RESEARCH ARTICLE **(Open Access)**

Assessment of natural feeding in larvae, free living fry and fingerlings of silver carp (Hypopthalmichthys molitrix Valenc. in Cuvier and Valenc., 1844) and grass carp (Ctenopharyngodon idella Valenc. in Cuvier and Valenc., 1844)

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Abstract:

The diets of silver carp and grass carp have been studied in their early living stages. It resulted that these two species change their feeding habits with age growth. Larvae and free living fry are carnivores since their diet is dominated from animal living beings of plankton. The fingerlings had a mixed feeding regime, but in this stage appears the tendency to consume the vegetal components with prevalence. Relative average composition ($\mu \pm S^2$) % of algae in the diet of silver carp fingerlings was 70.600±5.631. In the diet of grass carp fingerlings this index had the value of 28.15±3.412 in algae and 23.82±2.325 in macrophytes. Larvae and free living fry for two cyprinidae studied, manifested positive selection ability for ciliata, rotifers, nauplii and cladocerans with small size. The dimension of living beings included in the diet go up with the increase of fish size.

Keywords: larvae, free living fry, fingerling, grass carp, silver carp, food selectivity index

1. Introduction:

The fish change their feeding habits during their ontogenesis [14]. Habitually, in early stages of life fish are carnivores. The presence of animal living beings in diet of larvae and free living fry of cultivated cyprinidae is proved by many authors [18; 22; 21; 4; 17; 6]. The study of feeding habits for commercial species, especially when they are aliens, in conditions of stocking in natural and artificial basins has a great value for taking information in respect to impact they have in the environment, alimentary competition and abrasive behavior. According to [6] increases in the number of young non-native fish may exacerbate competition and diet overlap. [22], admit that fingerlings of grass carp behave as carnivores since they consume common carp eggs. [17] found that grass carp consuming macrophytes cause the reduction of phytofils population.

The work we present is a result of natural feeding study for two alien species of Cyprinidae family. We have studied the species composition of living beings consumed by larvae, free living fry and fingerlings of grass carp and silver carp as well as the relative content of each component in the diet.

2. Material and methods:

The study is done in experimental economy of Tapiza (Fushe Kruje) during a period of 58 days including the stage of larvae passing in active feeding, the stage of free living fry and the stage of fingerlings. In the first stage, sampling has been exercised daily. In the first 15 days of free living fry stage, sampling is done every two days, whereas in the second 15 days, sampling is done every four days. For the fingerlings stage four samplings are done every five days.

The samples aren't put in freezing because after removal they are subdued to analysis. In the laboratory, first, the zoological length (Lmm), and the length of digestive system of larvae and free living fry are included in the sampling. The length of digestive system is measured from the faring to the anal hole, after application of disection in stereomicroscope. To do the disection and to observe the content of digestive system we have used ZEISS stereomicroscope Stemi SV 11.

Digestive systems are conserved in formalin 4%, for seven days, before doing the qualitative and quantitative assessment of digestive system content. The results are mainly based in estimation of diet components found in the first half of digestive system and in the identification of living beings based on

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undigested pieces that were in the other part of the system. The faction relatively homogenous of digestive content found in intestine worsened the identification of some components, especially of infusors, because of their full digestion. Quantitative evaluation of diet components was done based on relative content according to the number [**8]**. Taxons determination of living being composing diet components for larvae, free living fry and fingerlings of two ichthyc species included in the study is done after application of standard procedures of optical microscope [19], exploiting respective keys of determination [25; 3; 12; 13; 16; 7; 24]. It is used ZEISS AxioScope A1.

