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Population Study of Euglenophyta at the Salmon Breeding Site in Cage-South Caspian Basin (Noshahr)

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ABSTRACT

Since the Caspian Sea has special conditions due to its strategic location, management and monitoring of ecosystems are necessary to protect and restore them from global changes and to fully understand the effects of fish farming in the cage. In this study, a total of 4 phytoplankton sampling periods were performed at depth and depth. Phytoplankton sampling was performed using Rotner breeding time, mid-breeding time and end of breeding time and one year after breeding time, from north, east, south and west of the cage. Samples were taken from fish shade (N_0), 200 m from cage ($N_{100-200}$) and 1000 m from cage (N_{1000}). It is noteworthy that ($N_{100-200}$) was at a distance of 100 m from the cage at the beginning of cultivation to 200 m. Samples were taken from three depths of the surface, middle layer and depth. In total, there were 3 species of Euglenophyta in the four sampling periods. In the Southern Caspian Sea, *Euglena* sp. and *Tracoelomonas spiculifera* and *Trachelomonas planctoniea* were identified. They increased significantly in the sampling one year after sampling, and some species of this group are in the form of Ticoplankt on in high concentrations of organic matter and temperatures, as can be seen, this may indicate good environmental conditions for the growth of this group.

Keywords: Euglenophyta. Salmon, Breeding site, Mazandaran, Caspian Sea Basin

INTRODUCTION

In Iran, studies on the effects of fish farming in the cage are very few, and since the Caspian Sea has special conditions due to its strategic location, therefore, management and monitoring decisions of ecosystems to protect and revive them are subject to global change and full recognition. The effects of fish farming in the cage are essential, and the first step in managing and protecting this ecosystem against these changes is to have a sufficient understanding of these ecosystems and their living creatures. As phytoplankton, including Euglenophyta, is the first indicator of contaminants in aquatic ecosystem, phytoplankton communities and trends in changes in the quality of aquatic ecosystems are always subject to environmental fluctuations. Optimal management of any ecosystem requires basic understanding of the process of environmental change and threats.

Phytoplankton is inexpensive and readily available from biological indicators, so this paper evaluates the status of the salmon breeding site in Cage-South Caspian Basin (Noshahr).

The success of fish breeding in cages depends entirely on the good quality of water around the cage, and the breeder should strive to minimize the environmental pressures on fish and since the Euglenophyta can Phagocytosis or Pinocytosis under conditions, It can be a good indicator for studying how to feed salmon cages in the Southern Caspian Basin, Nowshahr and one of the important factors that create and exacerbate environmental pressures on the cage is the abundance of nutrients that can lead to increased magnification, including Euglenophytes.

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Euglena is an example of a protozoan and is one of the flagellates studied extensively in primitive zoology. This single-celled habitat is the freshwater streams and ponds that the plant has abundant. Their body length is usually 60 microns, but there are also smaller and larger ones, for example, *Euglena oxyuris* reaches 500 microns.

Just beneath the outer shell of the Euglenas are protein bands and microtubules. Part of the tank is spent like flagella in front of the body. Another shorter flagellum is also in the same tank. At the base of each flagellum there is a conitosome, a pulsating vacuole also associated with the reservoir. The stigma blackhead apparently responds to light. There are a number of chloroplasts inside the cytoplasm that give off the green color. Paramyson bodies exist in various forms in the living body that are the source of starch and nutrient storage **(Figure 1)**.

