3 p. m. Water transparency was measured using a Secchi disk at 2-3 p. m. Laboratory processing of samples was carried out according to standard methods in hydrobiology (Saha, Saha, Basu, 2017: 156-164; Salazkin, Ivanova, Ogorodnikova, 1984:24). Before filling ponds SB1 and SB3, 10.0 tons of manure were added to them. All ponds were filled from one supply channel with Amudarya water. Data on morphometry and operating mode of fry ponds are given in Table. 1.

Table 1. Morphometry and operating mode of fry ponds

Ponds	SB1	SB2	SB3	SB4
Area, ha	0.8	0.8	1.5	3.5
Middle depth, m	0.8-1.0	0.8-1.0	0.8-1.0	0.5-1.0
Date of beginning of pond filling	22.05.26	22.05.27	22.05.26	22.06. 01
Date of finishing of pond filling	22.05.27	22.05.29	22.05.27	22.06.04
Species, date of stocking	Common carp, 22.06.02	Silver carp, 22.05.31; Common carp, 22.05.31 Common carp, 22.06.02	Silver carp, 22.05.31; Common carp, 22.05.31 Common carp, 22.06.02	Common carp, 22.06.02
Density of fish, 10^6 spec./ha	5.0	Silver carp, 2.5 Common carp, 5.0	Silver carp, 2.0 Common carp, 2.7	2.3

Results and discussion. Most of the bed in ponds SB1, SB2 and SB3 was covered with macrophytes (reeds) when flooded; pond SB4 was free of vegetation. Filamentous green algae *Spirogira sp.* were found; in the coastal areas of pond SB4, hard vegetation – reeds and cattails – was significantly developed; almost half of the pond bed was occupied by Characeae gen. sp. The water temperature in the ponds varied between 18.2 °C (7-8 a. m.) – 32.2 °C (2-3 p. m.).

In all ponds, transparency varied from 20 to 100 cm; on the first day after filling the ponds with water, it was cloudy, and then became more transparent. Water transparency in ponds SB1 and SB3 was high at the beginning and end of the period, and in the middle of the period it decreased slightly

due to the excessive reproduction of phytoplankton and Concostraca crustaceans (258.0 and 185.0 thousand ind./m^3, respectively), stirring up silt (Fig. 1).

