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Fergana Valley Fish-Breeding Pools Quantity and Quality Development of Zooplankton Organisms

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Abstract: ***This article covers 78 different species of planktons from Beshariq fish breeding farm pools Fergana Valley. 40 of them are Rotifera, 23 are Cladocera ва 15 are said to be Copepoda. In Namangan fishbreeding farm pools 41 zooplankton organisms, such as, 20 Rotifera, 11 Cladocera and 10 species of Copepoda are said to have been determined, zooplankton organisms species' number, their seasonal development, quality and quantity indication were brought up***

Keywords: Fergana valley, zoo-plankton, rotifera, cladocera, copepoda

1. Beshariq Fish Breedig Farm

78 types of zoo-planktons have been determined in the lawn pools and pools where maternal fish are bred. Among them are 40 Rotiferas, 23 Cladoceras and 15 Copepoda (Table-1).

Table 1: The seasonal succession quality indicator of zooplanktons in Beshariq fish-breeding pools

No.	Taxons	Months						
		III	IV	V	VI	VII	VIII	IX
	ROTIFERA							
1.	*Asplanchna sieboldi*	+	+	+	+	+	+	+
2.	*Anuraeopsis fissa*	-	-	+	+	-	+	-
3.	*Brachionus angularis*	+	+	+	+	+	+	-
4.	*B. bennini*	-	-	-	+	+	+	+
5.	*B. budapestinensis*	-	-	-	+	+	+	-
6.	*B. calyciflorus*	+	+	+	+	+	+	+
7.	*B. falcatus*	-	-	-	+	+	+	+
8.	*B. leydigii*	+	+	-	-	-	-	-
9.	*B. plicatilis*	+	+	+	+	+	+	+
10.	*B. quadridentatus*	+	+	+	+	+	+	+
11.	*B. urceus*	+	+	+	+	+	+	+
12.	*Euchlanis dilatata*	+	+	+	+	+	+	+
13.	*Filinia longiseta*	+	-	+	+	+	+	+
14.	*Hexarthra mira*	+	+	+	+	+	-	-
15.	*Keratella quadrata*	+	+	+	+	-	-	-
16.	*K. tropica*	-	-	-	+	+	+	+
17.	*K. cochlearis*	+	+	+	+	-	-	-
18.	*Lecane bulla*	+	+	+	+	+	+	+
19.	*L. decipiens*	-	-	-	-	-	-	+
20.	*L. luna*	+	+	+	+	-	+	+
21.	*L. quadridentata*	-	-	-	-	-	+	-
22.	*L. tethis*	-	-	-	-	-	+	-
23.	*L. hamata*	-	-	-	-	-	+	-
24.	*L. lamellate*	-	-	-	+	-	-	-
25.	*L. stenroosi*	-	-	-	-	+	-	-
26.	*Lophocharis kutikovae*	+	+	-	-	-	-	-
27.	*L. turanica*	-	-	-	-	+	+	-
28.	*L. salpina*	+	+	+	+	+	-	+
29.	*Mytilina ventralis*	-	-	+	+	-	-	+
30.	*Notholca acuminate*	+	+	-	-	-	-	-
31.	*N. squamula*	+	+	-	-	-	-	-
32.	*Platyas patulus*	-	-	+	-	-	-	-
33.	*P. quadricornis*	-	-	-	-	-	+	+
34.	*Polyarthra vulgaris*	+	+	+	+	+	+	+
35.	*Proalides tentaculatus*	-	+	-	+	-	-	-
36.	*Sinantherina sp.*	-	-	+	-	-	-	-
37.	*Synchaeta sp.*	+	+	+	+	+	-	-
38.	*Testudinella patina*	-	-	-	+	-	-	-
39.	*Trichotria pocillum*	-	-	+	+	+	+	+
40.	*Tripleuchlanis plicata*	-	-	-	-	+	-	+
	CLADOCERA							
41.	*Alona rectangular*	-	+	+	+	+	+	+
42.	*A. cambouei*	-	-	-	-	-	+	-
43.	*Bosmina sp.*	-	+	+	+	+	-	-
44.	*Ceriodaphnia cornuta*	-	+	-	-	-	-	-
45.	*C. Turkestanica*	-	+	+	+	+	+	-
46.	*Chydorus sphaericus*	+	+	+	+	-	+	+
47.	*Daphnia curvirostris*	+	+	+	-	-	-	-
48.	*D. magna*	+	+	+	+	+	-	-
49.	*D. longispina*	+	-	-	-	-	-	-
50.	*D. pulicaria*	+	+	+	-	-	-	-
51.	*Diaphanosoma dubium*	-	-	+	+	+	+	+
52.	*Ilyocryptus sordidus*	-	-	-	+	-	-	-
53.	*Macrotrix cf. spinosa*	-	-	-	+	-	-	-
54.	*M. hirsiticornis*	-	+	+	+	+	+	-
55.	*Megafenestra aurita*	+	+	+	-	-	-	-
56.	*Moina brachiate*	+	+	+	+	+	+	-
57.	*M. micrura*	-	-	-	+	+	+	-
58.	*M. macrocopa*	-	+	+	-	-	-	-
59.	*M. weismanni*	-	+	+	+	+	+	+
60.	*Pleuroxus aduncus*	-	-	-	-	+	+	-
61.	*Simocephalus exspinosus*	-	+	-	-	-	-	-
62.	*S. vetulus*	-	-	+	+	-	-	-
63.	*Scapholeberis kingi*	-	+	+	+	+	+	-
	COPEPODA							
64.	*Acanthocyclops trajani*	+	+	+	+	+	+	-
65.	*Cryptocyclops linjanticus*	-	-	-	-	+	-	-
66.	*Cyclops vicinus*	+	+	+	+	-	-	+
67.	*Diacyclops bisetosus*	+	+	+	-	-	-	-
68.	*Eucyclops serrulatus*	+	+	+	+	+	+	+
69.	*Mesocyclops aspericornis*	-	-	-	-	+	-	-
70.	*M. ogunnus*	-	-	-	-	+	-	-
71.	*M. peihpeiensis*	-	-	-	+	+	+	-
72.	*Microcyclops pachyspina*	-	+	+	-	-	-	-
73.	*Paracyclops fimbriatus*	-	+	-	+	-	-	-
74.	*Thermocyclops vermifer*	-	-	+	+	+	+	+
75.	*Th. Taihokuensis*	-	-	+	+	+	+	+
76.	*Th. Rylovi*	-	+	+	+	+	+	+
77.	*Arctodiaptomus salinus*	+	+	+	+	+	+	+
78.	*Phyllodiaptomus blanci*	-	-	+	+	+	+	-
	Total of species	29	43	46	50	43	41	29
	Total quantity , thousand. pieces./m3	287	137	200	198	122	87	88
	Total biomassмacca, g/m3	0,86	2,7	5,1	2,7	2,2	1,3	0,7