The food selectivity index is calculated according to [**9**] using this formula:

D*i*= (r*i*-p*i*)/(r*i*+p*i*-2r*i*p*i*)

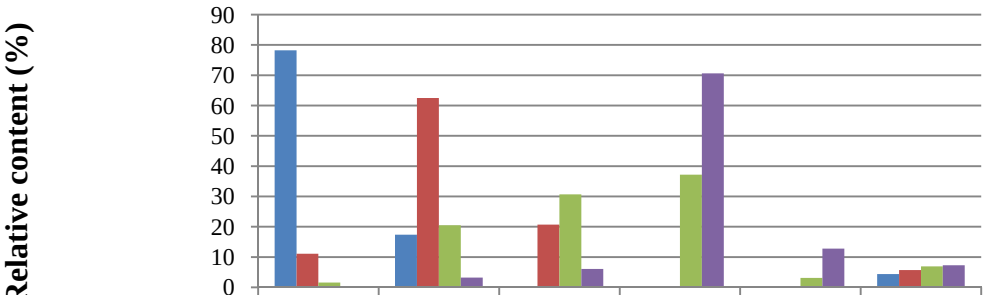
Where: "r*i*" is faction of feeding component "*i*" in digestive system content of analyzed samples and "p*i*" is faction of this component in environment. D index values are in range -1 ≤ D ≤ 1. The equal value -1.0 shows that a determined component of biocoenosis is completely refused from the consummator. The equal value 1.0 shows maximal alimentary preference.

The average values (M) of studied parameters accompanied with the standard mistake (SD). ANOVA, followed from LSD test, is applied to prove significant differences between average values. For the statistical analysis of data obtained from the differentiated study of average values of relative content for special diet components is used MSTATS computer program.

3. Results

a) The diet of larvae, free living fry, and fingerlings of silver carp (Hypopthalmichthys molitrix Val. in Cuvier and Val. 1844).

The analysis of digestive system content for larvae of age 4-6 days after hatching showed that the first components of exogenous feeding of silver carp after consuming vitellin, were the unicellular of Infusoria group (Ciliata). Doing the calculation based on individual number found in samples, it resulted that the relative average composition (%) of infusoria in larvae of silver carp was (μ±S²) 78.188±8.155 (Figure No.1). The diet of larvae in this age was composed mainly from infusoria Euplotes patella (Muller, 1773), Colpidium colpoda (Ehrenberg, 1831), Stylonychia mytilus (Ehrenberg, 1838) and less from Paramecium caudatum (Ehrenberg, 1838).



	Infusoria	Rotifera	Crustacea	Algae	Detritus	Not ident.
4-6 days (after hatching)	78.2	17.4	0	0	0	4.4
7-16 days	11.1	62.5	20.7	0	0	5.7
17-25 days	1.6	20.5	30.7	37.2	3.1	6.9
over 25 days	0	3.2	6.1	70.6	12.8	7.3

Diet component

Figure 1: Relative content of different diet components in the early living stages of silver carp (*Hypophthalmichthys molitrix*)

Planktonic living beings of the Rotifers were part of the secondary diet components, which we have found especially in analysis done in larvae at the age of 6 days after hatching. The relative average composition (%) of rotifers in digestive system of silver carp larvae was (μ±S²) 17.400±0.817. The rotifers consumed with higher frequency from the larvae at this age were Keratella quadrata quadrata (Muller, 1786), Filinia longiseta (Ehrenberg, 1834), Polyarthra vulgaris (Carlin, 1943) and Lecane luna (Muller, 1776).

Individuals at the age of 7-16 days after hatching belong to early free living fry stage. One typical distinction of silver carp diet in this stage of life was

the extension of range for consumed animal living beings. In analysis done, except representative of Infusoria and Rotifers, we have found other species that belong to different groups of plankton rustacean (Entomostraca).

The diet of early free living fry is dominated from rotifers. Relative average composition (%) in silver carps at the age of 7-16 days after hatching was ($\mu \pm S^2$) 62.500±6.749.

The nauplii stages of planktonic crustacean we have found ($\mu \pm S^2$) 16.600±1.156% of relative average composition of natural food taken from early free living fry of silver carp (Figure No.1). The relative average composition (%) of planktonic crustacean adults was ($\mu \pm S^2$) 4.140±0.715. Every adult crab included in early free living fry diet belongs to (Cladocera) group. Species found with higher frequency in digestive system were Bosmina longirostris (O.F.Muller, 1785) and Cydorus spahaericus (O.F.Muller, 1785).

