جامعة
بنغازي الحديثة

مجلة جامعة بنغازي الحديثة للعلوم والدراسات الإنسانية

مجلة علمية الكترونية محكمة

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شروط كتابة البحث العلمي في مجلة جامعة بنغازي الحديثة للعلوم والدراسات الإنسانية

1- الملخص باللغة العربية وباللغة الانجليزية (150 كلمة).
2- المقدمة، وتشمل التالي:
❖ نبذة عن موضوع الدراسة (مدخل).
❖ مشكلة الدراسة.
❖ أهمية الدراسة.
❖ أهداف الدراسة.
❖ المنهج العلمي المتبع في الدراسة.
3- الخاتمة. (أهم نتائج البحث - التوصيات).
4- قائمة المصادر والمراجع.
5- عدد صفحات البحث لا تزيد عن (25) صفحة متضمنة الملاحق وقائمة المصادر والمراجع.

القواعد العامة لقبول النشر

1. تقبل المجلة نشر البحوث باللغتين العربية والانجليزية؛ والتي تتوافر فيها الشروط الآتية:

- أن يكون البحث أصيلاً، وتتوافر فيه شروط البحث العلمي المعتمد على الأصول العلمية والمنهجية المتعارف عليها من حيث الإحاطة والاستقصاء والإضافة المعرفية (النتائج) والمنهجية والتوثيق وسلامة اللغة ودقة التعبير.
- ألا يكون البحث قد سبق نشرة أو قُدم للنشر في أي جهة أخرى أو مستل من رسالة أو اطروحة علمية.
- أن يكون البحث مراعياً لقواعد الضبط ودقة الرسوم والأشكال - إن وجدت - ومطبوعاً على ملف وورد، حجم الخط (14) وبخط (Arial 'Body') للغة العربية. وحجم الخط (12) بخط (Times New Roman) للغة الإنجليزية.
- أن تكون الجداول والأشكال مدرجة في أماكنها الصحيحة، وأن تشمل العناوين والبيانات الإيضاحية.
- أن يكون البحث ملتزما بدقة التوثيق حسب دليل جمعية علم النفس الأمريكية (APA) وتثبيت هوامش البحث في نفس الصفحة والمصادر والمراجع في نهاية البحث على النحو الآتي:
- أن تُثبت المراجع بذكر اسم المؤلف، ثم يوضع تاريخ نشرة بين حاصرتين، ويلي ذلك عنوان المصدر، متبوعاً باسم المحقق أو المترجم، ودار النشر، ومكان النشر، ورقم الجزء، ورقم الصفحة.
- عند استخدام الدوريات (المجلات، المؤتمرات العلمية، الندوات) بوصفها مراجع للبحث: يُذكر اسم صاحب المقالة كاملاً، ثم تاريخ النشر بين حاصرتين، ثم عنوان المقالة، ثم ذكر اسم المجلة، ثم رقم المجلد، ثم رقم العدد، ودار النشر، ومكان النشر، ورقم الصفحة.

2. يقدم الباحث ملخص باللغتين العربية والانجليزية في حدود (150 كلمة) بحيث يتضمن مشكلة الدراسة، والهدف الرئيسي للدراسة، ومنهجية الدراسة، ونتائج الدراسة. ووضع الكلمات الرئيسية في نهاية الملخص (خمس كلمات).

3. تحتفظ مجلة جامعة بنغازي الحديثة بحقها في أسلوب إخراج البحث النهائي عند النشر.

إجراءات النشر

ترسل جميع المواد عبر البريد الالكتروني الخاص بالمجلة جامعة بنغازي الحديثة وهو كالتالي:

- ✓ يرسل البحث الكترونياً (Word + Pdf) إلى عنوان المجلة info.jmbush@bmu.edu.ly او نسخة على CD بحيث يظهر في البحث اسم الباحث ولقبة العلمي، ومكان عملة، ومجاله.
- ✓ يرفق مع البحث نموذج تقديم ورقة بحثية للنشر (موجود على موقع المجلة) وكذلك ارفاق موجز للسيرة الذاتية للباحث إلكترونياً.
- ✓ لا يقبل استلام الورقة العلمية الا بشروط وفورمات مجلة جامعة بنغازي الحديثة.
- ✓ في حالة قبول البحث مبدئياً يتم عرضة على مُحكّمين من ذوي الاختصاص في مجال البحث، ويتم اختيارهم بسرية تامة، ولا يُعرض عليهم اسم الباحث أو بياناته، وذلك لإبداء آرائهم حول مدى أصالة البحث، وقيمته العلمية، ومدى التزام الباحث بالمنهجية المتعارف عليها، ويطلب من المحكم تحديد مدى صلاحية البحث للنشر في المجلة من عدمها.
- ✓ يُخطر الباحث بقرار صلاحية بحثه للنشر من عدمها خلال شهرين من تاريخ الاستلام للبحث، وبموعد النشر، ورقم العدد الذي سينشر فيه البحث.
- ✓ في حالة ورود ملاحظات من المحكُمين، تُرسل تلك الملاحظات إلى الباحث لإجراء التعديلات اللازمة بموجبها، على أن تعاد للمجلة خلال مدة أقصاها عشرة أيام.
- ✓ الأبحاث التي لم تتم الموافقة على نشرها لا تعاد إلى الباحثين.
- ✓ الأفكار الواردة فيما ينشر من دراسات وبحوث وعروض تعبر عن أراء أصحابها.
- ✓ لا يجوز نشر إي من المواد المنشورة في المجلة مرة أخرى.
- ✓ يدفع الراغب في نشر بحثه مبلغ قدره (400 د.ل) دينار ليبي إذا كان الباحث من داخل ليبيا، و (200 $) دولار أمريكي إذا كان الباحث من خارج ليبيا. علماً بأن حسابنا القابل للتحويل هو: **(بنغازي – ليبيا - مصرف التجارة والتنمية، الفرع الرئيسي - بنغازي، رقم 001-225540-0011. الاسم (صلاح الأمين عبدالله محمد).**
- ✓ جميع المواد المنشورة في المجلة تخضع لقانون حقوق الملكية الفكرية للمجلة.

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Evaluation of some Heavy Metal Concentrations (Cd,Cu,Zn,Cr,Ni and Pb) in some Fish Organs of Engineering Lake Faculty - UKM, Malaysia in 2019

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Abstract.

Evaluation of some Metal Concentrations in Fish Tissues (gills, liver and muscles) in Engineering and Built Environment Lake Faculty - UKM, Selangor, Peninsular Malaysia was conducted in January, April, July, and October 2019. Six metals i.e. cadmium, chromium, lead, nickel, zinc, and copper were determined in fish samples. Three fresh fish of Tellapia (*Oreochromis niloticus*) were collected by plastic net from fresh water lake monthly. The mean wet weight of these fish species were from 150 g to 180 g and the samples were sealed in polyethylene bags and kept in the freeze at – 20 ºC in the laboratory then they were transported to 25 ml Erlenmeyer flask for digestion. The metals concentration were determined by Inductively Coupled Plasma Mass Spectrometer (ICP –MS), Perkin Elmer Elan, Model 9000 (AOAC, 1990). For fish samples, metal concentrations were higher in gills than liver and muscles, and (in descending order) for Cu,Zn,Cr,Ni,Pb and Cd were (5.27,4.78,4.11), (4.09,3.29,2.57), (2.83,2.29,2.04), (2.33,2.05,1.45), (1.68,1.28,1.05) and (0.31,0.25, 0.19) respectively.

Key word: metals concentration. fish. Engineering and Built Environment Lake Faculty.

تقدير تركيز بعض المعادن الثقيلة (الكادميوم - النحاس - الزنك - الكروم - النيكل - الرصاص) في بعض الأسماك المتواجدة في بحيرة كلية الهندسة والبيئة بالجامعة الوطنية الماليزية خلال 2019م

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الملخص:

تقدير تركيز بعض العناصر الثقيلة في أعضاء بعض الأسماك وهي الخياشيم والكبد والعضلات في بحيرة كلية الهندسة والبيئة بالجامعة الوطنية الماليزية بدولة ماليزيا خلال أشهر يناير وأبريل يوليو وأكتوبر خلال 2019م. حيث تم تقدير تركيز ستة عناصر ثقيلة هي الكادميوم والكروميوم والرصاص والنيكل والزنك والنحاس في عينات بعض الأسماك وكانت من النوع سمك البلطي (*Oreochromis niloticus*) حيث تم جمع ثلاثة عينات بواسطة شباك بلاستيكية من مياه البحيرة بشكل شهري خلال شهور الدراسة. كان متوسط وزن الأسماك يتراوح من 150 جرام إلى 180 جرام حيث تم حفظها في أكياس بولي إثيلين في الثلاجة المعملية عند درجة حرارة - 20 درجة مئوية ثم تم نقلها إلى دوراق حجم 25 مل لإجراء عملية الهضم. تم تقدير تركيز العناصر الثقيلة بواسطة جهاز المطياف الضوئي. بينت النتائج أن تركيز العناصر الثقيلة كانت أعلى في عينات الخياشيم منها في عينات الكبد والعضلات وبترتيب تنازلي كالتالي: نحاس - زنك - كروميوم - نيكل - رصاص - كادميوم وكانت القيم المتحصل عليها هي (5.27، 4.78، 4.11) ، (4.09، 3.29، 2.57) ، (2.83، 2.29، 2.04) ، (2.33، 2.05، 1.45) ، (1.68، 1.28 ، 1.05) ، (0.31، 0.25، 0.19) على التوالي.

الكلمات المفتاحية: تركيز المعادن الثقيلة، الأسماك، بحيرة كلية الهندسة والبيئة.

INTRODUCTION.

Metal contaminants in aquatic ecosystems cause a serious environmental hazard because of their persistence and toxicity. Toxic metals from various sources namely discharge of industrial or sewage influents, domestic wastewater, periodic precipitation contaminated with airborne pollutants, transport, burning of fossil fuels, and fertilizers containing trace metals could affect fish healthy (Handy, 1994; Jent et al., 1998; Chaisemartin, 1983). Metals have been used in various human activities since thousands of years ago and metal pollution in the aquatic environment has been an issue. Variations in levels of metals among the fish may be explained mainly in terms of the chemical forms of the elements and their concentrations in the local environment, microbiological activity and differences in fish size.

In addition, different feeding habit of fish also contributes to the variation in metal accumulation. Mathis and Cummings (1973) showed a direct relation- ship between the trophic level of the fish and trace metals accumulation and reported that omnivorous fish had higher levels of trace metals than carnivorous and planktivorus. Variations in levels of metals among the fish may be explained mainly in terms of the chemical forms of the elements and their concentrations in the local environment, microbiological activity and differences in fish size. In addition, different feeding habit of fish also contributes to the variation in metal accumulation. Mathis and Cummings (1973) showed a direct relation- ship between the trophic level of the fish and trace metals accumulation and reported that omnivorous fish had higher levels of trace metals than carnivorous and planktivorus. Variations in levels of metals among the fish may be explained mainly in terms of the chemical forms of the elements and their concentrations in the local environment, microbiological activity and differences in fish size. In addition, different feeding habit of fish also contributes to the variation in metal accumulation. Mathis and Cummings (1973) showed a direct relation- ship between the trophic level of the fish and trace metals accumulation and reported that omnivorous fish had higher levels of trace metals than carnivorous and planktivorus. Malaysia as a developing country, finds it inevitable avoiding this problem. The existence of metals concentration in the environment could be of natural causes or anthropogenic. The natural causes could be weathering; climate changes (wind and temperature) inflicted on igneous and metamorphic rocks.

However the burning of fossil fuels, mining, melting minerals, industrial wastes, the use of fertilizers and pesticides in the agriculture are the main contribution of anthropogenic sources (Kendrick *et al*. 1992). In the context of environmental pollution, the existence of metal pollution and the existence of metal concentration could be categorized into 3 important types; non- critical, undiluted toxic metals which hardly exist and toxic metal concentrations which are widely used (Forstner & Wittman 1992). Unlike organic pollution, toxic metals could be not eliminated through biodegradable process and the impact of toxic metals could remain permanently in the environment. In some heavy metals such as mercury and cadmium, are known to have toxic effect although they have low concentrations (Forstner & Wittman 1992). Heavy metal concentrations in aquatic ecosystems are usually monitored by measuring its concentration in water and biota (Camusso *et al*. 1995), which generally exist in low levels in water and attain considerable concentrations in biota (Namminga and Wilhm 1976). Heavy metals including both essential and non- essential elements have a particular significance in ecotoxicology, since they are highly persistent and all have the potential to be toxic to living organisms such as fish (Storelli *et al*. 2005). Heavy metals do not exist in soluble forms for a long time in waters; they are present mainly as suspended colloids or are fixed by organic and mineral substances (Kabata - Pendias and Pendias 2001). In aquatic ecosystems, water contamination by heavy metals is one of the main types of pollution that may stress the biotic community (Baldantoni *et al*. 2004).