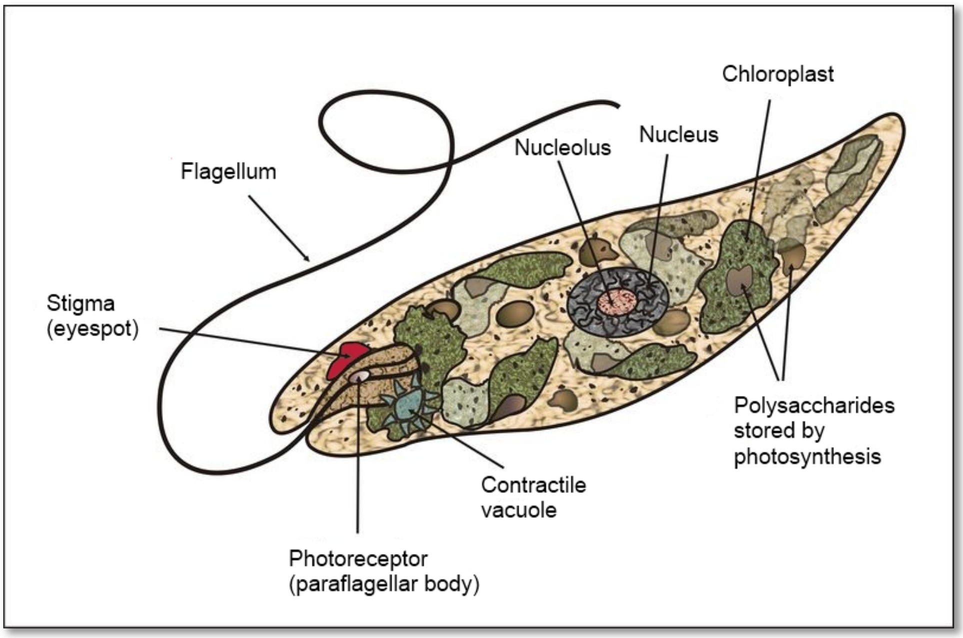

Figure 1. Schematic image of Euglena.

Source: https://commons.wikimedia.org/

Feeding Euglena is Autotrophic and animal or organic feeding in Euglena is scarce or rare. Euglena has plant nutrition and it makes some of the nutrients in the body. This is done through photosynthesis, but if the animal stays in the dark, it becomes sabotage and absorbs nutrients from the body.

Euglena usually lives in unfavorable conditions, such as in environments with high organic matter content or foul play. This type of nutrition is the absorption of water-soluble nutrients from the surrounding environment.

Awareness of the population of Euglenophytes contributes to a clearer picture of the aquatic ecosystem's nutritional status. Euglenophytes live in fresh and saline waters. They are more abundant in waters with higher organic matter content.

Consequently, in other to have successful fish farming in the cage, proper management of water around the cage fishes is needed, as any change in the dynamics of biological communities has an impact on the ecosystem fish, as well as any management problems in the cage fishery can affect the ecosystem.

Although cage farming is new in Iran, there are numerous projects on the living conditions of the southern Caspian Basin that could help with subsequent analyzes of the project, some of which are mentioned here.

Hosseini [1] reported that five studies of phytoplankton including Bacillariophyta, Cyanophyta, Pyrrophyta, Chlorophyta and Euglenophyta in the study of Hydrology and Hydrobiology in the southern Caspian Sea basin during the years 1374 to 1375 reported.

Hall [2] consider one of the environmental problems in cage rearing is the richness of organic matter in the substrate, which usually has the greatest effect on the distance near the cage.

Karimian [3] showed that it is possible to breed in the cage on the surrounding environment, but the water currents in the southern Caspian cause scattering and non-accumulation around the cage.

Jahani [4] studied on Quality Assessment of Contamination Loads due to Potential Impacts of Aquaculture Activities on Ghazaleh (Persian Gulf) on Benthic population with Using

ABC Index to Investigate the Potential Effects of Ghazaleh Cages on Benthic Communities as an Index on the pollution.

Karakassis [5] in 1998 examined the seasonal variation of sediment profiles beneath the Mediterranean cage. The results showed that the thickness of the sediment layer under the cages changes with the change of season, while decreasing with increasing distance from the cage in all seasons.

Due to the need for organic nitrogen, Euglenophyte is an indicator of contamination in aquatic ecosystems, study of Euglenophyte communities, and their interaction with fish breeding, is essential [6].

Therefore, in this study, sampling and identification of cage area in and around and before and after the period of fish rearing were performed according to the proposed methods. South Caspian Sea (Mazandaran Province) is in line with management planning.

MATERIALS & METHODS

In this study, a total of 4 deep and deep Euglenophyta sampling periods were conducted at the Rainbow Trout breeding site in Noshahran area.

Sampling was performed using Rotner Bottle at breeding time, mid-breeding time and end of breeding time and one year after breeding time from north, east, south and west of the cage at distances next to the fish cage (shade) (N_0), 200 m from The cage ($N_{100-200}$) and 1000 m from the cage (N_{1000}) were sampled.