The calculation of relative composition values (%) for special diet components showed that specific weight of infusors in free living fry feeding reduced in comparison with feeding of larvae. The index mentioned for the early free living fry had the average value ($\mu \pm S^2$) 11.060±1.269.

Individuals at the age of 15-25~30 days after hatching belong to the typical free living fry stage. Our analysis proved that a distinctive feature of silver carp feeding in this stage of life was the integration of vegetal component. This feature gives these species the omnivore character feeding regime. Dismissing detritus and un-identified material found in digestive system of typical free living fry of silver carp, the report between the food with animal origin and food with vegetal origin (algae) was 1.42:1.0. This report shows that independently of omnivore feeding regime, in typical free living fry of silver carp the animal component of diet resulted to be dominant in comparison with vegetal component.

Relative average composition (%) of animal component in free living fry diet was ($\mu \pm S^2$) 30.700±2.600 for planktonic crustacean and ($\mu \pm S^2$) 20.500±3.714 for rotifers. In free living fry diet except the adult of mentioned crustacean, are added Daphnia longispina (O.F. Muller, 1785), Simocephalus sp and rarely Eudiaptomus gracilis (G.O. Sars, 1863). In the diet of free living fry of age 15-25 days after hatching we found bigger rotifers as Brachionus calyciflorus f. amphiceros (Ehrenberg, 1838) and Asplanchna sieboldii (Leydig, 1854).

Relative average composition (%) of algae in free living fry diet was ($\mu \pm S^2$) 37.200±3.378 (Figure No.1). The analysis showed the domination of green algae (Clorophyceae) that belong to Pediastrum simplex (Meyen, 1829), P.duplex var. gracillimum (West & G.S. West 1895), Scendesmus quadricauda (Turpin) Brebisson, 1835 and Anchistrodesmus sp. The diatomae (Bacillariophyta) were the second group of algae forming the vegetal diet of free living fry of silver carp. The diatomae consumed with higher frequency from the free living fry were of Navicula (Bory de St. Vincent, 1822), Cyclotella (F.T. Futzing ex.A. de Brebisson, 1838) and Gyrosigma (Hassall, 1845).

Individuals at the age of 25-30 days after hatching until they rich the weight of 8-10g are included in the fingerlings stage. Our analysis results showed that the report between diet components with animal origin compared to vegetal origin in silver carp fingerlings feeding was 0.13:1. This report proves a strong vegetal tendency in the feeding of fingerlings of this species. Relative average composition (%) in fingerlings diet was ($\mu \pm S^2$) for algae 70.600±5.631, crustacean 6.100±0.673 and rotifers 3.200±0.524. Except algae we have mentioned fingerlings used in their feeding the populations of green algae Clorela vulgaris (Beyerinck, 1890) and Eudorina sp, green-blue algae (Cyanophyta) Microcystis aeruginosa (Kutzing, 1846) and diatomae Pinnularia viridis (Nitzsch) Ehrenberg, 1843.

The diagram we have shown in figure no.1 proves the alterations that occur in the grass carp feeding regime during the stage of passing from larvae to fingerlings. The data prove that larvae and fingerlings are carnivores, since their diet is composed only by plankton animal living being of ponds. The fingerlings demonstrated a mixed feeding regime when in their diet were present both animal living being and planktonic algae. Carnivore tendency in early stages of life replies to more intensive growth of body size in these stages. In reality the consumption of diets with animal origin guarantees to larvae and free living fry food of high energy-protein levels, reality converted with high index of growth intensity.

In figures No.2 and No.3 we have shown the results of calculating the values of food selectivity index from free living fry of silver carp, for two groups of plankton living beings, rotifers and Entomostraca crabs. The free living fry at the age of 7-16 days after hatching demonstrated full refuse for Asplancna sieboldtii rotifer (Leydig, 1854),although some hydro-biologic analysis done for estimating the

special component of natural food present in cultivation ponds proved that the number of this rotifer made up 18.9% of general individuals number present at the moment of sampling. Negative selectivity values are proved for Brachionus (D*i* = -0.52 for B.calyciflorus Ehrenberg, 1838 and D*i* = -0.41 for B.quadridentatus Ehrenberg, 1832).

