## NOTE

# Heavy Metal Levels in Tissues of *Cyprinus carpio* from Kaz Lake in Tokat, Turkey

MEHMET KARATAS* and YASAR SEKER†
*Department of Fisheries and Aquaculture, Faculty of Agriculture*
*Gaziosmanpasa University, Tokat 60250, Turkey*
*E-mail: docdrmehmetkaratas@gmail.com*

In this research, samples of commonly consumed fish (*Cyprinus carpio*) were analyzed for concentrations of heavy metals (Al, Cd, Mn Cr, Cu, Fe, Ni, Pb, V and Zn) inhabiting the Kaz Lake (Tokat, Turkey). Heavy metal contents of muscle, gill and gonad tissues was detected in fresh matter by atomic absorption spectrophotometer and counted in mg kg$^{-1}$. With respect to concentrations of pollutants in the Kaz Lake should not pose any threat to the fishes and public health.

**Key Words: Heavy metals, Pollution, Kaz Lake, Fishes.**

Fish is one of the main food sources and relatively sensitive to changes in their environment. Fishes give a good indication of the health status and aquatic ecosystem. Aquatic systems are very sensitive to heavy metal pollutants and the gradual increase in the levels of such metals in aquatic environment, mainly due to anthropogenic sources, became a problem of primary concern. Fishes have been popular targets of heavy metals monitoring programs in aquatic environmentals[1]. Because of this reason, the accumulation levels of heavy metals in fish is very important to determine that making high proportion of protein sources in the food chain for human health and sustainable ecological balance. The increasing levels of pollution in aquatic systems and its influence on the biota have been widely reported[2,3].

Fishes being one of the main aquatic organisms in the food chain may often accumulate large amounts of certain metals[4,5]. In general, heavy metals are taken by fish in several ways; (a) from water columns, (b) from food accumulated in fish feed, (c) from other organisms living with fish and carrying metals in their body[6]. Heavy metals accumulate in the tissues of organisms that ingest them and are passed up the food chain. Thus, large carnivorous fishes are most susceptible to high levels of heavy metals. Small amounts of them are absorbed directly from the water throughout their gills and other tissues.

†Department of Animal Science, Faculty of Agriculture, Gaziosmanpasa University, Tokat 60250, Turkey.

The level of heavy metals in tissues and organs of fish species in different aquatic environments have been investigated by many researchers[7-11].

Kaz Lake is located next to the Pazar-Zile highway in the province of Tokat. It also covers the districts of Turhal and Pazar. It is situated at 40°15'00"-40°22'30" northern latitude and 36°07'30"-36°15'00" eastern longitude. The depth of the lake varies between 1.0 and 1.5 m. Kaz Lake is at an altitude of 540 m. The Kaz Lake is an important water supply for agricultural usage and it is also a fishing area. The lake is fed only by an underground spring.

The present study has been undertaken to determine the levels of heavy metals in *Cyprinus carpio* which is the dominating and mainly consumed species of Kaz Lake.

A total 37 fish samples were catched from different areas in Kaz Lake in 2006. The fishes were brought to the laboratory immediately in ice and then frozen at -25 ºC until dissection. Total length and wet weight of the captured fish were recorded with 1 mm and 0.01 g sensitivity, respectively. Scales were used for age determination. The muscle, gill and gonads were dissected using clean equipment. They digested with macro kjeldahl tubes using kjeldahl racks until a clear solution is appeared. After digestion, samples have been cooled and the volume of the digest was made up to 100 mL with distilled water. Level of heavy metals (Al, Mn, Cd, Cr, Cu, Fe, Ni, Pb, V and Zn) was carried out by using atomic absorption spectrophotometer. All the data are presented as concentrations in per unit wet weight of the samples (ppm).

The characteristics of the analyzed fishes (age, total length and weight) are listed in Table-1. The concentrations of the heavy metals are given in Table-2.

TABLE-1
CHARACTERISTICS OF ANALYZED FISHES

| Species | N | Total length (cm) | Weight (g) | Age |
|---|---|---|---|---|
| *Cyprinus carpio* | 37 | 18-28 | 145-397 | 2-4 |

Heavy metals are widely distributed in free water sources and are harmful to aquatic fauna. The accumulation level and toxicity of heavy metals in tissues of fishes vary considerably because of the differences of ecological conditions and the organisms. Considering the results in Table-1, it seems that Cr and Cd levels in tissues of *Cyprinus carpio* are lower than the others. The data show that Zn has the highest concentration, followed by Fe and Pb in fish. Mn and V were in nondetectable level in all samples of fish. All heavy metals are found very high in gills.

TABLE-2
LEVELS OF HEAVY METALS IN DIFFERENT TISSUES OF
*Cyprinus carpio* IN KAZ LAKE

| Heavy metal | Examples of organs | *C. carpio* (Mean ± SD) | Heavy metal | Examples of organs | *C. carpio* (Mean ± SD) |
|---|---|---|---|---|---|
| Al | Muscle | 1.315 ± 0.26 | Pb | Muscle | 0.345 ± 0.03 |
|  | Gill | 5.012 ± 1.03 |  | Gill | 0.986 ± 0.05 |
|  | Gonad | 4.214 ± 1.97 |  | Gonad | 0.433 ± 0.02 |
| Cd | Muscle | 0.045 ± 0.01 | V | Muscle | ND |
|  | Gill | 0.158 ± 0.03 |  | Gill | ND |
|  | Gonad | 0.125 ± 0.05 |  | Gonad | ND |
| Cr | Muscle | 0.015 ± 0.01 | Zn | Muscle | 10.205 ± 4.02 |
|  | Gill | 0.069 ± 0.03 |  | Gill | 185.400 ± 12.50 |
|  | Gonad | 0.038 ± 0.02 |  | Gonad | 214.100 ± 10.00 |
| Cu | Muscle | 0.460 ± 0.23 | Fe | Muscle | 7.150 ± 0.45 |
|  | Gill | 0.975 ± 0.05 |  | Gill | 40.350 ± 3.19 |
|  | Gonad | 1.952 ± 0.31 |  | Gonad | 57.780 ± 7.41 |
| Ni | Muscle | 0.101 ± 0.03 | Mn | Muscle | ND |
|  | Gill | 0.375 ± 0.01 |  | Gill | ND |
|  | Gonad | 0.137 ± 0.02 |  | Gonad | ND |

ND = Not detected.

In conclusion, heavy metals cause deleterious effects on fishes. Also, the pollution of heavy metals affects both aquatic organisms and public health as a result of bioaccumulation in food chain. The results indicate that levels of detected metals in all samples are below the limits for fish proposed by FAO[12] and safe within the limits for human consumption in the edible parts of fish species in the region.

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