It is noteworthy that ($N_{100-200}$) was at a distance of 100 m from the cage at the beginning of cultivation to 200 m. Sampling from each station was done from three depths of the surface, middle layer and depth **(Figure 2)**.

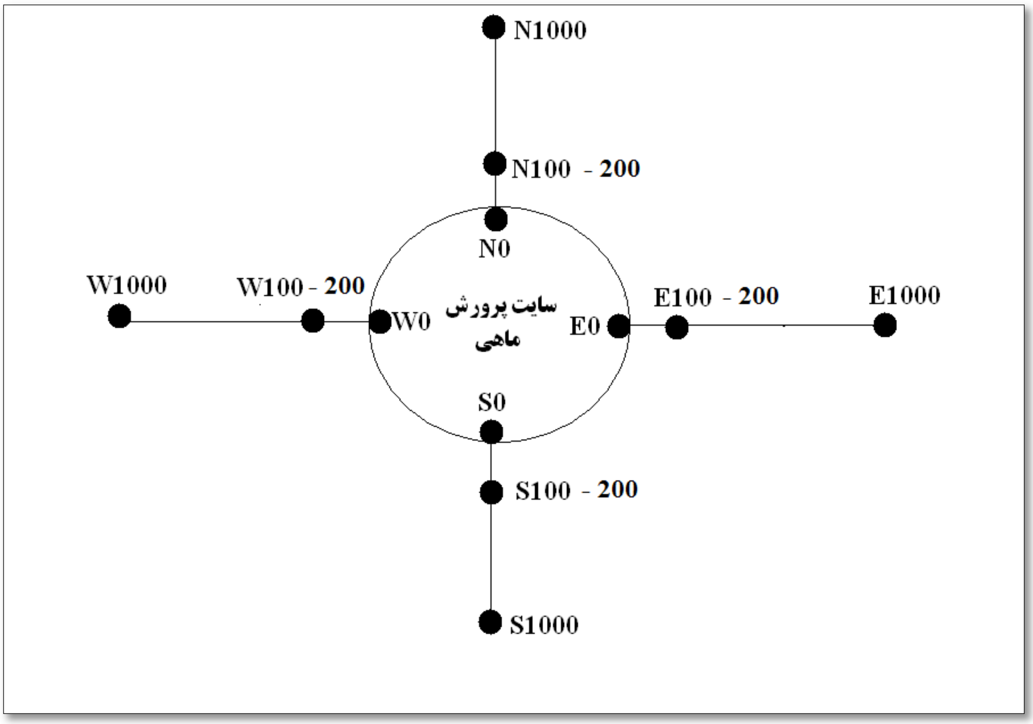

Figure 2. Sampling stations.

The specimens were immediately recorded in 4% formalin fixation specimen and station characteristics and time of sampling and transferred in 500 ml glass containers to planktonic laboratory of Caspian Institute of Ecology. Samples were kept in the dark for 10 nights in the laboratory to completely precipitate. It was then discharged with a special upper-level siphon or supernatant that lacked any plankton.

The remaining samples were centrifuged (Labofuge200) at a speed of 3000 rpm for several minutes to achieve a final volume of 25-30 ml. Samples were counted on linear slides by pipet pistons with volume of 0.1 cm^3 [7].

The samples were homogenized after centrifugation and stained with a few drops of eosin and then identified and examined under a microscope at 10x, 20x and 40x magnification.

At this stage it is a qualitative review and it is important to know their limits only to dilute or concentrate it if it is too high for the quantification phase. After quantitative determination of the samples, after determination of dilution or concentration in the qualitative phase, the sample was precipitated for 24 h and then, using a pipette, removed 0.1 ml of the sample and stained using eosin. The microscope was identified and the number and then the density per cubic meter were counted [7-11].

It should be noted that phytoplankton identification sources were used to identify phytoplankton [12-17]. Liters were determined at each station and recorded in the classified information forms and branch density and finally total density of phytoplankton were calculated.