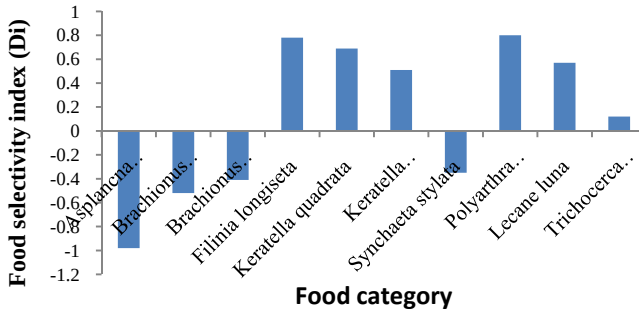


Figure 2: The values of Jacobs index (D*i*) for some rotifers in silver carp fry

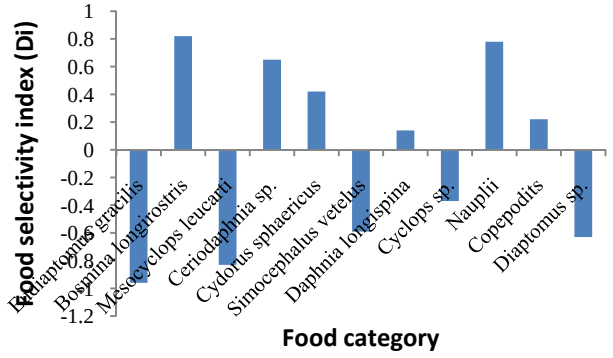


Figure 3: The values of Jacobs index (D*i*) for some Plankton Crustacea in silver carp fry

Higher positive values of selectivity index are calculated for rotifers Polyarthra vulgaris Carlin, 1943 (D*i* = 0.80), Filinia longiseta Ehrenberg, 1834 (D*i* = 0.78) and Keratella quadrata Muller, 1786 (D*i*=0.69). As long as the other rotifers are concerned, positive values of selectivity index (D*i*) have been in an interval from 0.12 to 0.57 (Figure No.2). It should be mentioned that positive values of selectivity index for K.quadrata resulted higher compared to the values calculated for the similar species K.cochlearis Gosse, 1851, meanwhile the second species creates more dense populations than the first species in pond.

For the free living fry at the age of 17-25 days after hatching, we have found higher positive values of selectivity index for Plankton Crab Bosmina longirostris O.F.Muller, 1785 (D*i*=0.82), for nauplius stage of Entomostraca crabs (D*i*=0.78) and for Ceriodaphnia sp. cladocer (D*i*=0.65). Larvae stage copepodae of Entomostraca crab Daphnia longispina O.F.Muller, 1785 had lower positive values of food selectivity index.

The calculated values for food selectivity index (D*i*) proved that the silver carp free living fry of age 17-25 days after hatching refused to include in their diet the planktonic crab of Copepoda group Eudiaptomus gracilis G.O.Sars, 1863. We found a similar result for the two other species of this group: Mesocyclops leucarti Claus 1857 (D*i*= -0.83) and Diaptomus sp. (D*i*= -0.63) (Figure No.3). As we proved from the analysis results, the adult species that are part of the Copepoda group of plankton crabs did not have positive selection in the feeding of silver carp free living fry at the age of 17-25 days after hatching. It is proved positive selectivity only for larvae stages of these crabs.

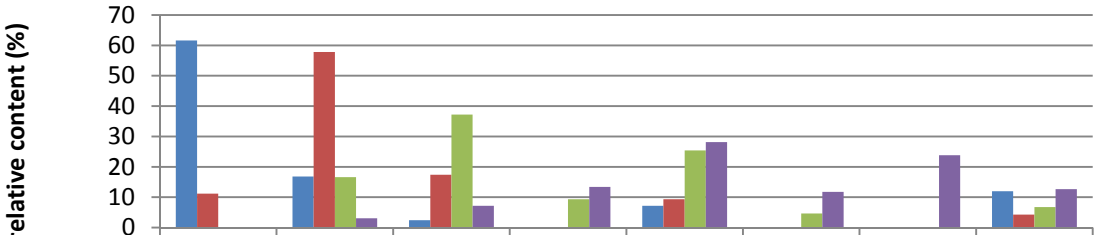
b) The diet of larvae, free living fry, and fingerlings of grass carp (Ctenopharyngodon idella Val. in Cuvier and Val.1844).