The objective of this research is to evaluate some metal concentrations in some fish organs in Engineering Lake Faculty - UKM, Selangor, Peninsular Malaysia.

MATERIALS AND METHODS.

Study area.

Engineering and Built Environment Lake Faculty is a man - made freshwater lake. It is geographically located at 02^0 55' 30" N and at 101 46' 20" E. The depth is 1.5 meters. The main source of water was Langat River and rain water, the drainage was through one drainage pipe to the surrounding areas. Engineering Lake covers average of 1.8 acres (Personal Communication) (Fig. 1).

Determination of Heavy metals Concentration in Fish.

Three fresh fish of Tellapia (*Oreochromis niloticus*) were collected by plastic net from fresh water lake monthly. The mean wet weight of these fish species were from 150 g to 180 g. The fish samples were sealed in polyethylene bags and kept in the freeze at - 20 ºC in the laboratory. The fish samples were given about 2 hrs of defrosting before analysis. After the fish were rinsed with de - ionized water, each fish was dissected with the help of stainless - steel knife and scissors on a clean Petri dish to extract gill, liver and muscle tissues. Polyethylene gloves were worn during dissection of fish tissues to reduce surface contamination of samples. After dissection, 2 g samples of each tissue were dried by oven (Memmert/ F503.022 Model) at 80 ºC over night (24 h) to a constant weight. Dried tissues were ground, sieved (1 mm size) and transferred to a porcelain basin. One gram powdered samples was kept in 30 ml crucible and placed in the muffle furnace (Carbolite. ELF 11/14) at 50, 150 and 450 ºC for 10 min, 1 and 8 hrs respectively by raising the temperature for complete ashing. Then they were transported to 25 ml Erlenmeyer flask for digestion. Each tissue was digested separately with tri - acid mixture (HNO_3:$HClO_4$:H_2SO_4 = 10:4:1) at 5 ml per 0.5 g of sample and was placed on a hot plate at 120 ºC for 2 h. Digestion was continued until the liquor was clear (AOAC, 1990).

All the digested liquors were filtered through Quantitative Whatman 541 filter paper and diluted to 25 ml in the volumetric flask with distilled water. They were stored in acid rinsed polyethylene bottles at 4 ºC prior to analysis. The metals concentration were determined by Inductively Coupled Plasma Mass Spectrometer (ICP –MS), Perkin Elmer Elan, Model 9000 (AOAC, 1990).

Statistical analysis.

One –way analysis of variance (ANOVA) was conducted to see the variation of heavy metal concentration among the different months and different fish organs. All data were analysis using the statistical package SPSS (Version 20).

RESULTS.

Metal concentration in fish.

The metal concentrations in fish tissues of Engineering Lake are summarized in Table 1. In the present study, tellapia fish (*Oreochromis niloticus*) contained variable levels of different metals. The order of concentration of these elements in fish was Cu >Zn> Cr>Ni> Pb > Cd. Metals accumulated at variable levels in different tissues of fish and followed the order of Gills>liver>muscles.Table.7. Zinc values recorded the lower value for gills on January (4.00 µg /g) and the higher value on July (4.20 µg /g), while on July (3.31 µg /g) and on October (3.34 µg /g) for liver, whereas on January (2.50 µg /g) and on July (2.60 µg /g) for muscles tissues. Copper values recorded the lower value for gills on January (5.20 µg /g) and the higher value on July (5.32 µg /g), while on January (4.70 µg /g) and on October (4.88 µg /g) for liver, whereas on July (4.08 µg /g) and on October (4.18 µg /g) for muscles tissues. Nickel values recorded the lower value for gills on January (2.30 µg /g) and the higher value on July (2.36 µg /g), while on January (2.00 µg /g) and on April (2.08 µg /g) for liver, whereas on January (1.40 µg /g) and on April (1.49 µg /g) for muscles tissues.

