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## RESEARCH ARTICLE

# INVESTIGATION OF HEAVY METALS IN VEGETABLES AND FRUITS IN DIYALA PROVINCE \_LOCAL MARKET

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### INTRODUCTION

Lead is an element cause plant contamination at a great rates and it has been established that leafy vegetable and fruits are the most affected plants (Al-seid,2007) And heavy metals like lead, cadmium, couplet and zinc conceded as main pollutants for environment that emitted by burning fuel , friction tires , oil leak and erosion of batteries and metal part (Dolan *et al.*,2006) kupper and other(1998) found that the up take of heavy metal such as Hg, Cu, Cd, Ni, Fe and Zn. may lead to replay these metals instead magnesium and this may affected on vital posses such as photosynthesis (Al-seid, 2007). The plant vary in their ability to lancer mineral pollution and when ever increased to learner ability of plants increased accumulation of contaminants in the tissue plants (Al\_seid, 2007)

In study was carried by Al-khalife and other (1990-1994) heavy metals was determined in nine of fresh vegetables products (tomatos, lettace, green onion, onion, egg plant, parsley, zucchini, carrot and cucumber), they found the higher concentration of lead in parsly compared with other vegetable which cd was higher in each of green onion lettuce, zucchini, onion and carrot, respectively.

Turkodogn *et al.* (2002) were also studied the concentration of heavy metals in soil, vegetable and fruits and the showed that

### ABSTRACT

In the present study , heavy metals (Pb , Ni , Cu and Cr) was determined in vegetable and fruits . twenty four samples was collected from local markets included local and imported vegetable and fruits during spring 2014 . the analysis was done dy atomic absorption spectrophotometer .the results show that this was increases in pb rate in each of *Foeniculum vulgare* and Pakistan *Solanun tuberosum*(1.3389 and 1.7247 ppm, respectively ) while no nickel rate was recorded in this study . the highest rate of cu was in the leeks (0.8028 ppm) in local regrettable and fruits while highest rate of this element was in Jordanian *Lycopersicon esculentum*(0.1969 ppm) .highest rate of cr was in *Prttroselinum hortense* and Jordanian *Lycopersicon esculentum* 0.7953 and 0.6180 ppm respectively.

the concentration of Cu, Mg, Pb, cd and co were higher by 3\_4 time than they permissible limits and they suggested that the high rate of cancer among population in studied area may related to high concentration of heavy metals while Husain *et al.*(1995) obtain that the concentration of three heavy metals element (Pb, Cd and Hg)was within the permissible of these minerals in imported vegetable and fruits and Collected from Kuwait markets but there was few samples reported exceeded concentration of these three mineral and these concentration were higher than permissible limits.

The aim of present study is to investigate of the heavy metals in fruits and vegetables in local markets in Diyala province in Iraq.

### MATERIAL AND METHODS

Local and importer fruits and vegetables samples was collected from local markets in diyala province during the spring season 2014. The samples were washed with distill water and dried in an oven at 70 c. Dried samples were grinded and of powder was taken and placed in beaker. The samples were digested by using nitric acid, sulfuric acid and per chlorate acid in ratio 1:1:2 respectively for 2\_4 hour. the samples were taken to beaker and complete the volume to 50 ml with distilled water

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(Aphp,1998).The concentration of Pb, Ni, Cu and Cr were estimated by atomic absorption spectrophotometer.

## RESULT AND DISSUASION

Table (1) show that the *Foeniculum vulgare* recorded highest rate of lead concentration (1.3389 ppm) while the lowest concentration of this element was in *Capsicum spp.*(0.6436 ppm) and when compared the result with permissible limits value of codex Alimentarius (0.3 ppm) for leafy vegetable and (0.1 ppm) for non leafy vegetable and fruits. the result show that all present samples recorded high concentration of lead this may due to increase in using of distal generators that operate by fuel for generating electricity and increase in using of transport vehicles. In addition, there was un safety treatment of fuels waste and industrial and household waste which throw randomly in agriculture area and river. For nickel, *Allium cepa* recorded highest value (0.4523 ppm) compared with *Citrullus maxima* which recorded lowest value(0.0035 ppm) and the result for all studied samples was within permissible limits value (table 1). The same table show that *Allium porrum* recorded the highest value for copper (0.8027 ppm) while the lowest value was recorded in *Citrus sinensis*(0.0359 ppm). the result obtain *Allium porrum* had a contamination rate higher than allowable limits (0.61 ppm) this may due to the use of chemical fertilizer large quantities or due to using insecticide and fungicides.