The results we have shown in Figure No.4 prove that grass carp larvae (age 5-8 days after hatching) principal components of exogenous feeding are plankton animal living beings. These living beings make up the main components of grass carp diet in this stage of life. Comparing the diet of grass carp larvae with silver carp larvae showed that feeding spectrum of the first species was wider, since in the diet, except infusors and rotifers, were included larvae, plankton crabs and algae too. Although the report between the vegetal component and that of the animal one in the diet of grass carp larvae was 1:11.3, the consumption of algae gives to the alimentary regime of this species omnivore nature, but with strong deviation from consumption of carnivore species.

In natural feeding of grass carp larvae, we found the same living being of taxonomic groups Infusoria and Rotifers found in the diet of silver carp. About 70% of grass carp larvae diet was made up from infusors; Euplotes patella (Muller,1773) and Stylonychia mytilus (Ehrenberg, 1838) and the rotifers; Keratella quadrata (Muller, 1786) and Polyarthra vulgaris (Carlin, 1943).

The algae consumed by larvae of age 5-8 days after hatching belong to three species of Clorophyta group. About 75% of vegetal component of the diet was made up of Pediastrum simplex (Meyen,1829). About 15% of this component was made up of Scendesmus quadricauda (Turpin) whereas the other part belongs to Pediastrum duplex (West& G.S West 1895).

Based on the number of big taxonomic groups in which living beings consumed by grass carp are classified, and on the analysis of digestive system composition of early free living fry (age 9-14 days after hatching), it resulted that food specter of individuals of this age is the same with food specter of larvae. Relative average composition (%) of rotifers in early free living fry diet was ($\mu \pm S^2$) 57.840±4.956 when for nauplii larvae of plankton crabs ($\mu \pm S^2$) 11.310±0.853. There aren't verified any significant alterations in respect to rotifers exploitation level, from the early free living fry of silver carp and grass carp ($t=0.565$; $P \leq 0.95$). A different situation is proved when comparing the consumption of plankton crabs larvae from the early free living fry of these two species ($t=3.67$; $P \geq 0.999$).



	Infusoria	Rotifera	Crustacea	Insecta (larvae)	Algae	Detritus	Macrophyta	Not ident.and variae
5-8 days	61.64	16.79	2.44	0	7.15	0	0	11.98
9-14 days	11.18	57.84	17.38	0	9.32	0	0	4.28
15-25 days	0	16.63	37.21	9.33	25.41	4.65	0	6.77
over 25 days	0	3.06	7.15	13.39	28.15	11.78	23.82	12.65

Diet component

Figure 4: Relative content of different diet components in the early living stages of grass carp (*Ctenopharyngodon idella*)

In the feeding of early free living fry, the specific weight of algae increased, although not significantly ($t=1.26$; $P \leq 0.95$). Except unicellular and colonial algae found in larvae, in early free living fry diet we also found filamentous algae of Spirogyra crassa (Kutzing) 1843, Zygnema stellinum (Vaucher) C.Agardh 1824 and Oscillatoria tenuis C.Agardh 1813.

Typical free living fry at the age of 15-25 days after hatching are distinguished for their omnivore feeding regime since the specific weight of vegetal component in their diet increased very much. Relative average composition (%) of algae in free living fry diet at this age was ($\mu \pm S^2$) 25.410±2.873 when the report between this component and animal component of the diet was 1:2.48. This report shows that the typical free living fry of grass carp, even with omnivore nature of feeding still preserve the tendency to consume with prevalence animal components of biocoenosis found in cultivation ponds.

Diet analysis of free living fry of age 15-25 days after hatching showed that grass carp displaces at the bottom of the ponds to search for food between benthos living beings. This fact was verified because of the insect larvae presence in digestive system composition. We have identified insects larvae of Cloeon dipterum Linnaeus 1761, Baetis spp. (Ephemeroptera), Leuctra fusca (Linnaeus, 1758) (Plecoptera), Chironomus spp and Tipula spp (Diptera).

