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VARIATIONS SEASON AND ANNUAL MAIN INDICATORS EUTROPHICATION SOME PONDS FISH. NOTES (I) PARAMETER PHYSICAL- CHEMICAL

VARIATII SEZONALE SI ANUALE ALE PRINCIPALILOR INDICATORI DE EUTROFIZARE A UNOR BAZINE PISCICOLE . NOTA (I) PARAMETRII FIZICO - CHIMICI

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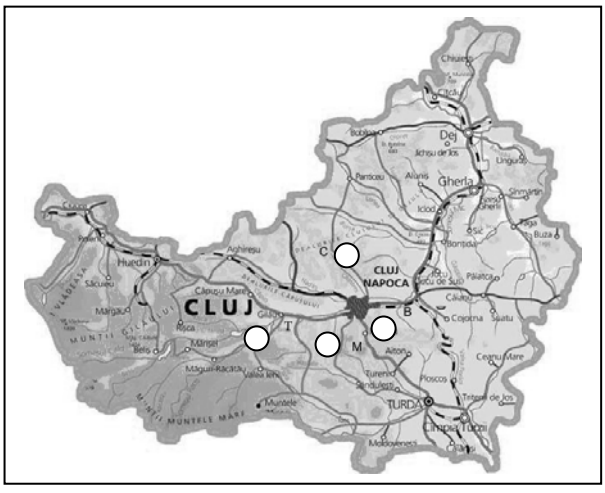
Study physico- chemical parameters is an integral part in the study of any ecosystem, especially at the level of aquatic. Indicators of water quality is mirrored in the final fish production obtained, thei acting and interacting simultaneously.
Keywords: water quality, ponds, water degradation

Introduction

The aim of this paper work consist in monitoring of those physical – chemical parameters who has an great influence above the chemical structure of water quality during biological year (March – October 2008). The research was made in 4 fish pond situated in Cluj county who belongs to Association of fish man (2 ponds, B and C), and two ponds belongs private owners (M and T). The variable who was follow: the organic matter decay (CCOMn), the variation amount of nutrients, ammonium, nitrites, nitrates and phosphates, together with temperature, the amount of dissolved oxygen, degree of saturation, water pH. Develop seasonal fluctuation of the amount of organic matter and nutrients, the maximum value recorded in summer season, the same upward curve shows a



temperature and pH parameters , and background value for dissolved oxygen and saturation level. Values obtained in water include water in mesosaprobic category. Statistical data were analyzed using Microsoft Excel program and for comparing the data was used one-way ANOVA, t - test for independent samples for $P < 0.05$ as level of significance. For value who does not fallow Gaussian curve and are very dispersed we use an non – parametric test Mann-Whitney

Materials and Methods

Sampling of water at the fish ponds was made from different points, including the middle of basin, obtaining a sample of mixture.

Dissolved oxygen, temperature and pH of the water were determined in - situ using the necessary equipment (oxygen-meters, electronic thermometer with probe and pH meter, and the elements of nitrogen and phosphorus (nitrites, nitrates, ammonium, phosphates) spectophotometric using Refleqtoquant RQ - Flex Plus Merck. The organic matter was determine using the method with potassium permanganate.

Results and Discussion

Beside the parameters who was taken in our study we followed the evolution of abiotic factors of air: temperature, precipitation, wind speed with direct or indirect influences on the evolution of aquatic variables.