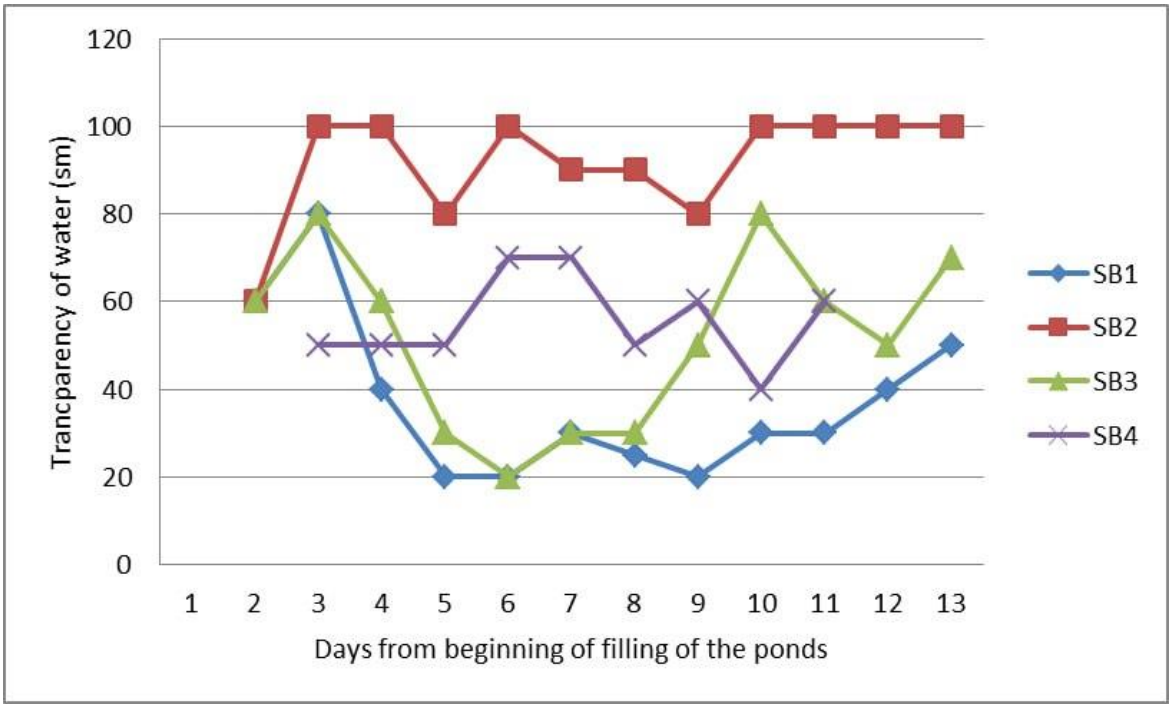

Fig. 1. Water transparency of the studied fish fry ponds

The species composition of zooplankton in the studied ponds was quite similar; almost the same species dominated. A total of 30 species of zooplankton were recorded in four fry ponds, of which 14 species were rotifers, 10 were cladocerans, and 6 were copepods. Rotifers were more diverse (46% of total zooplankton) (Table 2).

Table 2. Taxonomic composition of zooplankton in the studied fish fry ponds (+ – presence, ++ – dominants, – absence)

Taxa/Ponds		1	2	3	4
ROTIFERA					
1	*Anuraeopsis fissa* Gosse, 1851	-	+	-	-
2	*Asplanchna sieboldi* Leydig, 1854	-	++	++	++
3	*Bdelloida gen. sp.*	+	+	-	+
4	*Brachionus angularis* Gosse, 1851	-	-	+	-
5	*Br. calyciflorus* Pallas, 1766	+	++	++	++
6	*Br. plicatilis* O.F. Müller, 1786	-	+	-	+
7	*Br. quadridentatus* Hermann, 1783	+	+	+	++
8	*Euchlanis dilatata* Ehrenberg, 1832	-	+	-	+
9	*Hexarthra mira* Hadson, 1871	++	++	++	++
10	*Lecane luna* O.F. Müller, 1786	+	+	+	+
11	*L. ungulata* Gosse, 1887	-	-	-	+
12	*Testudinella patina* Hermann, 1783	-	+	+	-
13	*Platyias quadricornis* Ehrenberg, 1832	+	+	+	+
14	*Polyarthra vulgaris* Carlin, 1943	-	+	-	+
CLADOCERA					
1	*Moina weismanni* Ishikawa, 1896	+	++	++	++

2	*Scapholeberis sp.*	+	+	+	-
3	*Simocephalus vetulus* O.F. Müller, 1776	+	-	+	-
4	*Bosmina longirostris* O.F. Müller, 1776	-	+	+	+
5	*Daphnia galeata* Sars, 1863	+	-	+	-
6	*Diaphanasoma dubium* Manuilova, 1964	-	-	-	+
7	*D. macrophtalma* Korovchinsky et Mirabdullaev, 1995	+	+	+	++
8	*Macrothrix sp.*	+	+	+	+
9	*Coronatella cf. rectangular*	+	+	+	-
10	*Chydorus cf. sphaericus* O.F. Müller, 1776	-	+	-	-
COPEPODA					
1	*Phyllodiaptomus blanci* Guerne et Richard, 1896	+	++	++	++
2	*Thermocyclops taihokuensis* Harada, 1931	+	++	++	++
3	*Acanthocyclops trajani* Mirabdullaev et Defaye, 2004	++	++	++	++
4	*Mesocyclops pehpiensis* Hu, 1943	-	+	-	-
5	*Macrocyclops albidus* Jurine, 1820	+	-	-	-
6	*Eucyclops cf. serrulatus* Fischer, 1851	+	+	-	-

In general, the detected zooplankton taxa are well known in various types of water bodies of Uzbekistan and in particular in fish ponds (Kuzmetov,1998:20; Mirabdullaev, Kuzmetov, Khegai, 1994: 49-53). Many of them reported in fishponds of Asia (Saha, Saha, Basu, 2017:156-164), Europe (Goździejewska, Tucholski, 2011: 67-79), Africa (Adedeji, Adeniyi, Masundire, 2013:631-640).