RESULTS

In this study, in total, during all four sampling periods, three species of Euglenophyta were identified, including *Euglena* sp., *Tracoelomonas spiculifera* and *Trachelomonas planctoniea*. one year after breeding time, 1 species of *Trachelomonas planctoniea*, at the breeding time, 2 species of *Trachelomonas planctoniea* and *Euglena* sp, in the mid-breeding time 2 species of *Trachelomonas planctoniea* and *Tracoelomonas spiculifera* and at the end of breeding time, no species of this group was observed **(Table 1)**.

The change of the whole branch of Euglenophyte during the study period were significant ($p<0.05$).

Table 1. List of identified Euglenophyta species in different sampling stations and layers around the cage.

Phylum	Species	Breeding time	Mid-breeding time	End of breeding time	One year after breeding time
	Euglena sp	+			
Euglenophyta	*Tracoelomonas spiculifera*		+		
	Trachelomonas planctoniea	+	+		+

In this study, Euglenophyta had low density during aquaculture activity, but Euglenophyta shoot density increased significantly at all three depths, mid and deep one year after the growing season (December 97). Although Euglenophyta phylum decreased at the highest level and with increasing depth of density of Euglenophyta species, these depth changes were not significant ($p>0.05$) **(Figure 3)**.

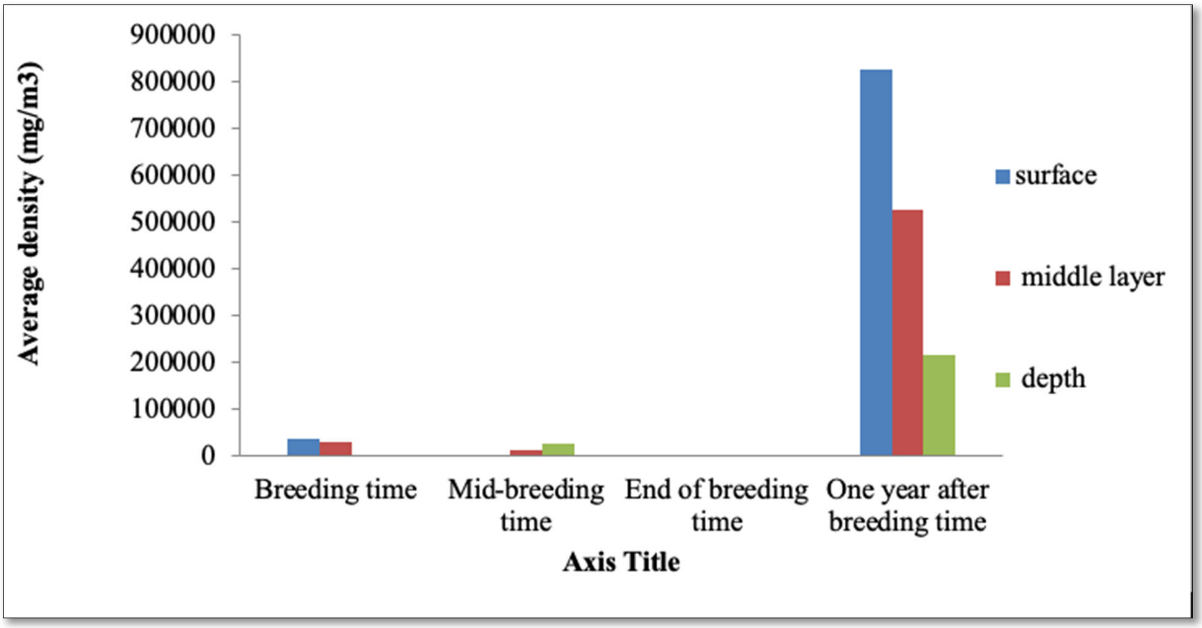

Figure 3. Average Euglenophyta density at different breeding times and different depths.

At all stations during the one-year breeding period, the Euglenophyta phylum was observed **(Figure 4)** belonging to the species *Trachelomonas planctoniea* **(Table 1)**.

The highest density was observed in the east of the shade and then in the west at distance of 200 m, while in the shade south the lowest was observed.