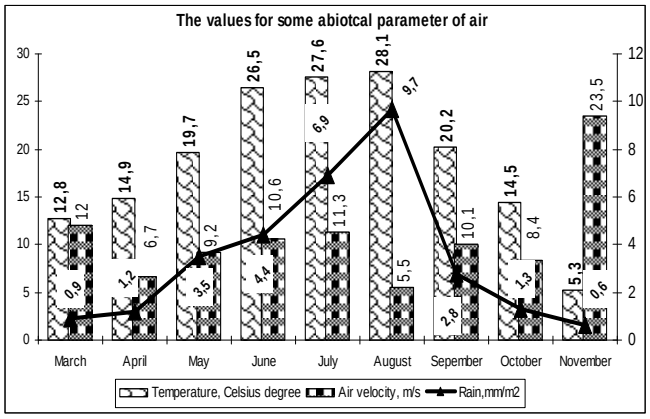


Figure 1

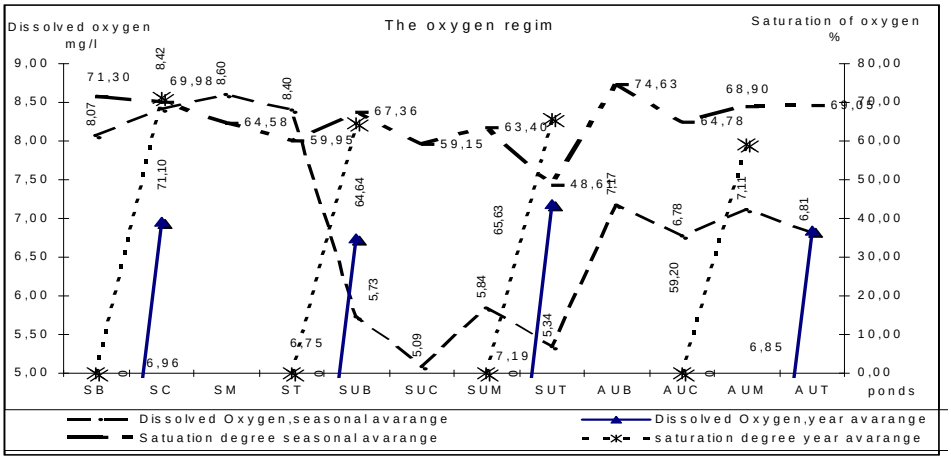
Air temperature values are included between 5.3^0C and 28.1^0C. The movement of air currents is variable the minimum recorded in August is 5.5 m / s and maximum 23.5m/s in November.(graph 1). Amount of precipitation has maximum vale in summer season 4.4 - 9.7 mm/m2, reduce in spring and autumn season. Thermal regime of the ponds studied, reveals specific phenomena who happen in deep small basin, the seasonal variations recording the evolution of close air temperatures. Average annual values ranging from 16.55 ± 1.04^0 C at 18.96 ± 1.30 ^{0}C and seasons on the curve represents an increase of values with the submission for the summer and fall in autumn season as can be seen from graphic 2. The temperature in the spring season has values who ranging from 11.75 ± 1.34^0 C (T) -

15.00 ± 1.97^0 C (C), heating water in the summer will lead to the increase of the temperature between 22.34 ± 0.81^0 C (T) - 25.50 ± 0.57^0 C (M). Once the weather is cooling and a decrease of water temperature in autumn values are obtained ranging between 15.01 ± 1.06^0 C (T) - 16.45 ± 1.38^0 C (M).

Comparing the values obtained from pools a year biologic we don`t notice differences, but the comparison of values within the same season pond reveals significant differences between significant and distinct significant between spring-summer seasons.

The dissolved oxygen. Included water fish ponds studied in first-class of quality in the spring season, the value obtained having 8.06 ± 0.34 (B) - 8.41 ± 0.39 (M) mg / l (graph 2). A further decrease we meet in the summer season (graph 3), with increasing values of temperature at the water level 5.09 ± 0.22 (C) - 5.84 ± 0.26 (M) mg / l and a recovery in terms of increasing concentration with decreasing values of temperature in autumn 6.81 ± 0.20 (T) - 7.17 ± 0.12 (B) mg / l. Average annual values obtained at the pond waters studied include the building of a second condition which reflects the protection of aquatic ecosystems (Article 2, Annex, The law of water) and are good value for Cyprinidae species who are resistent when the oxigen dissolvet become lower (Bura, 2002).

Even if in summer season the dissolved oxygen quantity is reduce the



Figures 2, 3

necessary requirements of fish species is good, less pike perch, when in this time of year was recorded massive mortality on this the species in Lake C, and massive infestation with Saprolegnia all species in Lake T (Negrea , 2007).

The degree of oxygen saturation. Fluctuating curve shows the same as in the case of oxygen which is linked as well as the water temperature. On an organic whole, in terms of trophic state of water included B pond in slight pollution 71.09 ± 1.90% and 3 other ponds in mesosaprobic. Season include values are between 59.95 ± 1.74 (T) - 71.09 ± 1.90% (B) spring; 48.60 ± 1.31% (T) - 67.35 ± 1.46 (B) - summer and 64.78 ± 0.63 (C) -- 74.63 ± 1.66% (B) - fall. Between seasons were

recorded differences between spring and summer season in pond C and very significant differences between season of summer-autumn pond in case T. On year we found very significant difference between B and T ponds, minimal oxygen saturation as a parameter characteristic assessment of trophic status in ponds studied included ponds C, M and T mesosaprobic stage.