Since the sample are taken on a monthly basis determining the quality of zoo-planktons' seasonal succession became easily available. (Table-1).

For spring-time (March-April) condition of zoo-plantcton organisms these types are noted to be typical: *Asplanchnopus multiceps, Brachionus leydigii, Notholca acuminata, Notholca squamula, Lophocharis kutikovae, Diacyclops bisetosus*. Spring time representatives rather than summer ones are *Keratella cochlearis, Keratella quadrata, Cyclops vicinus, Moina brachiata, Moina lipini, Daphnia spp*. Typical summer types are *Diaphanosoma mongolianum, Moina micrura, Moina salina, Moina micrura, Thermocyclops crassus, Thermocyclops rylovi, Acanthocyclops trajani, Mesocyclops aspericornis, Mesocyclops ogunnus, Mesocyclops peihpeiensis, Keratella tropica, Brachionus bennini, Brachionus falcatus, Filinia longiseta* [1,2,3,4,6].

Among Rotifera characteristic for spring are these types *Asplanchnopus multiceps, Brachionus leydigii, Lophocharis kuticovae, Notholca acuminata, Notholca squamula, Epiphanes brachionus*. In summer times, from May to August *Anuraeopsus fissa, Brachionus rubens, Lecane stenroosi, Lophocharis turanica, Testudinella patina, Trichotria pocillum, Tripleuchlanus pilicata could come across. Asplanchna sieboldi, Brachionus caliciflorus, Brachionus plicatilis, Brachionus quadridentatus, Brachionus rubens, Lecane bulla, Polyarthra vulgaris, Lophocharis salpina, Filinia longiseta* and some other types like *Asplanchna sieboldi, Brachionus caliciflorus, Brachionus plicatilis, Brachionus quadridentatus, Brachionus rubens, Lecane bulla, Polyarthra vulgaris, Lophocharis salpina, Filinia longiseta* are found to have spread levelly during whole the vegetation period [5].
Among the Cladocera group typical for the spring time are these types such as, *Daphnia similis, Daphnia curvirostris, Daphnia longispina, Daphnia pulicaria, Diaphanosoma sarsi, Simocephalus exspinosus, Megafenestra aurita* [4].