We have proved significant alterations in algae consumption during the comparison of quantitative indices of diet of typical free living fry of silver carp and grass carp ($t=2.66$; $P>0.95$). This situation hasn't been proved for the consumption of plankton crabs ($t=1.45$; $P<0.95$).

The report between vegetal component and animal component during the feeding of grass carp fingerlings (age over 25 days after hatching) was 1:0.45. This report proves the growth of phytophagous tendency in grass carp feeding with age anticipation. Nevertheless the results of qualitative analysis of diet showed that grass carp fingerlings continue to consume plankton and benthos animals but on the other hand the dimensions of the consumed animal beings increase.

Except unicellular, colonial and filamentous algae, grass carp fingerlings used up aquatic macrophyta Lemna minor (Linnaeus, 1753), Spirodela polyrhiza (Linnaeus, 1753) Schleiden, Ceratophyllum

demersum (Linnaeus) and Potamogeton crispus (Linnaeus, 1753). Comparing the quantitative indexes of diets it was proved that grass carp fingerlings have phytophagous tendency more expressed compared to grass carp fingerlings (t=2.82; P>0.99).

The data we have shown in figure No.4 prove that in the moment of passing from exogenous feeding, grass carp manifests almost carnivore feeding regime. In the feeding of free living fry of grass carp, a relative balance between vegetal components and animal components of diet is set. Vegetal component was dominant in fingerlings stage although animal feeding had a special role and more important compared with silver carp fingerlings.

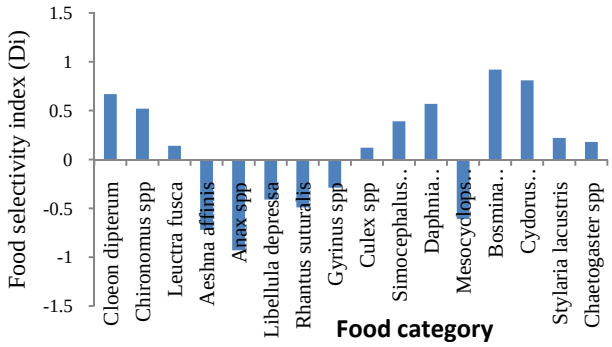


Figure 5: The values of Jacobs index (D*i*) for some animal components in the diet of grass carp fry

In figure No.5 we have shown the values of food selectivity index (D*i*), for some animal components of grass carp free living fry diet. Higher positive values of this index are proved for cladoceran Bosmina longirostris (O.F.Muller, 1785) (D*i*=0.92), Cydorus sphaericus (O.F.Muller, 1785) (D*i*=0.83) and Daphnia longispina (O.F.Muller, 1785) (D*i*=0.57) and for insects larvae Cloeon dipterum (Linnaeus, 1761) (D*i*=0.67) and Chironomus sp (D*i*=0.52). The analysis verified that free living fry of grass carp showed positive selectivity for some typical benthos representatives for example oligochaetes annelid. D*i* value for Stylaria lacustris (Linnaeus, 1767) was 0.22 when for Chaetogaster sp 0.18.

Negative values of food selectivity index, from grass carp larvae, have mainly resulted for insects larvae with large dimensions. We mention here the larvae of Anax sp (Di=-0.93), Aeshna affinis (Vander Linde, 1823) (D*i*=-0.72) and Libellula depressa (Linnaeus,1758) (D*i*=-0.41) (Odonata). The larvae of some Coleoptera insects, which are fast swimmers or hide between vegetative mass of macrophytes, usually aren't reached from consummator fish. Negative selectivity is calculated for coleopterans larvae Rhantus suturalis (MacLeay, 1825) (D*i*=-0.49) and Gyrinus sp (D*i*=-0.29).