Table 1 show that *Petroselinum hortense* recorded highest rate of Cr (0.7953 ppm) while the lowest rate was in *Solanum melongena* (0.1976 ppm) and comparing these results with the W.H.O. maximum allowable limits for this element (0.5 ppm) the result show that *Petroselinum hortense* and *Citrullus maximahad* higher than this limits and this may due to using of untreated water and using chemical fertilizer in a large amounts.

**Table1**concentration of heavy metals in local vegetabls and fruits

Cr	Cu	Ni	Pb	Vegetables and Fruits local
No.d	0.4691	0.2913	0.9023	<i>Brassica o.var.botrytis</i>
No.d	0.8027	0.2696	1.2265	<i>Allium porrum</i>
No.d	0.3095	0.3181	1.116	<i>C.grandis</i>
No.d	0.2850	.02794	1.2259	<i>Apium graveolens</i>
No.d	0.6901	0.2779	1.3389	<i>Foeniculum vulgare</i>
No.d	0.2088	0.3135	1.2709	<i>Citrullus maxima</i>
No.d	0.0885	0.3249	1.2169	<i>Brassica o.var.capitata</i>
No.d	0.0359	0.2726	1.1932	<i>Citrus sinensis</i>
No.d	0.5892	0.3489	1.2415	<i>Lepidium sativum</i>
No.d	0.2060	0.4243	0.9335	<i>Vicia faba</i>
0.4703	0.1721	0.4523	1.1665	<i>Allium cepa</i>
0.3746	0.3341	0.3626	0.7699	<i>Phaseolus vulgaris</i>
0.4011	0.1799	0.3182	0.6697	<i>Beta vulgarisvar.cicla</i>
0.1976	0.1535	0.2844	0.7314	<i>Solanum melongena</i>
0.2700	0.2526	0.3173	0.6436	<i>Capsicum spp.</i>
0.7167	0.1365	0.0035	0.9433	<i>Cucurbita maxima</i>
0.4687	0.1447	0.1351	0.9384	<i>Cucumis sativa</i>
0.7953	0.2538	0.2882	1.3291	<i>Petrselinum hortense</i>

Table (2) show that pakistan *Solanum tuberosum* recorded highest value of lead element(1 .7249 ppm), while pakistan *Citrus reticulata* Recorded lowest value (0.7469 ppm) for the same element. The result for studied samples show high contamination with lead when compared with codex Adimentarius allowable limits (0.1 pp) this may due to

presence of contamination with this element in cultivated area and using of chemical fertilizers.

The same table show that Turkish *Solanum tuberosum* recorded highest concentration of nickel (0.3645 ppm) while Jordanian *Lycopersicon esculentum* record lowest rate (0.1497 ppm)and all result were within allowable limits (4.46 ppm) for this element in all studied samples (table 2).

Jordanian *Lycopersicon esculentum* recorded highest value for copper elements (0.1969 ppm) while the lowest value was recorded in Turkish *Lycopersicon esculentum*(0.0869 ppm) all studied samples except Turkish *Lycopersicon esculentum* have higher value of this element than allowable limits this may be due to contaminate cultivated area or using of fertilizers and pesticides in large counts or water contamination with heavy metals .

Table 2 show that Jordanian *Lycopersicon esculentum* recorded highest value of Cr ( 0.6180 ppm ) while it was not recorded in the rest samples. The recorded value of this element was higher than WHO allowable limits (0.5 PPM) this may be due to contamination of the cultivated environment with this element or the use of sludge.

**Table2** concentration of heavy metals in imported vegetables and fruits

Cr	Cu	Ni	Pb	Vegetables and Fruits Imported
No.d	0.0869	0.2300	1.0404	<i>Lycopersicon esculentum</i> Turkish
No.d	0.1129	0.2422	0.7478	<i>Pyrusmalus</i> Turkish
No.d	0.1551	0.3645	0.7719.	<i>Solanum tuberosum</i> Turkish
No.d	0.1427	0.3215	0.7469	<i>Citrus reticulate</i> Pakistan
0.3590	0.1847	0.3620	1.7249	<i>Solanum tuberosum</i> Pakistan
0.6180	0.1969	0.1497	1.0143	<i>Lycoperscion esculentum</i> Jordanian

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