Several types of them (*Daphnia magna, Moina brachiata, Simocephalus vetulus, Alona rectangula, Ceriodaphnia reticulata*) are considered the sring representatives, could be wide-spread in month April to May with the water temperature 21-25^{0}C (degree Celsius). In summer months it is noted that the representative of crablike representatives with branchy-antenna disappear totally.

From Copepoda group one can come across *Cyclops furcifer, Diacyclops bisetosus, Microcyclops pachyspina, Paracyclops affinis, Thermocyclops dybovskii* in spring (May-April). In summer from May to August species like *Apocyclops dengizikus, Cryptocyclops linjanticus, Mesocyclops aspericornis, Mesocyclops ogunnus, Mesocyclops peihpeiensis, Microcyclops pachyspina* were detected from time to time [7].

The quantity of zoo-planktons equaled that of the summer time by September.

During the time the research was on the run the dominant froms of cyclope such as, *Acanthocyclops trajani, Eucyclops serrulatus, Thermocyclops crassus, Thermocyclops Rylovi* became distinct. They could be seen during the period from March to September.

Once the common members of zoo-planktons have been checked, one could say the spring months could be called the month of "rotifera". Because it is the time when the rotifera increase in small forms. Later on these crab-like creatures converted into the dominants with branchy-antenna ones. By the mid-summer those crab-likes decreased in numbers and the place was taken by the rotifera little by little. The main reason for such rebuilding process might be explained because the larger crab-likes are eaten by the fishes and the result of which is the change of quality of phyto-planktons.

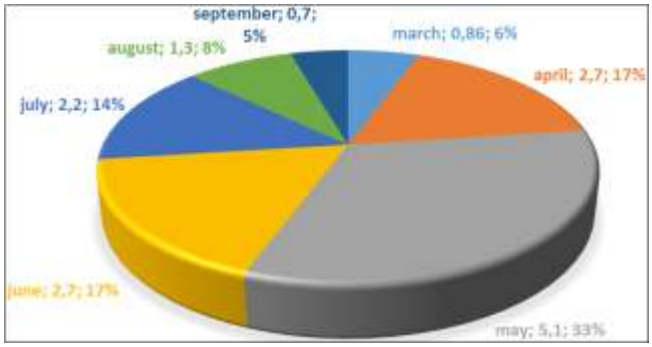


Figure 1: The biomass of zooplankton organisms in Beshariq fish-breeding pools

This fish-breeding farm were the polygons where the seasonal quantity change of zooplanktons has been watched. In spring (March month) the biomass quantity was relatively low and made up of 0. quantity of zooplanktons was very high (averaging 287.000 pieces/m^3), but the biomass of zooplanktons was relatively low and made up 0.86h/m^3.

It is in that time that Rotifera developed. Especially the quantity of zooplankton organisms was high and made up 1219.000 pieces/m^3, biomass made up 0.42g/ m^3. The biggest quantity indication was sensed in April and May months. At this period *Daphnia magna, Daphnia curvirostris, Daphnia galeata, Ceriodaphnia turkestanica, Moina brachiata, Moina Weissm* developed fast and the quantity of zoo-planktons came to be 137-200 thousand pieces /m^3 and the biomass equaled 2,7-5,1 h/m^3.

The crablike creatures with antler-like antenna came to be 49,5 thousand pieces./m^3 in quantity and their biomass made up 31,7 h/m^3. In this pool in the month of May canoe-legged crab-like creatures came into the pool their quantity promoted the development of *Acanthocyclops trajani, Eucyclops serrulatus* species and made 100 thouand pieces/m^3, the biomass becamer – 5,1 g/m^3. During the passing time the quantity of zooplanktons decreased incessantly. (Fig.1).

Table 2: Beshariq fish breeding farm zooplankton quantitative dynamics (pieces./m^3)

Pools №	March	April	May	June	July	August	September
1.	184,0	4,0	121,0	103,5	33,0	0	-
2.	6,0	254,0	181,7	24,0	19,0	11,5	10,5
3.	12,5	4,0	50,0	80,0	10,0	9,5	-
4.	262,5	87,0	168,0	60,0	2,0	5,5	2,2
5.	142,0	169,0	11,5	83,0	50,5	1,0	-
6.	119,5	76,5	222,0	0	64,0	233,5	6,5
7.	350,5	266,0	357,0	98,0	21,0	3,7	-
8.	1219,0	238,0	488,0	468,0	189,5	23,2	-
Amid	287,0	137,3	199,9	135,0	69,8	8,7	6,3

Figure 2: Seasonal quantitative dynamics of zooplankton organisms in meadow pools of Beshariq fish breeding farm (pieces/m^3)

2. Namangan fish breeding farm

The zooplankton organisms' development was held in three meadow pool of this fish breeding farm. Up to that time hydrobiology of water pools were not studied. During the research 41 zooplantkton organisms, such as, 20 species of Rotifera, 11 species of Cladocera ва 10 species of Copepoda have been detected (3-table).