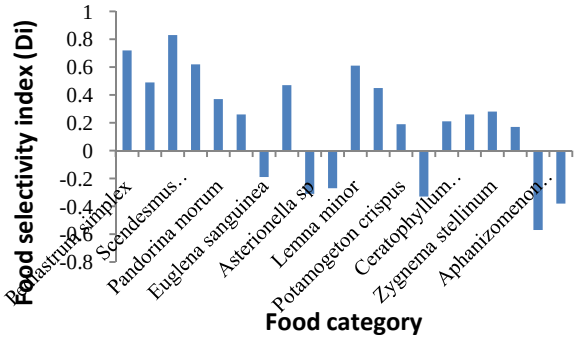


Figure 6: The values of Jacobs index (D*i*) for some vegetal components in the diet of grass carp fingerlings

As it resulted for free living fry of silver carp, the free living fry of grass carp don't include in their diet the plankton crabs of Copepods group. The value of food selectivity index for Mesocyclops leucarti (Claus,1857) proved that this value was negative (D*i*=-0.61).

As far as fingerlings of grass carp are concerned, we have estimated the values of food selectivity index (D*i*) for vegetal component of the diet (Figure No.6), since this component dominated the feeding regime of individuals 25 days after hatching.

From our calculating, we noticed higher positive values of food selectivity index for green algae (Clorophyta) of Scendesmus quadricauda (Turpin) Brebisson, 1835 (D*i*=0.83), Scendesmus bijugatus (Kutzing, 1833) (D*i*=0.62) and Pediastrum simplex (Meyen 1829) (D*i*=0.72). Two Euglena (Flagellatae) had different values in feeding of grass carp fingerlings.

Positive value (D*i*) is calculated for Euglena acus (O.F.Muller) Ehrenberg, 1830 (D*i*=0.26) and negative value for Euglena sanguinea (Ehrenberg, 1830) (D*i*=-0.19). The same situation is proved for two diatom (Bacillariophyta). The (D*i*) value Navicula sp was 0.47, when for Asterionella sp this index was -0.31. The green algae Hydrodiction reticulatum (Linnaeus) Bory de Saint-Vincent 1824, it isn't consumed from grass carp fingerlings (D*i*=-0.27), although in particular ponds created big accumulations concentrated in water surface.

Positive selectivity is calculated for filamentous green algae Spirogyra crassa (Kutzing) Kutzing 1843 and Zygnema Stellinum (Vaucher) C.Agardh 1824.

Green-blue algae (Cyanophyta) Aphanizomenon flos-aquae Ralfs ex Bornet & Flahault, 1886 (D*i*=-0.57) and Microcystis aeruginosa (Kutzing) (D*i*=-0.38) are refused from grass carp fingerlings.

High positive values of food selectivity index for grass carp fingerlings are found in macrophytes Lemna minor (Linnaeus, 1753) (D*i*=0.61) and Spirodela polyrhiza (Linnaeus, 1753) (D*i*=0.45). For the two species of Potamogeton, opposite values (D*i*) have been calculated. For P.crispus (Linnaeus, 1753) the value of this index was 0.19 when for Potamogeton perfoliatus (Linnaeus, 1753) this value was -0.33.

3. Discussion:

The study of species composition of natural feeding and relative composition (% in conformity with individual number) for particular diet components of silver carp (Hypopthalmichthys molitrix) and grass carp, showed that this two species, in early living stages use plankton faction of biocoenosis present in cultivation ponds. Quantitative analysis proved that relative content of plankton (zooplankton plus phytoplankton) in feeding of silver carp larvae was 95.6%, in early free living fry 94.3%, in the feeding of typical free living fry 90% and in fingerlings feeding 79.9%, when for grass carp were 88.02%, 86.4%, 79.25% and 38.36%.

Exploitation of plankton living beings from early living stages of silver carp and grass carp is proved in studies done by [18; 22; 20; 11; 15; 5; 2; 6].

According to [20], silver carp in the stage from larvae to fingerlings is distinguished for having two feeding regimes. The larvae are carnivores since they feed with zooplankton living being. Fingerlings have the tendency to feed with algae and as a result their feeding regime is phytophagous. [11] studied the rhythm of silver carp feeding and proved that variations in consumption degree are caused because of alterations in feeding habits, from feeding with zooplankton to feeding with phytoplankton during transition from free living fry stages to fingerlings stages. [2] have studied the role of silver carp feeding upon the reduction of plankton in ponds and reached the conclusion that except for the ability to exploit algae, the digestive system of this species digests living beings of plankton such as infusoria and rotifers.