The pH of the water. Evolution of the values this parameter is dependent of weather conditions and the present in water to other elements, the pH influencing the physical - chemical and biological processes from water (Man, 2006)

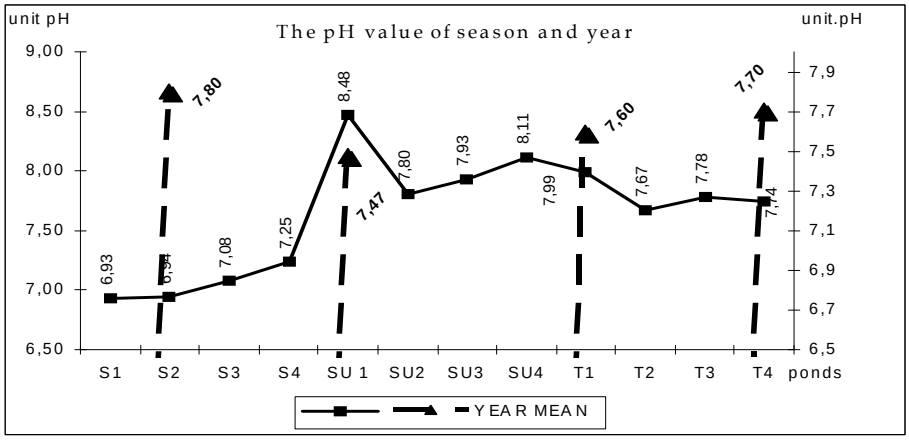


Figure 4

Season average values, fluctuation, lower values are recorded during spring (graph 4) 6.93 ± 0.12 (B) -7.24 ± 0.05 unit. pH (T); in the summer the values ranging from 7.80 ± 0.10 (C) -8.48 ± 0.14 (B) unit.pH, followed by a new fall season immediately following 7.74 ± 0.06 (T) - 7.99 ± 0.18 (B) unit. pH. Annual average values ranging from 7.47 ± 0.08 (C) -7.80 ± 0.13 (B) unit pH. Average values obtained are within the limits 6.5 - 8.5 unit. pH, but in the summer season the value over 8 pH unit can be considered dangerous for fish. Season comparison indicates significant differences and very significant value who was registered at the same pond as follows: between seasons of spring-summer the value obtained are very significant into B and M pond and between seasons-autumn at the same lakes (graph 4). The small value is registered in summer season when raining. This value are confirmed from literature by authors like (Pricope, 2000).

Organic matter. In the photic zone, the organic substance expressed by CCOMn presents seasonal variation with minimum values recorded in the spring at the 4 ponds, 17.60 ± 1 (C) - 19.12 ± 0.90 (M) $KMnO_4$ mg / l (4.45 ± 0.26 -4.83 ± 0.22 mg O_2 / l) (graphic 5). Values increase in summer season 33.34 ± 1.57 (T) - 29.26 ± 0.94 mg $KMnO_4$ / l (B) (8.29 ± 0.41 - 7.28 ± 0.24 mg O_2 / l) and maintained at high value in next season 28.8 ± 0.87 (B) - 34.37 ± 0.75 (T) $KMnO_4$mg /, respectively 7.29 ± 0.32 - 8.69 ± 0.27 24 mg O_2 / l. From point of view of this parameter the water of ponds study it is included in category

mesosaprobic water, the phenomenon of water degradation is more pronounced in the case of Lake T (graph 5) .

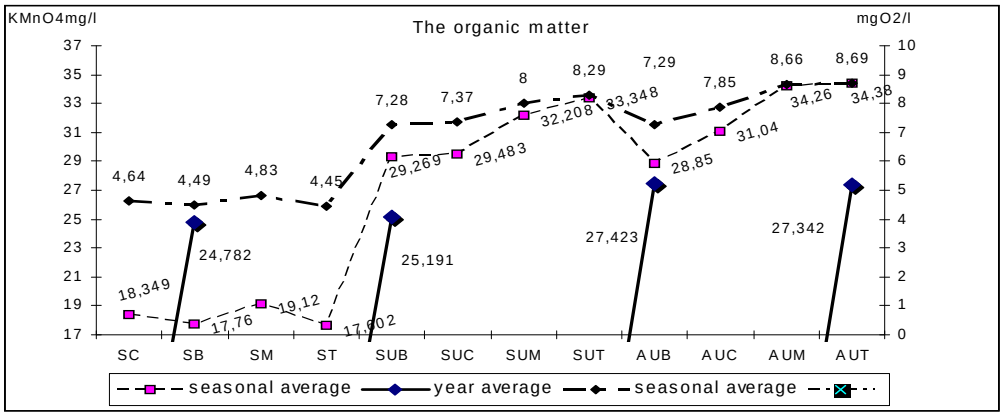
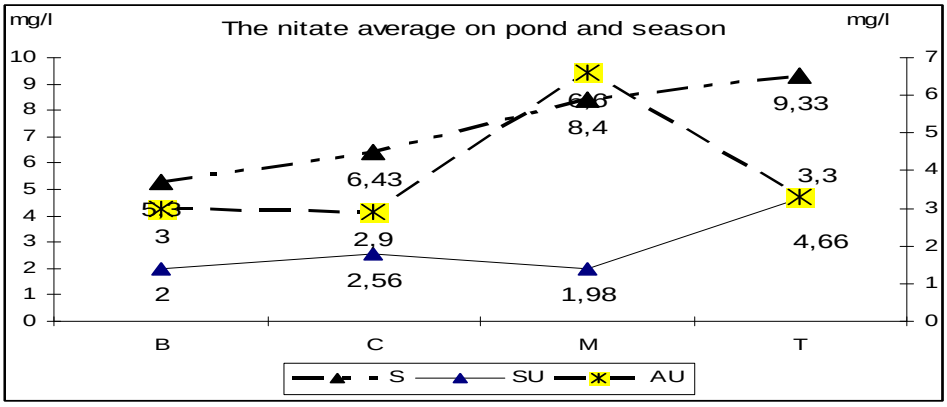


