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# Monitoring and Assessment of Heavy Metals Contamination in two types of Fish Carp Fish and Binni Fish (*Cyprinus Carpio* and *Barbus Bynni*) And Bioaccumulation in Them

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**Abstract**

This study was carried out to assess concentration of heavy metals (lead, cadmium and copper) in two types of fish carp fish and binni fish (*Cyprinus carpio* and *Barbus bynni*) during the summer and winter seasons,in Al- Dalmaj marsh in Al-Diwaniyah Governorate, middle Iraq we have measurement and determined concentration heavy metals in in gills and muscles of fish. The results of measurement of the concentration of heavy elements are shown , the highest average concentration of elemental Lead fish the highest concentration of lead was recorded was 223.11 ppm in the gills samples of the Caribbean fish *Cyprinu scarpio* during the summer season. For Cadmium concentrations, in fish, the highest concentration of 1.81 ppm in the gills of buni fish *Barbus bynni* during the winter season. The concentration of the copper element, fish samples the highest concentration of the Copper element reached 6.236 ppm in the gills of the buni fish *Barbus bynni* during the winter season. All measurements of heavy metals in fish were relatively high. This led to the conclusion that the bioaccumulation of fish with these minerals came from water. It means that the water is relatively contaminated with heavy metals.

**Key words**: heavy metals, Cd, fish carp, binni fish

## Introduction

Disruption of the balance of any ecosystem is a type of pollution that in turn leads to environmental degradation (Cock *et al*., 2000). Pollution is the presence of any of the polluting agents and materials in a large quantity or for a period, that directly or indirectly affects the damage to living organisms and their surroundings (Habib, 2001). Marshes are considered a transitional region between land and water, as they represent the middle between terrestrial and aquatic ecosystems, as they are largely command by water and have a special type of organism, which usually undergo distinct, time bound changes from aquatic to intermediate kinds (Goswami *et al*., 2010). Al-Dalmaj marsh is one of the ecologically significant marsh and the notable and the minimal studied in the Middle Euphrates, it is of huge importance at the national, regional and international levels, as the region is characterized by many advantages that make it unique and distinct from the environmental and recreational perspectives, despite the environmental importance of the Hor Al-Dalmaj region, It is exposed to several acute pressures and threats such as poor management of the hydrological planner , agricultural expansion, pollution and habitat demolition

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(Kadhum *et al*., 2018). The concentration of elements within cells depends on each of the external factors that affect the interaction between the elements and the cell membrane, such as pH, salinity and other complex organic and inorganic molecules, as well as chemical and physical factors that control the rate of metabolism such as temperature. Light, oxygen, nutrient ratio, as well as the amount of element in the water and the nature of the organism's metabolic activities (Favero *et al*., 1996). The development of industry and the expansion of chemical compounds used in various branches of industry led to the environmental spread of heavy metals and increased pollution with many heavy metals in the southern marshes of Iraq, which was of interest to many researchers, including (Bedair *et al*., 2006; Al-Saad *et al*., 2007).

## Materials and Methods

The study area, illustrated in Figure (1), located between Wasit and Diwaniyah governorates, detecting the concentrations of some heavy elements (lead, cadmium and copper), during the summer and winter seasons, in two types of fish carp fish and binni fish (*Cyprinus carpio* and *Barbus bynni*) Figure (2)


**Figure (1): Study area and station distribution.**

***Barbus bynni***

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Cyprinus carpio

**Picture from study area. : Figure (2)**

**Collecting fish samples**

The studied fish (*Cyprinus carpio* and *Barbus bynni*) were collected from hunters, where the adult fish were taken and cut up, then the parts required for examination (gills and muscles) were taken and mashed by hand mortar each separately. Then the analysis samples were taken and kept in aluminum foil marked and preserved with degree Temperature -20 ° C until extraction and analysis (Paruk1*et al*., 2014).

**Extraction of Bird and Fish Samples**

Extraction was done according to the following method (Mittendorf*et al*., 2010):

**Heavy metals measurement**

Conducting the measurement of the proportions of heavy elements in plants, birds and fish by taking the necessary steps for measurement with the Flame Atomic Absorption Spectrophotometer, depending on (Haswell, 1991), as follows:

1. A quantity of pre-prepared samples was taken and placed in a watch bottle in an electric oven at 105 ° C until dehydration.
2. two gm of the dry form was taken in glass beakers, and 40 ml of concentrated nitric acid HNO3 (70%) was added to it to carry out the digestion process and left the form covered with an hour bottle for a day.
3. The sample was heated using a hotplate at a temperature of 60 ° C until the sample was melted.
4. After letting the model cool down, 3 ml of pyrochloric acid $HClO_4$ (60%) was added and the heating process was repeated at a low temperature of 40 ° C until it dried.
5. The sample was lifted from the hot plate and then it was cooled. 3 ml of HCl and 3 ml of distilled water were added to it and returned to the preheater at a low temperature for dissolving the sediments.
6. Whatman 0.45 filter paper was filtered and the resulting solution was placed in a 50 mL glass volumetric flask and completes the volume with distilled water to the mark.