The zooplankton organisms development laws didn't make a difference with that of «Beshariq baliqchilik» farm.

The quality ingredients of springtime (March-April) zooplankton organisms excelled with the abundance of *Notholca acuminata*. The proper species in these pools for spring forms rather than summer ones are as follows: *Keratella cochlearis, Keratella quadrata, Cyclops vicinus, Daphnia magna.* Typical summer forms could be: *Diaphanosoma macrophthalma, Moina micrura, Moina weismanni, Thermocyclops rylovi, Mesocyclops ogunnus, Keratella tropica*. In the summer months branched-antenna crablike creatures were not seen.

The detection of zoo-plankton organisms are alike that of Beshariq fish breeding farm. In the September month one could see the summer forms as well.

The list of dominant species during the research time during the whole period was as follows: *Brachionus quadridentatus, Acanthodiaptomus denticornis, Eucyclops serrulatus, Thermocyclops rylovi*. They were seen incessantly from March to September .

Table 3: Ltd «Namangan baliq» meadow pools zooplankton fauna and seasonal succession quality indication changes

№	Taxons	Months						
		III	IV	V	VI	VII	VIII	IX
ROTIFERA								
1.	*Asplanchna sieboldi*	-	-	+	+	+	+	+
2.	*Filinia longiseta*	-	-	+	-	-	+	+
3.	*Mytilina ventralis*	-	+	+	+	-	-	-
4.	*Lecane bulla*	-	+	+	+	+	+	+
5.	*L. Luna*	+	+	+	+	+	+	+
6.	*Lecane lunaris*	-	-	-	+	+	-	-
7.	*Hexarthra mira*	+	+	+	+	+	+	+
8.	*Polyartnra vulgaris*	-	+	+	+	+	+	+
9.	*Anuraeopsis fissa*	-	-	+	+	+	+	-

10.	*Keratella quadrata*	+	+	+	-	-	-	-
11.	*K. Cochlearis*	-	-	+	-	-	-	+
12.	*K. Tropica*	-	-	+	+	+	+	+
13.	*Brachionus angularis*	-	-	+	-	-	-	-
14.	*B. calyciflorus*	-	+	+	+	+	+	-
15.	*B. quadridentatus*	+	+	+	+	+	+	+
16.	*B. Urceolaris*	-	+	+	+	+	+	+
17.	*Notholca acuminata*	+	-	-	-	-	-	-
18.	*Proalides tentaculatus*	-	-	+	+	+	+	-
19.	*Trichotria pocillum*	-	+	+	+	+	+	-
20.	*Synchaeta sp.*	-	-	+	-	-	+	+
CLADOCERA								
21.	*Bosmina longirostris*	-	-	+	+	+	+	+
22.	*Diaphanosoma macrophthalma*	-	-	+	+	+	-	-
23.	*Ceriodaphnia turkestanica*	-	+	+	+	+	+	+
24.	*Daphnia cf. galeata*	-	-	+	+	+	+	-
25.	*D. magna*	+	+	+	+	-	-	-
26.	*Moina micrura*	-	-	+	+	+	+	+
27.	*M. weissmani*	-	-	+	+	+	+	+
28.	*Alona rectangular*	-	-	+	+	+	+	-
29.	*Simocephalus vetulus*	-	+	+	+	+	-	-
30.	*Chydorus sphaericus*	-	+	+	+	+	+	+
31.	*Scapholeberis kingi*	-	+	+	+	+	+	-
COPEPODA								
32.	*Cyclops vicinus*	+	+	+	-	-	-	+
33.	*Cryptocyclops linjanticus*	-	-	+	+	+	+	+
34.	*Thermocyclops vermifer*	-	+	+	+	+	+	+
35.	*Th. rylovi*	-	+	+	+	+	+	+
36.	*Mesocyclops ogunnus*	-	+	+	-	-	-	-
37.	*Mesocyclops aspericornis*	-	-	+	+	+	+	
38.	*Eucyclops serrulatus*	+	+	+	+	+	+	+
39.	*Microcyclops pachyspina*	-	+	+	+	+	+	+
40.	*Acanthodiaptomus denticornis*	+	+	+	+	+	+	+
50.	*Phyllodiaptomus blanci*	-	-	+	+	+	+	-
Total of species		9	22	39	35	31	30	22
Total quantity, piece./m^3		471,0	178,0	82,6	169,0	226,6	12,5	15,6
Total biomass , g/m^3		2,22	1,55	0,78	1,34	1,75	0,23	0,21