Figure 5

The annual average values obtained to this parameter correspond to classes of quality 3-4, but in terms of the dominant species of fish the substance expressed in mg O_2 / are favorable for growth Cyprinidae species (Bud, 2002). The value $KMnO_4/O_2$ report indicates a decrease of the mineralization capacity of organic matter accumulation of organic substance who can not be decompose corresponding state meso / polysabrobic in the basin B, C, MSI mesosaprobic pond for T.

Comparing the season value at the pond and the annual average between ponds were very significant differences within the same basin in spring - summer, the same highly significant difference obtaining between the spring-autumn seasons. Per biological year is not record differences between values obtained in ponds.

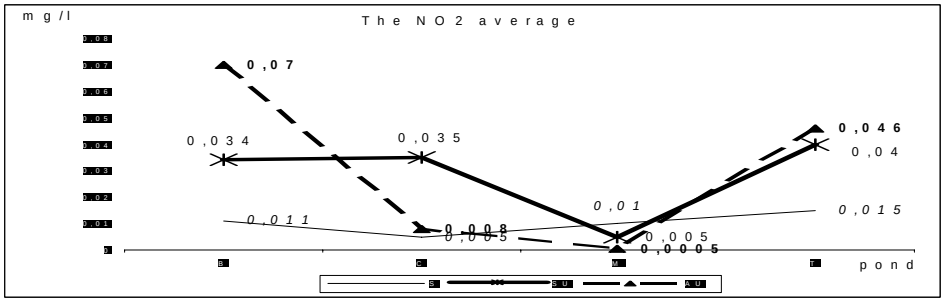
The value of nitrate parameters present an ascending curve towards summer season, average values located on the seasons is situated over the considered protective for the aquatic ecosystem of 3 mg / l. (graph 6).



Graph 6

The lower values of this parameter is recorded in months vara2.0 ± 0.6195 (B) 5.0 ± 0.2796 (M) mg / l. Compared with these values estivale, spring season comes with a higher intake in nitrates 5.3 ± 0.9168 (B) - 9.4 ± 0.8876 (M) mg / l. Autumn values follow those of the summer 2.96 ± 0.6513 (C) - 6.6 ± 0.8600 (M) mg / l. Ciprinialor If these values are well below the reference (50 mg / l) (Bud, 2004).Values significant and distinct significant were recorded only at the basin B seasons spring summer autumn and spring. Comparison between the average annual river reveals very significant between pools B and C, C and T and between distinct pools C and T.

The nitrites value during study shows fluctuation 0005 ± 0001 (C) - 0015 ± 0001 mg / l (M) in the primavera, the growing season warm season average beeing between 0005 ± 0000 (M) - 0035 ± 0007 (C) mg / l, while in autumn there



Graph 7

is a recovery of valoriolr media is variable between 0000 ± 0.0005 (M) mg / l - 0070 ± 0006 (T) mg / l (graph 7).
The values obtained are much lower than the amount permitted by some authors (Schlotfeldt HJ, 1995) . Season compared to values in the same basin reveals significant differences between the season of spring - summer in the pool B and the comparison between average annual river reliefeaza very significant differences in this parameter between pools B and M and between distinct pools B and C.