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7. The Blank reference solutions were prepared in the same way, without using a sample.
8. Fluka dispenses standard element solutions.
9. The element concentrations in the models were estimated with the English made Flame Atomic Absorption Spectrometry Buck 210 VGP.

**Results and discussion**

For fish, the Figure (3) shows that the highest concentration of lead was recorded at 223.11 ppm in gills samples of the Caribbean fish *Cyprinus carpio* during the summer season, with a obvious difference from the mean of the rest of the models, while the lowest concentration was 0.04 ppm in muscle samples of Caribbean fish during the winter season. Rahman *et al*. (2012) that the fish Pb concentration was 0.0203 ppm. In a study Zolfaghari (2018) to determine mercury and lead concentrations in the muscle of *Ctenopharyngodon idella*, *Cyprinus carpio*, *Hypophthalmichthys nobilis*, *Schizocypris ideidorsalis*, *Schizothoraxmicellar* and *cyprinus cyprinyi*, lead concentrations in *Ctenopharyngodon idella*, *Cyprinus carpio* and *Hypophthalmichthys molitrix* were within the range suggested by the Food and Agriculture Organization and the World Health Organization, but the lead concentration in *Schizocyprisaltidorsalis* and *Schizothorax zardunyi* was higher than WHO and reported that the cumulative risk increased dramatically. The rate of fish consumption, which leads to alarming concern to the health of the consumer. Sheta *et al*. (2019) stated when studying the concentrations of heavy elements in fish within wet areas in Egypt that the average concentration of elemental lead reached 6.59 ppm. Pakusina *et al*. (2018) noted in their study for evaluation Gilchin River in Russia for the period 2014-2015 that in the fall of in 2015, there were cases of a lead concentration increase of 1-1.2 ppm in Prussian carp muscles from the Kozmodemyanovskoe reservoir of the Gilchin River.

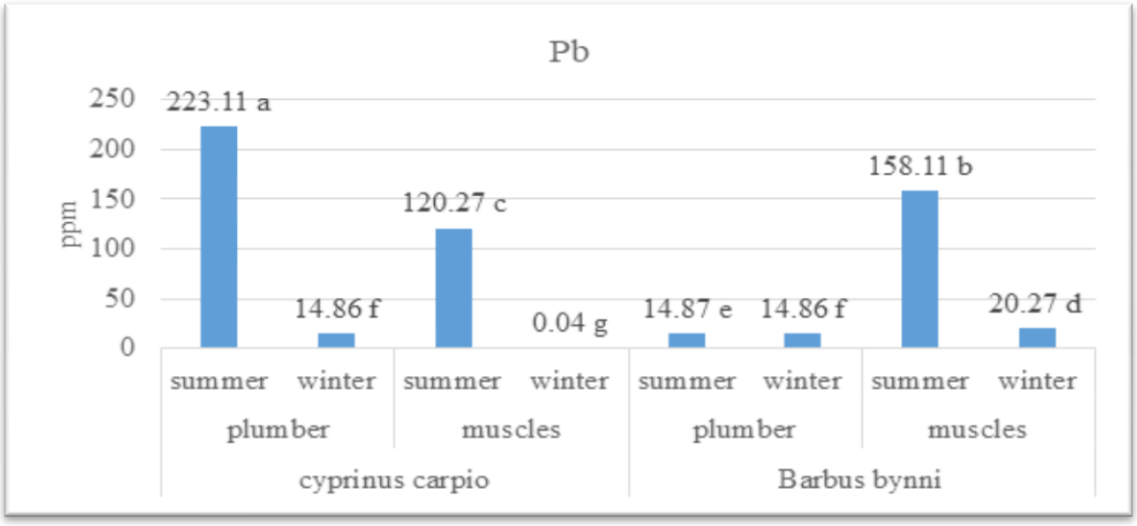


**Figure (3): Means of lead concentrations in fish samples during summer and winter seasons (ppm).**

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The values attend by the identical letter do not diverge significantly from each other according to the Duncan Multiple- Range -Test (Pr≤0.05).

For cadmium concentrations in fish, Figure (4) shows that the gills of *Barbus bynni* fish during the winter season recorded the highest significant concentration, which reached 1.81 ppm, while the lowest concentration of cadmium was 0.012 ppm in the gills of the same species during the summer season. Rahman *et al*. (2012) found that the Cd component of fish concentration in Bangshi River in Bangladesh was 0.0013 ppm. Sheta *et al*. (2019) when studying the concentrations of heavy elements in fish in wet areas in Egypt that the average concentration of cadmium was 6.67 ppm. Pakusina *et al*. (2018) in their evaluation study of the Gilchin River in Russia for the period 2014-2015 that the cadmium element concentrations in the studied fish samples were less than 0.1 ppm.