Chromium values recorded the lower value for gills on January (2.80 µg /g) and the higher value on July (2.88 µg /g), while on October (2.27 µg /g) and on July (2.30 µg /g) for liver, whereas on January (2.01 µg /g) and on October (2.07 µg /g) for muscles tissues. Lead values recorded the lower value for gills on January (1.60 µg /g) and the higher value on October (1.80 µg /g), while on January (1.20 µg /g) and on October (1.37 µg /g) for liver, whereas on January (1.00 µg /g) and on October (1.13 µg /g) for muscles tissues. Cadmium values recorded the lower value for gills on January and April (0.30 µg /g), and the higher value on July (0.32 µg /g), while on January and April (0.24 µg /g) and on July (0.26 µg /g) for liver, whereas on October (0.17 µg /g) and on July (0.20 µg /g) for muscles tissues. The order of concentration of these elements in fish was Cu >Zn> Cr>Ni> Pb > Cd. In the present study, the averages of Cu,Zn,Cr,Ni,Pb and Cd in gills, liver and muscles were (5.27,4.78 and 4.11µg /g), (4.09,3.29 and 2.57 µg /g), (2.83,2.29 and 2.04 µg /g), (2.33,2.05 and 1.45 µg /g), (1.68,1.28 and 1.05 µg /g),(0.31,0.25 and 0.19 µg /g), respectively.

DISCUSSION.

Metal concentration in fish.

Variations in levels of metals among the fish may be explained mainly in terms of the chemical forms of the elements and their concentrations in the local environment, microbiological activity and differences in fish size. In addition, different feeding habit of fish also contributes to the variation in metal accumulation. Mathis and Cummings (1973) showed a direct relation- ship between the trophic level of the fish and trace metals accumulation and reported that omnivorous fish had higher levels of trace metals than carnivorous and planktivorus. Trace metal accumulation in fish species was in the order of omnivorous feeder> phytoplankton> zooplankton> carnivorous> macrophyte feeder (Balasubramanian et al. 1997).

The difference in the accumulation of heavy metals in various organs of fishes may be attributed to the proximity to the tissues to the availability of the metals, i.e., the quantity present in the water, sediment and plankton, age and type of the fish and presence of ligands in the tissues having an affinity to the metal and /or to the role of the tissue in the detoxification process. Maximum accumulation heavy metals occurred in gills and this is may be due to their capacity to accumulate heavy metals brought by blood from other parts including liver and muscles of the body and induce the production of the metal binding protein, metallothionein, that is believed to play a crucial role against the heavy metals by binding them (Bhattacharya et al. 1985; Klavercamp et al. 1984; Kent 1998).

The highly branched structural organization of the gill and the resultant highly increased surface area, along with the large volume of water passing through the gill surface and the highly vascular physiological state and the relatively small biomass when compared to their surface area (Mayer et al. 1991) make the gill a prime site for heavy metals accumulation (Jayakumar and Paul 2006). Muscle contained the lowest concentrations of heavy metals among all the tissues investigated in the present study. Muscle does not come into direct contact with the metals as it is totally covered externally by the skin that in many ways helps the fish to ward off the penetration of the heavy metals and also it is not an active site for detoxification and therefore transport of heavy metals from other tissues to muscles (as in the case of liver) does not seems to arise. Muscles are the main edible part of fish and can directly influence human health. Therefore, most governorates have established toxicological limits for heavy metals in seafood (Agah et al. 2009). According to WHO (2005), the element levels of fish muscles in this study were below the allowable concentration, and have no threat to public health.

CONCLUSIONS.

The present results indicate that metals concentration in Engineering Lake were For fish samples were higher in gills than liver and muscles, and (in descending order) for Cu,Zn,Cr,Ni,Pb and Cd

