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STUDY OF CONCENTRATION OF SOME TRACE ELEMENTS IN THE EUPHRATES RIVER WATER IN AL-MUTHANNA GOVERNORATE, IRAQ

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Abstract

This study was conducted in four sites (Al-Mushtarak, center, Al-Taha, Al-Khudhur) of the Euphrates River passing in the province of Muthanna, August 2018 to March 2019, to study and know the concentrations of some trace elements (cadmium, copper, iron, chromium), Concentrations were higher than the limit allowed for some elements studied at study sites (0.0001-0.002, 0.001-0.09, 0.05-1.11, intangible - 0.02) mg / l, respectively, the present study shows the location and season variation at the probability level ($P \leq 0.05$) in concentrations of trace elements, Thus, the possibility of using river water to indicate the pollution of trace elements mentioned in the study.

***Keywords*:** Trace elements concentration, Euphrates River, Water, Al-Muthanna Governorate.

Introduction

The Euphrates River is the main source of drinking water, agriculture and all other human activities in Muthanna province, as a result of the growing population, industrial and technological power plants, generators, increasing urban areas, sewage systems, leveling agricultural land and low river level, It required an increased need to detect the levels and types of contaminants present in this waterbody, contamination of the aquatic environment with trace elements was a serious environmental problem because of its long-term viability, toxicity and biodegradability, Biochemical recycling, as well as accumulation behavior in aquatic habitats (Gao and Chen, 2012). Trace elements are of great importance in the aquatic environment, some of which are necessary for most organisms to have limited concentrations, human activities have increased the concentrations of these elements (Reisinger *et al*., 2009). Thus serious environmental degradation of living aquatic organisms (Vardanyan and Trchounian, 2015). It leads to the accumulation of these elements in aquatic plants and animals, which may enter into human food, and lead to many health problems on the human (Ma *et al*., 2016; Wu *et al*., 2017). The aim of this study was to find out the levels of concentrations of cadmium, copper, iron and chromium in the waters of the Euphrates River passing through Muthanna Governorate and its pollution levels.

Materials and Methods

Water samples were taken at four stations in Muthanna Governorate as follows:

1. Al-Mushtarak site of the confluence of Al-Tshan and Al-Subul rivers in the city of Samawah.
2. The center site in the center of the city of Samawah.
3. Al-Taha site, located 8 km south of Samawah.
4. Al-Khudhur site, located in the center of the district of the city of Al-Khudhur, 30 km south of the Muthanna province.

Water samples were taken for four seasons (August, November, December and March).

The selection of sites was based on the amount of contamination from the presence of dumped waste, agricultural terraces, sewage, dead animals, car wash stations, restaurant, waste and shops adjacent to the river at those sites.

The concentrations of the aforementioned elements were measured using a device, flame Atomic Absorption Spectrophotometer Type AA-7000, manufactured by Shimadzu corporation, after digestion of the samples.

Results

Table 1 shows the superiority of Al-Mushtarak site with most of the elements studied for the summer, autumn and spring over the rest of the study sites, it recorded a superiority of copper, iron and chromium for summer (8.9, 84.71 and 20.46) mg / L respectively, cadmium and copper for autumn by (2.1 and 19.7) mg / L respectively, cadmium and iron for spring by (0.4 and 1111.5) mg / L respectively, equal to some elements in some other locations in different seasons, While in the winter, the Center and Al-Taha outperformed Al-Mushtarak and Al-Khudhur site, cadmium and chromium components of the center were superior to the other sites (0.89 and 6.83 mg / l respectively), While the Al-Taha site was superior to copper and iron elements over the rest of the sites (3.96 and 35.34) mg / l respectively.