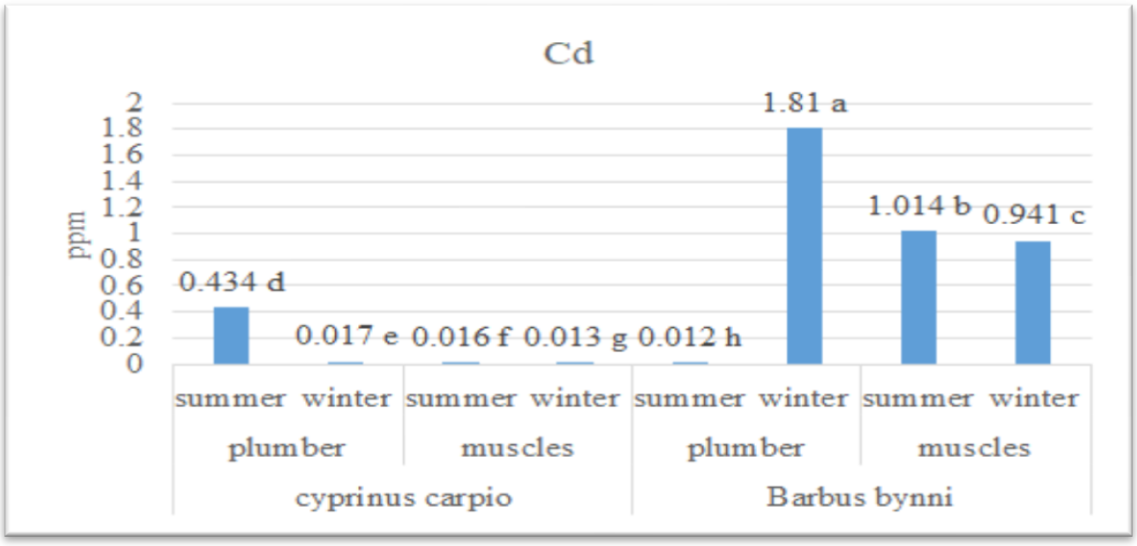


**Figure (4): Means of cadmium concentrations in fish samples during summer and winter seasons (ppm).**

The values attend by the identical letter dont diverge significantly from each other according to the Duncan Multiple_ Range Test (Pr≤0.05).

For fish samples, Figure (5) shows that the highest concentration of copper was 6.236 ppm in the gills of the brown fish *Barbus bynni* during the winter season, with an obvious difference from the average concentrations of the rest of the models, while the gills of *Cyprinus carpio* fish during the winter average was 1.984 ppm. Pakusina *et al*. (2018) in their evaluation study of the Gilchin River in Russia for the period 2014-2015 that the copper element concentrations in the studied fish samples ranged between 0.57-10 ppm.

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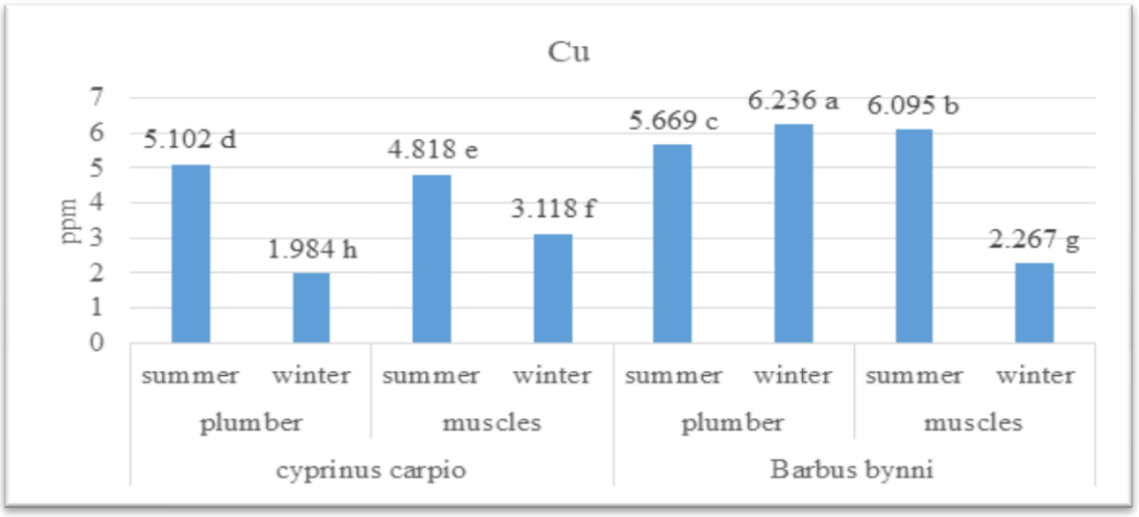


**Figure (5): Means of copper concentrations in fish samples during summer and winter seasons (ppm).**

The values attend by the identical letter do not diverge significantly from each other according to the Duncan Multiple_ Range Test (Pr≤0.05).

## Conclusion

The reason for the high concentrations of elements in this study may be due to their high concentrations in the water of the studied area compared to other areas. During this study and compared to other local and global regions, found a remarkable increase in measurements that may pose a great threat to the biological diversity and the functions of living organisms. The causes of pollution are due to the population groups and different agricultural practices.

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