Pond SB2 stood out sharply from other ponds due to the significant development of rotifers (mainly *B. calyciflorus*) on days 3-6 after flooding the pond with water, when the total number of zooplankton reached 237.0 $\cdot 10^3$ ind./m^3. In other ponds, the number of zooplankton did not exceed 46.5-71.0 $\cdot 10^3$ ind./m^3 (Fig. 2).

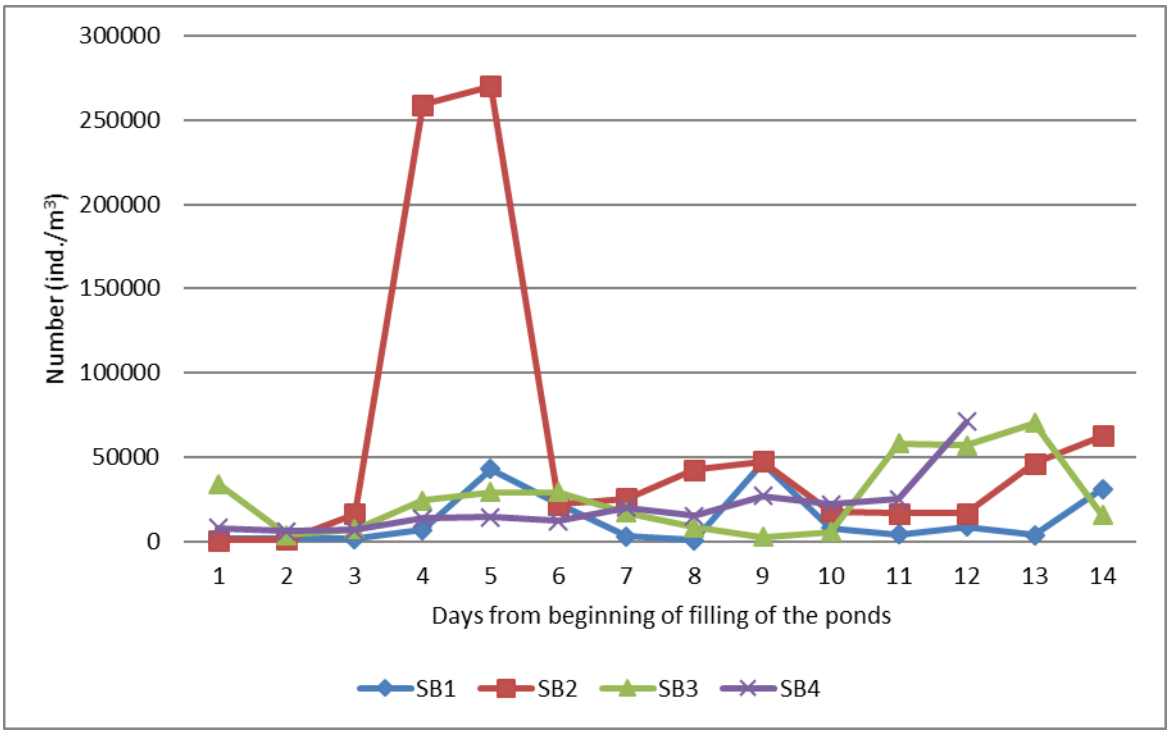

Fig. 2. Dynamics of zooplankton number in the studied ponds

The biomass of zooplankton in all ponds tended to increase towards the end of the period of operation of the ponds (Fig. 3-6), mainly due to the development of Copepoda (*Th. taihokuensis* and *Ph. blanci*). In pond SB2, in the first week after flooding, Rotifera and Cladocera dominated (Fig. 4); in pond SB3, Cladocera dominated (Fig. 5). In general, Copepoda predominated in biomass in all ponds (Fig. 3-6).