Table 2 shows the fall of autumn in the Al-Mushtarak site of the elements of cadmium and copper by (2.12, 19.69) mg/l respectively compared to the rest of the seasons, while the spring season at the center location with copper and iron elements exceeded the rest of the seasons by (77.17 and 1.08) mg/l, respectively, the summer at Al-Taha site was also 0.70 mg/l with cadmium, In the spring, the iron content of the same site was 1070.7 mg/l, The spring season also exceeded Al-Khudhur site with copper and iron by 10.53 and 1.11 mg / L respectively.

Table 1 : Comparison between the studied sites (Mean± standard error) of water for the seasons of the year.

Sig.	Locations				Element
	Al-Khudhur	Al-Taha	Center	Al-Mushtarak	
			Summer		
*	a± 0.66 0.06	a0.2 ± 0.7	b±0.21 0.05	b± 0.21 0.008	**Cd**
*	c0.12 ± 1.78	bc1.74 ± 4.35	b0.3 ± 4.9	a0.46 ± 8.9	**Cu**
*	c±18.61 0.61	b±38.74 4.03	a±74.17 5.77	a5.16 ±84.71	**Fe**
*	c0.05 ±1.86	d±0 0	b±3.71 0.5	a±20.46 0.2	**Cr**
			Autumn		
*	b0.01 ±0.3	c±0.2 0.01	b0 ±0.3	a2.1 0.01 ±	**Cd**
*	d±5.9 0.01	c0.01 ±9.5	b±6.8 0.04	a±19.7 0.15	**Cu**
*	d±44.25 0.015	a±77.54 0.002	c±62.28 0.016	b±76.04 0.001	**Fe**
*	a±15.6 0.01	d0±0	b±11.2 0.01	c±2.2 0.01	**Cr**
			Winter		
*	c±0.51 0.001	b±0.66 0.005	a±0.89 0.005	d±0.11 0.001	**Cd**
*	b±3.01 0.001	a±3.96 0.001	c±1.46 0.003	d±1.25 0.01	**Cu**
*	d±5.65 0.05	a±35.34 0.00007	c±21.64 0.58	b±26.23 0.57	**Fe**
*	b±6.2 0.15	c±4.96 0.001	a±6.83 0.06	d±2.48 0.05	**Cr**
			Spring		
*	d0±0.1	c0±0.2	b0±0.3	a0±0.4	**Cd**
*	c±10.5 0.33	c±9.8 0.12	a±77.2 0.57	b±17 1.53	**Cu**
*	a±1115.1 2.08	b±1070.7 11.2	b±1085.2 3.44	a±1111.5 2	**Fe**
N.S	0	0	0	0	**Cr**

Note: Some items were multiplied by 1000 or less to round the number to the nearest rank.

Table 2 : Comparison between the seasons (Mean± standard error) of water for the studied sites.

Sig.	Seasons				Element
	Spring	Winter	Autumn	Summer	
			Al-Mushtarak		
*	.40 b **0**± 0008 .0	0.11 d ± 001 .0	2.12 a ±008. 0	0.2 c ±8	**Cd**
*	17 ab±1.52	1.25 c ±01 . 0	19.69 a ± 1. 0	8.90 b ± 4 .0	**Cu**
N.S	1.11 ±001 .0	.260 ±005 .0	.760 ±000008 .0	.84**0** ±05 .0	**Fe**
*	b 0	b 0 ±0 .0	0 b ±00 .0	0.02 a ±0.0	**Cr**
			Center		
N.S	.280 ±0.003	.890 ±0.005	.260 ±0.003	0.21 ±05**0.**	**Cd**
*	a 77.17 ±5 .0	b 1.46 ±003 .0	b 6.81 ±0.04	b 4.9 ±0.3	**Cu**
*	a 1.08 ±0.003	d .210 ± 005. 0	c .620 ±0.0001	b .74**0** ±0.05	**Fe**
*	0 c	b0.01±0.00	a0.01±0.00	b 0 ±. 001**0**	**Cr**
			Al-Taha		
*	.17 b**0** ±0.004	0.66 a ±0.005	.23 b0 ± 0.005	.70 a**0** ±0.2	**Cd**
N.S	9.8 ±0.1	3.96 ± 0.001	9.53 ±0.008	4.35 ±1.47	**Cu**
*	1070.7 a ±11.2	353.46 c ±0.0006	775.36 b ±0.01	387.43 c ±**40.38**	**Fe**
N.S	0	0	0	0	**Cr**
			Al-Khudhur		
*	.14 b0 ±0.004	0.51 a ±0.001	.26 b0 ±0.01	.66 a**0** ±0.06	**Cd**
*	10.53 a ±0.3	3.01 c ±0.001	5.88 b ±0.01	1.78 d ±0.1	**Cu**
*	1.11 a ±0.002	.05 c0 ±0.0005	0.44 b ±0.0001	0.18 c ±0.006	**Fe**
*	d **0**	b 0.01 ±0.0	a 0.02 ±0.00	c 0 ±0.0	**Cr**