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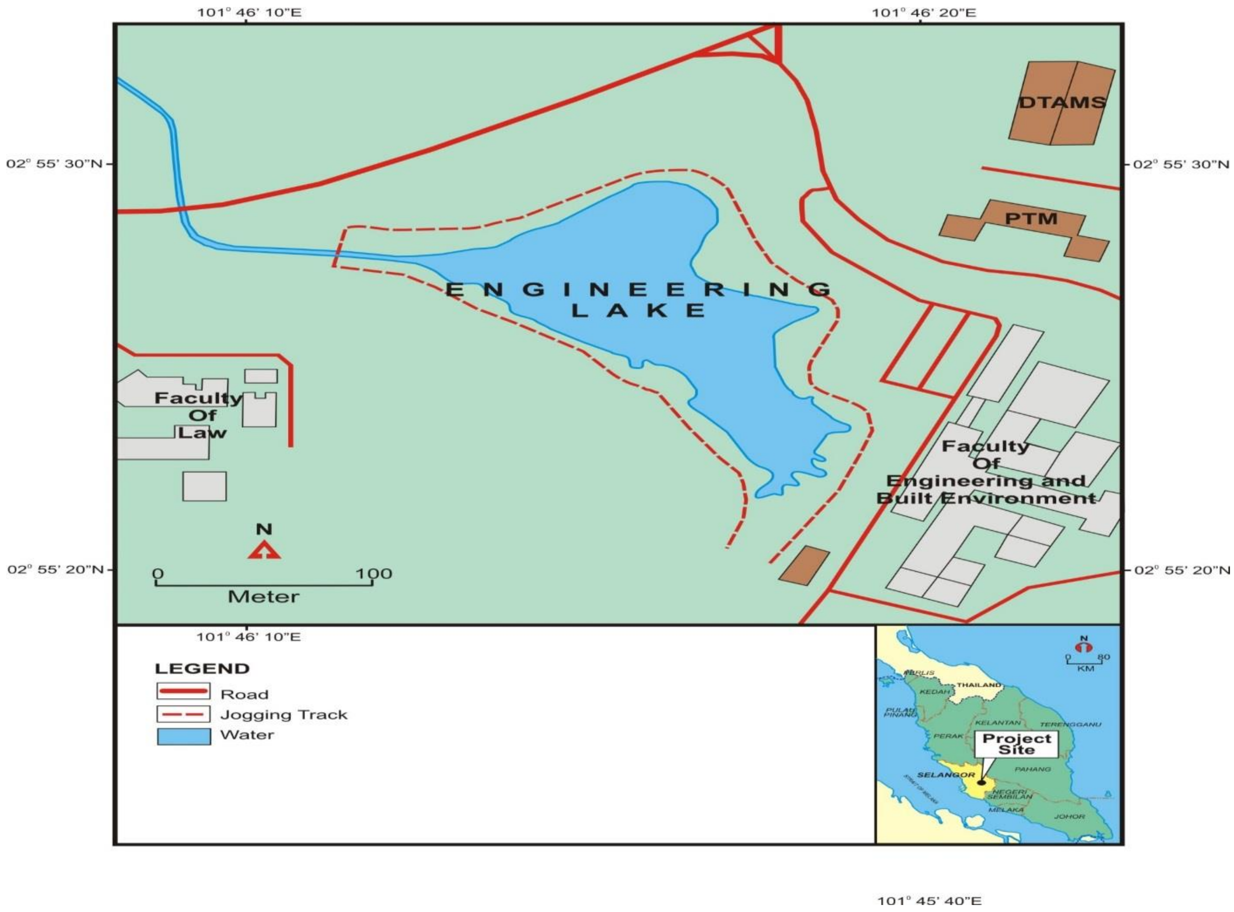

Fig.1. Geographical location of Engineering and Built Environment Faculty Lake - UKM, Selangor, Peninsular Malaysia.

Table 1: Metal concentrations (µg /g) of different fish tissues in Engineering Lake, Selangor, Peninsular Malaysia (2019).

Metal	Jan			Apr			Jul			Oct		
Tissues	Gills	Liver	Muscles	Gills	Liver	Muscles	Gills	Liver	Muscles	Gills	Liver	Muscles
Cd (µg /g)	0.30	0.24	0.19	0.30	0.24	0.18	0.32	0.26	0.20	0.31	0.25	0.17
Cu (µg /g)	5.20	4.70	4.09	5.25	4.73	4.09	5.32	4.80	4.08	5.30	4.88	4.18
Pb (µg /g)	1.60	1.20	1.00	1.62	1.28	1.02	1.70	1.26	1.04	1.80	1.37	1.13
Zn (µg /g)	4.00	3.20	2.50	4.09	3.30	2.58	4.20	3.31	2.60	4.08	3.34	2.58
Cr (µg /g)	2.80	2.28	2.01	2.83	2.29	2.03	2.88	2.30	2.06	2.82	2.27	2.07
Ni (µg /g)	2.30	2.00	1.40	2.33	2.08	1.49	2.36	2.06	1.44	2.33	2.06	1.47