Despite the fact that the density of fish larvae in pond SB4 was 2-3 times less than in other ponds, the zooplankton biomass in it was at the same level. The highest biomass was observed in pond SB3 (Fig. 5).

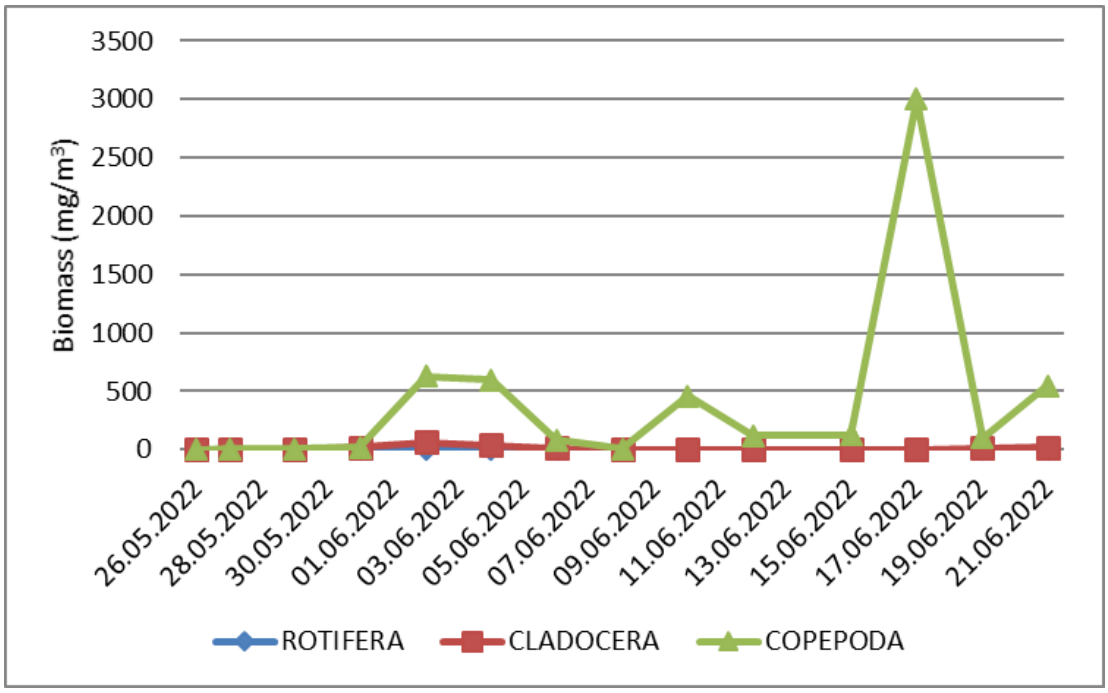

Fig. 3. Dynamics of zooplankton biomass in the fry pond SB1

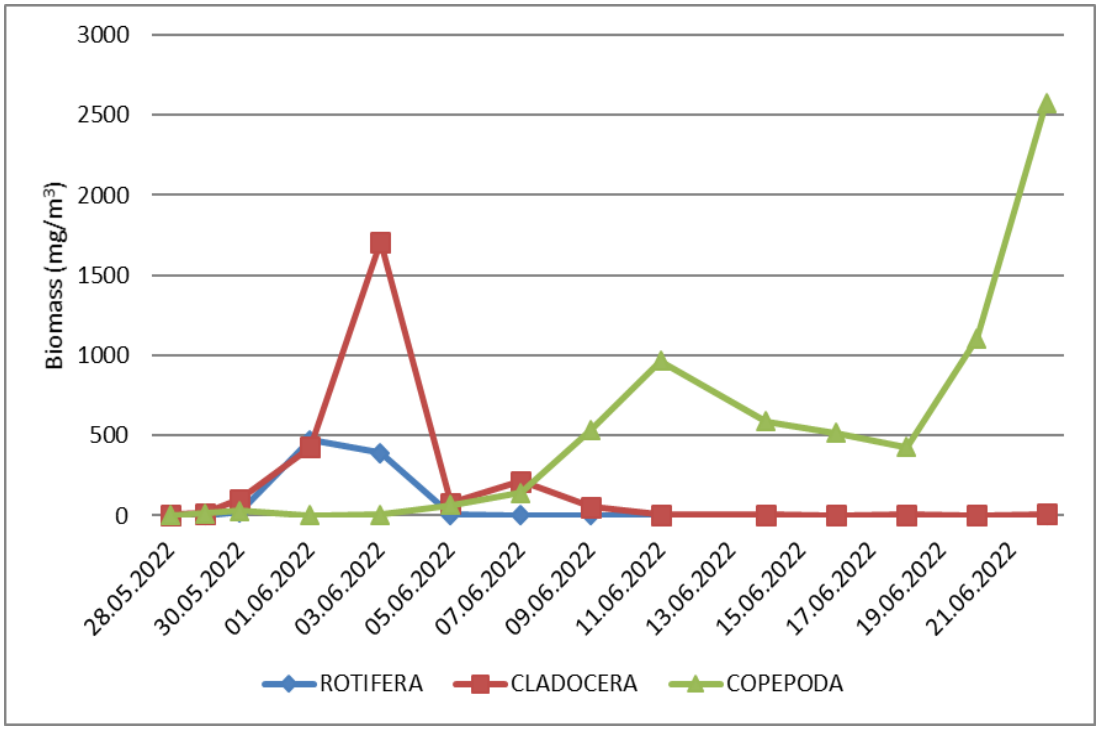

Fig. 4. Dynamics of zooplankton biomass in fry pond SB2

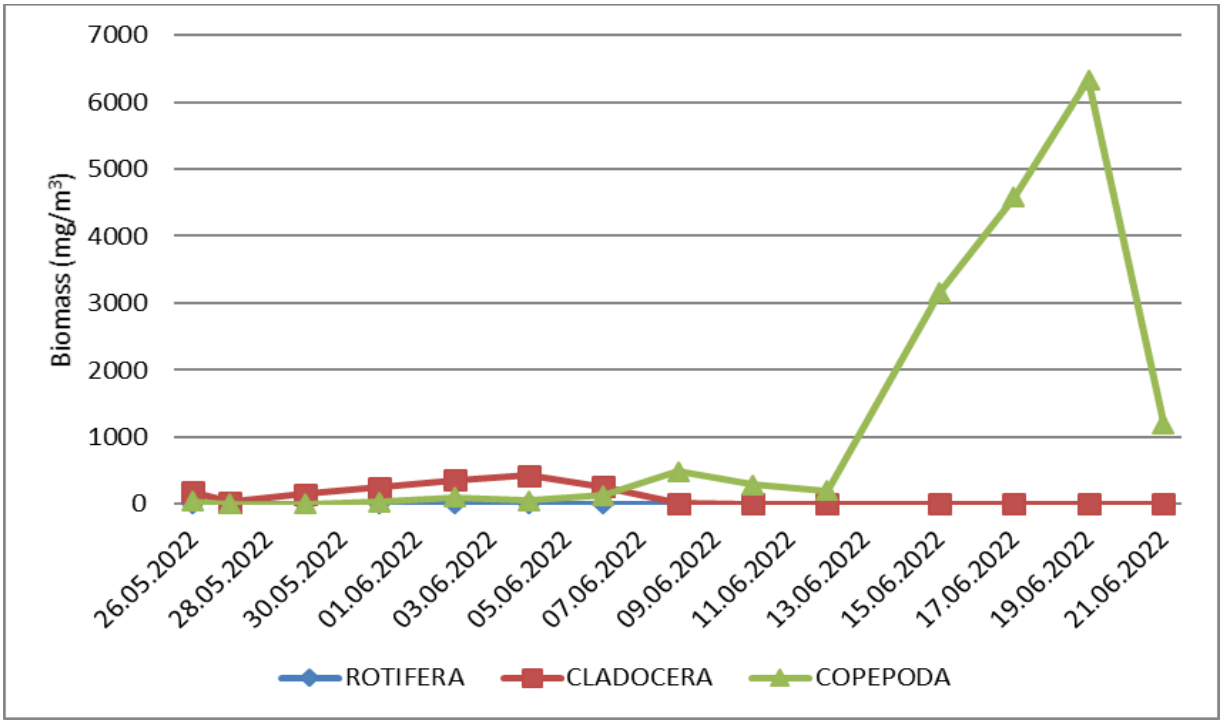