Previously have been studied [22; 1; 5; 17; 6] particular aspects of mixed feeding of grass carp in early stages of life. According to [22] grass carp fingerlings take animal food under certain conditions. In this component of the diet we include chironomid larvae, nymphs of ephemeropteran and plecopteran, oligochaetes and gastropods. There are found the trichopteran larvae, neuropteran and amphipod crabs. [1] admitted that the faction of vegetal food in grass carp diet increases with fish age, but animal food is important too, with zooplankton being partially replaced by benthos and especially, phytophilous fauna. According to [**5**] factors like age and individual size influence in composition of grass carp food. These authors admitted that primary diet of grass carp is made up from infusoria and rotifers and the bigger individuals feed with cladocerans and insects larvae. After three weeks, the occurrence of plants in the diet increases, with the appearance of filamentous algae and macrophytes. Same opinions present [**17]** when he admitted that grass carp firstly exploits animal food and the individuals of length 25 cm begin to consume filamentous algae, up to the age of one month consumes submersed aquatic plants. [**6]** pointed out that larvae and free living fry of grass carp are not herbivores and it is proved that they feed with copepods, cladocerans and insects larvae. In this way the free living fry of grass carp may cause alterations of trophic dynamics between communities competing directly for food with larvae and free living fry of native species.

Our study pointed out that the dimensions of the living beings consumed by silver carp and grass carp in their early living stages of life increased with age. Relative average composition ($\mu \pm S^2$) of infusoria in food consumed by silver carp and grass carp larvae was respectively 78.188±8.155% and 61.64±5.875%. In feeding of early free living fry the relative average composition of rotifers for silver carp was 62.500±6.749% and for grass carp was 57.840±4.956%. Maximal consumption of plankton crabs is proved in free living fry stages. Their relative average composition in silver carp feeding was 30.700±2.600% when in grass carp feeding it was 37.210±3.661%.

Romanzova [18] studied the alterations that suffered species composition of diet components of grass carp with growth of body size and found that larvae of length 4.0-6.15 mm have a mixed feeding regime (vitellin plus Scendesmus) whereas the 4-5days larvae present diversification in their feeding regime, manifesting first zooplanctonphagous tendency (infusoria and rotifers). [23] found that five days larvae consume zooplankton of size 50-150 micron, especially Brachionus rotifers. Free living fry feed with cladocerans Moina and Daphnia. According

to valuations of [10] natural feeding of grass carp free living fry of length 7-9 mm is made up of protozoa, rotifers and nauplii of planktonic crabs. The grown forms of planktonic crabs are added to the diet of grass carp individuals with length 12 mm. The diet of free living fry with length 13-17 mm Copepods, is made up of cladocerans and benthos algae. Both authors add that silver carp free living fry of length 7-9 mm feed more with zooplankton, rotifers and nauplii. As the free living fry grow up, in their diet are added grown cladocerans and phytoplankton. [**15]** treating problems of cyprinidae family cultivation in their larvae stage have marked that the first food eaten by larvae in ponds consists mainly of protozoa, rotifers and nauplii. As the larvae grow, they quickly shift to larger food items, including cladocerans and insects larvae.

In different stages of development for the two cyprinidae included in the study we have proved the existence of a selection ability for particular components of diet. We think that this ability in the feeding process depends on prey dimensions, from possibilities of reaching it, disposability of particular living beings in the ecosystem and from biological preferences of the consumer. According to [**2**], the most selected species in silver carp feeding were those that created more dense population. According to the above mentioned authors, high values of selection ability for Scendesmus and Actinastrum algae are related to the fact that their dimensions help maintenance from filter structure of gills. [**26]** states that specific results reported by various authors related to the selective manifestation of grass carp feeding are due to different rearing and feeding conditions on one hand, and to the high trophic plasticity of the species on the other hand.

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