The biggest quantity indication (618 thousand pieces./m^3)and biomass (14,3 g/м^3) were observed in the second pool in the month of March (3-table). In March and April months branchy-antenna creatures and canoe-legged crablike creatures developed and they decreased in quantity and biomass in the month of May. Although in June and July months the quantity of zooplanktons were lesser than in the month of March, the second development maximum was observed. At that time the quantity of the zooplankton organisms was determined as follow 1536 thousand pieces ./m^3, biomass – 8,7 g/m^3 and the basis of them was made up of the species *Cyclops vicinus*, the typical quantity indicator was 416 thousand pieces./m^3, biomass reached 5,2 g/m^3. Like this the species *Moina weismanni* also developed vastly and reached the indication of 288 thousand./m^3, biomass – 3,1 g/m^3. (Fig 3-4).

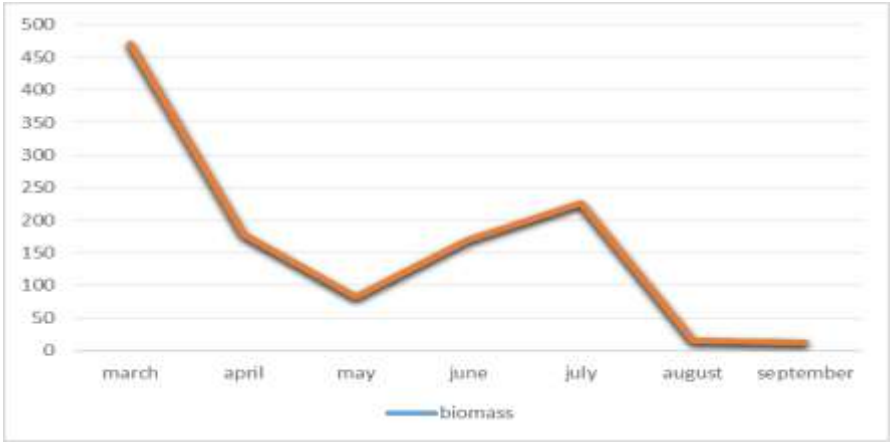
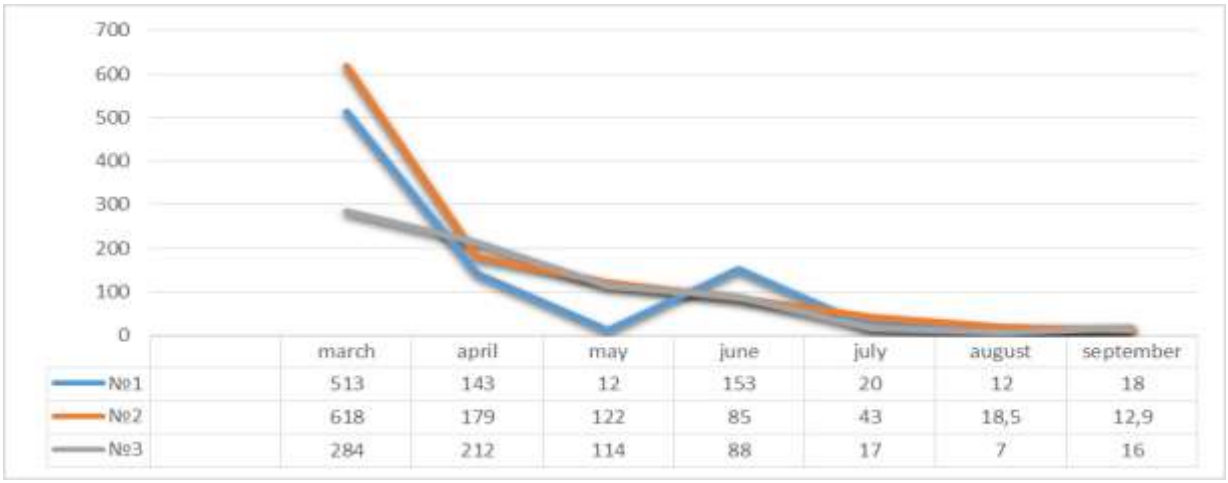


Figure 3: Navbohor fish breeding zooplankton organisms biomass



	march	april	may	june	july	august	september
№1	513	143	12	153	20	12	18
№2	618	179	122	85	43	18,5	12,9
№3	284	212	114	88	17	7	16

Figure 4: Namangan fish breeding farm meadow pool zooplankton organisms' seasonal quantitative dynamics (piece/m^3)

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