Fig. 5. Dynamics of zooplankton biomass in fry pond SB3

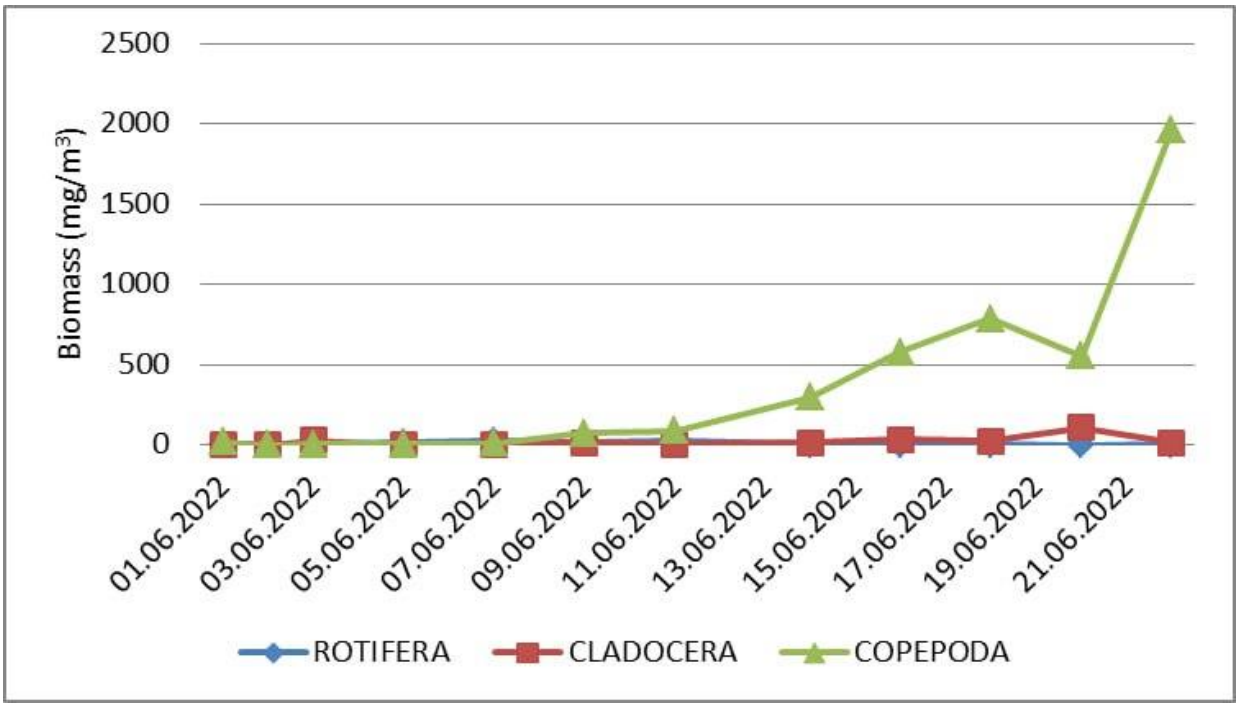

Fig. 6. Dynamics of zooplankton biomass in fry pond SB4

All ponds were dominated by rotifers *Asplanchna sieboldi*, *Brachionus calyciflorus*, *B. quadridentatus* and *Hexartra mira*, crustaceans *Moina weismanni*, *Diaphanasoma macrophtalma*, *Thermocyclops taihokuensis*, *Acanthocyclops trajani* and *Phyllodiaptomus blanci* (Table 1). The maximum development of rotifers occurred on days 5-8 after filling the ponds, the maximum development of cladocerans on days 7-16, and the maximum development of copepods on days 10-16 after filling the ponds. A similar direction of zooplankton succession was observed in fry ponds in the Tashkent region (Mirabdullaev, Khegai, Akhmedov, 1991:146-147).

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