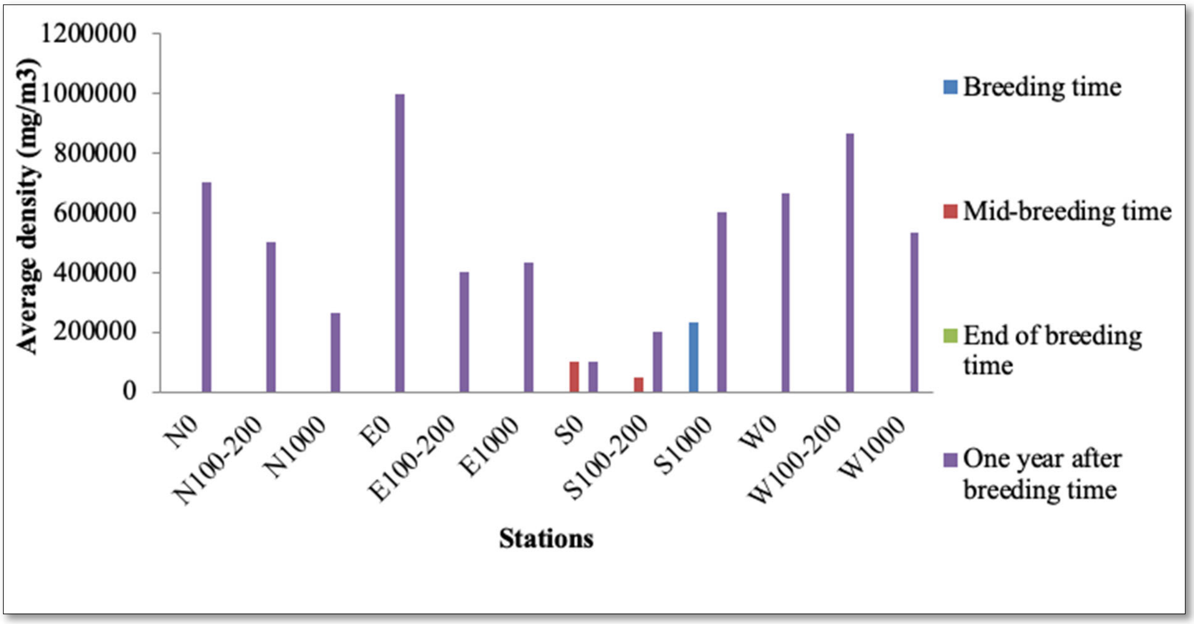

Figure 4. Average density of Euglenophyta at different sampling stations around the cage at different breeding times.

DISCUSSION

Specimens identified as Euglena in the southern Caspian basin had a spindle body, flagella, long green chloroplasts, or multiple fragments. Paramylon bodies were changed to rod-shaped and cell-shaped by impact and movement, although they could remain the same. Spiral lines were sometimes seen on the body and red cells in such a way that the hematochromes almost covered the green grains [1].

When feeding as a heterotroph, Euglena takes in nutrients by osmotrophy and can survive without light on a diet of organic matter, such as beef extract, peptone, acetate, ethanol or carbohydrates [6]. The accumulation of this genus in the lakes turns red water due to the production of hematochromes in cells, but this was not the case in this study. In the southern Caspian Sea, species Euglena, *Tracoelomonas spiculifera* and *Trachelomonas planctoniea* were identified. Tracoelomonas were differentiated by disk-shaped, chloroplasts of green to ovoid, usually coated with a round cover, such as round or oval-brown. The cells were transverse and over 25 microns. The flagellum came out of a protruding pore whose flagellum was hard to see [6].

This genus is sometimes equipped with thorns and spines, but the thorns of their bodies were not found in the species of reef fishponds in Mazandaran province. The wall in this flat genus was rarely spiny, reticulate, or porous. This color is different depending on the amount of iron.

Tracoelomonas is found as Euplankton in shallow water and intakes. It is also found in environments with high nutrients and high temperatures. Some species of this genus also occur as Ticoplankton in environments with high concentrations of organic matter and high temperatures, which were also observed in the southern Caspian Basin.

In this study, *Euglena* sp., *Tracoelomonas spiculifera* and *Trachelomonas planctoniea* from the Euglenophyta branch gave relatively large dispersal to the southern Caspian basin [18].