Note: Some items were multiplied by 1000 or less to round the number to the nearest rank.

Discussion

Table 1 show that the location of the subscriber exceeds most of the elements studied on the rest of the sites, the rise of some elements may be due to the shift of elements from the solid phase to the dissolved phase, or release from sediment back into the water column (Wang and guo, 2000), in addition to the fact that some common elements in wastewater (Kastratović *et al*., 2016), Water is constantly exposed to human and animal influences and to chemicals leaking from hazardous waste, hazardous waste and waste sites include metal washing from natural sediments and agricultural activities that play a major role in water pollution (Sepllman, 2008; Santana *et al*., 2017). It may also be due to forms of human activities on the banks of the river, such as the presence of pipes to drain sewage without treatment of the river directly and the disposal of waste restaurants and casinos, as well as places of washing cars and leveling some agricultural land adjacent to the river and converted to residential areas (Kara *et al*., 2017). The elevation of the copper element in surface water was significant at Al-Mushtarak, center and Al-Taha locations, may be due to excessive use of pesticides containing copper compounds for agricultural purposes (Messier, 2010), for example, the rise of the iron element in some locations may be the result of

sewage spreading in the city, the waste of the shops and workshops near the river, the reason for the presence of these elements in the study sites of the Euphrates River is due to the presence of trocar for agricultural land, which flows directly into the river.

There is also a significant decrease in some elements in the rest of the sites and for the Al-Mushtarak site as well, may be due to the fact that many trace elements interact physically and chemically with other natural substances in the aquatic environment, leads to a change in the oxidative state of trace elements, precipitation and concentration or adsorption on the surfaces of particulate matter (Dube *et al*., 2001). The low concentration of some elements is also due to their removal by adsorption on suspended substances, sedimentation or consumption by aquatic organisms (Abdul Jabbar *et al*., 2013).

Table 2 show that a significant differences between the studied elements between the seasons of the study sites, with some within or below the limit at the winter of all locations, the low concentrations of some trace elements in winter may reduce pollutants from the rest of the year such as summer, increase in the amount and speed of water flow in the river, reducing the concentration of pollutants (Coetzee *et al*., 2002), may be due to the mitigation of winter rains and consequently high water levels and increased speed (Hanaf, 2016), may be due to the tendency of elements to accumulate in different aquatic organisms (Vardanyan *et al*., 2008). Some trace elements studied in some seasons, such as iron, rise in the spring, lower water levels and higher temperatures, increased evaporation and increased contaminated flows from agricultural land, or may be tends to oxidize conjugated with oxygen-oxidized iron oxides, the industrial processes of iron are one of the largest sources of the element, whether gaseous, dust or liquid (Al-Sabah, 2007). The rise of some elements in summer, autumn and spring may be due to increased influx of pollutants into the river and the direct throwing of waste into the river and lower water levels.

Conclusions

The presence of location and season variation in trace concentrations of water, the concentration of different trace elements between seasons and locations, some of which are superior, indicates the continuity of river contamination from different sources.

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