Ammonia is another parameter identified and followed mostly negative due to the action that you can have when increasing pH values (Horvath, 2005). The values of the spring varies from 0.23 ± 0.02562 (M) - 0.45 ± 0.09770 (C) mg / l, 0.17 ± 0.02 in summer (C) mg / l - 0.66 ± 0,051 (T) mg / L and 0.10 ± 0037 (C)

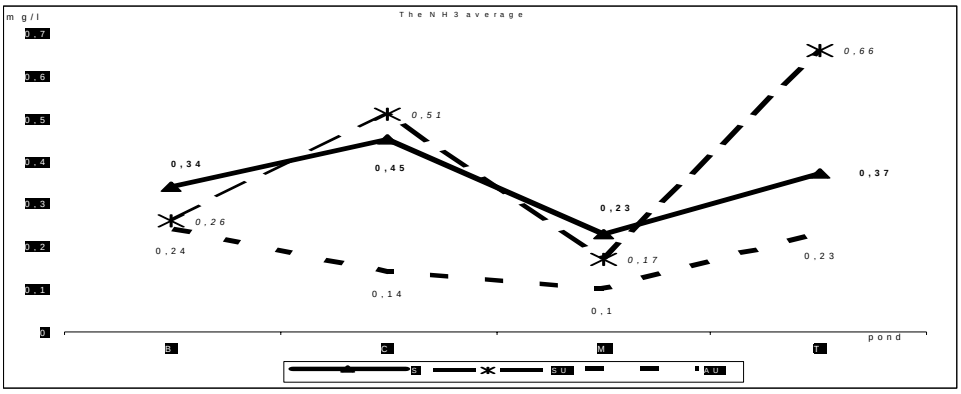
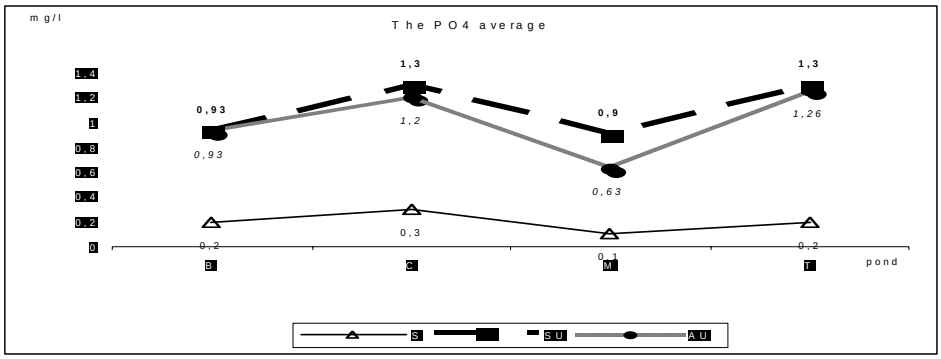


Figure 8

mg / l autumn - 0.24 ± 0,021 (T) mg / l. Reported in literature Gabriela Munteanu and col, 2003), the value of this parameter are much larger, but have not identiicat cases intoxcatie with ammonia in any of the studied basins disinct Significant Differences between the season in the basin aceliasi iregistreaza the summer between seasons - autumn in the river C and T. Average annual comparative between basins recorded very significant between pools B and M, M and T and significant inre pools C and M

Besides the nitrogen-based and has watched the evolution of ortho - phosphate, the same period. Average spring ranges between 0.16 ± 0,007 (M) mg / l - 0.37 ± 0.06 (C) mg / l. Values increase during the summer was between 0.9 ± 0.04 (M) mg / l - 1.3 ± 0.05 (C) mg / l. (graphic 9) The season of autumn
decrease slightly compared to the summer as follows: 0.63 ± 0.12 (M) mg/l- 1.26 ± 0.13 (T) (graph 9). Comparative values of the season out very different semnificative0.56 ± 0.05 mg / l (M) - 0.95 ± 0.08 mg / l (C) between spring-summer (C and T) and distinguish between the same seasons in the basin B and T.

Comparing the average annual emphasize significant differences between ponds C and semfificativ between M and M and T to the phosphate. Values obtained in this setting are higher than the permitted limits, especially as this variable is respensabila of water eutrophication (Nicoara 2002).



Graph 9

Conclusions

During biological year distinguish an increase in general pollution coefficients with the submission for the summer season.

Values obtained at the main parameters are typical the water degradation waters being included in studied in the mesosaprobic water category. Water temperature has values close to those of air temperatures.

The value of dissolved oxygen shows a downward curve with increasing thermal gradient

pH fluctuation of water is present during biological year but the maximum recorded in summer season, lower values recorded in the period with precipitation

The organic matter increase, nitrate levels decrease during the summer, nitrites and ammonium, elements with toxic character presents high values, and phosphates presents an upward curve, the values being higher than those stipulated by the literature.

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