Overall, the abundance of Euglenophytes in the lakes indicates the onset of increased organic matter and contamination in waters and eutrophication, and they are more abundant in waters with higher organic matter also on Lake Arancio also cited these species as stress and pollution-resistant Dinoflagellates [19].

Overall, according to the results obtained, the difference in the population density of the whole Euglenophytes depends on the physicochemical conditions of the water, the amount of organic matter, and their distribution and density.

Although it is difficult to find the cause of all these differences and determine the factors that influence their growth; however, more thorough studies with more appropriate identification equipment and resources can help us better understand the ecological relationships of aquatic ecosystems and better biodiversity indices.

In order to have successful fish farming in the cage, proper management of water around the cage fishes is needed, as any change in the environment of the cage environment affects the fish, as well as any management problems in the cage fishery can affect the Caspian Sea ecosystem. As well as the method of feeding and collecting waste, it needs to be very careful not to increase the organic matter in the environment.

REFERENCES

1. Hosseini SA, Rowshantabari M, Roodi SA, Makhlouq A, Takmilian K (2010) Hydrology and Hydrobiology of the Southern Caspian Basin. Iran Fisheries Research Institute, pp: 510.
2. Hall POJ, Anderson LG, Holby O, Kollberg S, Samuelsson MO (1990) Chemical fluxes and mass balance in a marine fish cage farm: I. carbon. Mar Ecol Prog Ser 61: 61-73.
3. Karimian AS (2016) Study of environmental conditions in rainbow trout (Oncorhynchusmykiss) cage in Abbas Abad area of Southern Caspian Sea, PhD dissertation, Khorramshahr University of Marine Science and Technology.
4. Jahani N, Prophet SMB, the peasant school, S. And Seyyed Morteza, Q. R. (2010) Quantitative assessment of pollution load caused by probable effects of aquaculture activities on Ghazaleh (Persian Gulf) on benthic using ABC index. J Fish Sci 4(19): 54-43.
5. Karakassis I, Tsapakis M, Hatziyanni E (1998) Seasonal variability in sediment profiles beneath fish farm cages in the Mediterranean. Mar Ecol Prog Ser 162: 243-252.
6. Pringsheim EG, Hovasse R (1948) The Loss of Chromatophores in Euglena Gracilis. New Phytol 47(1): 52–87.
7. Newell GE, Newell RC (2006) Marine plankton: A practical guide. Lymington, Hanys: Pisces Conservation.
8. Vollenweider AR (1974) A manual on methods for measuring primary production in aquatic enviromantal. Blackwell scientific Publication. Oxford, London, pp: 423.
9. APHA S (2005) Standard Methods. American Public Health association .Washington, DC 2005, USA, pp: 346.
10. Desikachary TV (1958) Electron microscope study of the Diatom–wall structure. J Sci Indust Res 11B (11): 491-500.
11. Habit RN, Penkow (1976) AlgaenoFloranderstoseeVebgustaFishersVerlaygiena, pp: 493.
12. Prescott GW (1962) Algae of the western great lakes area. Vol 1, 2, 3. W. M.C. Brown company Publishing, Iowa, U.S.A., pp: 933.
13. Maosen H (1983) Fresh water plankton illustration. Agriculture Publishing House, pp: 85.
14. Ruttnerkollisko A (1974) Plankton Rotifers, Biology and Taxonomy stuttyart, Schwizerbart'scheVerLagsbuchhandlang, Stuttgart.
15. Tiffany LH, Britton ME (1971) Thealgae of Illinois, Hanfer Publishing company, New York, pp: 407.
16. Edmondson WT (1959) Fresh water biology. New York, London. John Wiley & Sons, Inc., pp: 1248.
17. Pontin RM (1978) A key to the fresh water planktonic and semiplanktonic rotifer of the British Isles. Titus Wilson and Son.Ltd., pp: 178.
18. Rassashko IF, Karymashkov OA (1992) Phytoplankton of the upper Dnieper and its tributaries in the belorussianpolesie. Gidrobiologia 27(5): 46-52.
19. Barone R, Flores LN (1994) Phytoplankton dynamics in a shallow, hypertrophic reservoir (LakeArancio, Scily). Hydrobiologia 289: 199-214.