



DETERMINATION OF HEAVY METAL ANALYSIS IN VEGETABLE SAMPLES OF BENGALURU AND TUMUKUR SOME MARKET PLACES, KARNATAKA, INDIA

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Introduction

In general for development of human life, some tracer metals are essential, contaminated vegetable may produce health defect of human being by taking up of heavy metal, this study was conducted to determine the concentration of heavy metal like Cu, Fe, Cr, Pb, Mn, in vegetables. The vegetables, sample are collected by different market sites of Bengaluru and Tumkur. Overall, this study indicates that vegetables are contaminated by toxic metals present in sewage water or the water which is used for cultivation. There is an opinion that the vegetables marketed in Bangalore were from the farmland where the sewage water was used for the cultivation.

Keywords: Heavy metals, Vegetables, XRF, WHO, Markets, Heavy metal concentration.

Introduction

The consumption of vegetable and fruits as food offers rapid and least means of providing adequate vitamins supplies, minerals and fibers .vegetable are used as food include those used in making soups or served as integral parts of main source of a meal .leaf vegetable occupy a very important place in the human diet but unfortunately constitute a groups of foods which contribute maximally to nitrate and other anions as well as heavy metal consumption, the excessive application of nitrogen and other inorganic fertilizers and organic mummies to this vegetable can accumulate high levels of iron as well of heavy metal .and consequently their consumption by humans and animals can serious health hazards⁽¹⁾.Rapid and unorganized industrialization and urbanization have contributed to the elevated levels of heavy metals

in the urban environment in developing countries; heavy metals are non-bio degradable and persistent environmental contaminants which may be deposited on the surface and then absorbed into the tissues of the vegetables⁽¹⁾. Plants take up heavy metals by absorbing them from deposits on the parts of plants exposed to the air from the polluted environment as well as from contaminated soils. And also these study comparisons with some vegetable samples are collected from Bangalore organic vegetable stores. In organic stores, vegetable samples heavy metals concentration are less compare to the heavy metal concentration in vegetable samples sold in market places⁽³⁾.

The consumption of vegetable and fruits as food offers fast and least means that of providing adequate vitamins provides, minerals and fibers .vegetable are used as food embrace those used in creating soups or served as integral elements of main supply of a meal .leaf vegetable occupy an awfully vital place within the human diet however sadly represent a teams of foods that contribute maximally to nitrate and alternative anions Furthermore as significant metal consumption, the excessive application of atomic number 7 and alternative inorganic fertilizers and organic mummies to the current vegetable will accumulate high levels of iron Furthermore of significant metal .and so their consumption by humans and animals will serious health hazards⁽¹⁾.Rapid and unorganized industrial enterprise and urbanization have contributed to the more levels of significant metals within the urban setting in developing countries; significant metals are non-bio degradable and protracted environmental contaminants which can be deposited on the

surface and so absorbed into the tissues of the vegetables(1). Plants take up significant metals by engrossing them from deposits on the elements of plants exposed to the air from the contaminated setting Furthermore as from contaminated soils. And conjointly these study comparisons with some vegetable samples are collected from urban center organic vegetable stores. In organic stores, vegetable samples significant metals concentration ar less compare to the significant metal concentration in vegetable samples sold-out in market places (3).

MATERIAL AND METHODS

Analysis:

Vegetables collected from different places were analysed for Concentrations of heavy metals using **X-ray fluorescence spectro photometer (XRF α -4000)**.Vegetable samples were collected from different market places [Chintamani, Kolar District, Hesaragatta, agaar, nelamangala,Bengaluru District and Madhugiri, Tumkur District].at each sample location; vegetable samples were collected from 5 different location to provide replicate samples each plant. Vegetable samples include potato, carrot, beetroot, menthol, coriander, aware leaves, sabbakki leaves, curry leaves, etc.

Preparation of samples:-

The different vegetables were collected from Chintamani, Hesaragatta, Agara, Madhugiri, and nelamangala market places. The collected samples were washed with distilled water to remove the dust particles and were cut into small pieces using a clean knife, the pieces of vegetables were dried in an oven at 100 °C for three days .after drying the samples were ground into a fine powder using a commercial blender and stored in polyethylene bags. The powdered samples were analyzed for heavy metals such as Copper, Chromium, Lead, Iron, Manganese, etc.

Result and discussion:-

Metallic elements are ubiquitous in the environment. Some trace heavy metals are significant in nutrition, either for their essential nature or their toxicity. The aim of this study was to check the presence of heavy metals vegetables collected from Bangalore and Tumkur market places. Sources of contamination affecting predominately Vegetable samples are due to various inputs, such as fertilizers, pesticides, sewage sludge, etc. Heavy metals analysis

revealed that the sample contained Cu, Cr, Mn, Fe, and Pb. The Results were tabulated in Table1. Iron is a mineral needed by our bodies, iron is a part of all cells and does many things in our bodies, in the market places vegetable samples Fe which was slightly greater (1702 to 42567 ppm)than permissible Recommended value by WHO (300 PPM). Iron is a vital mineral in the human body. Iron overload, however, is deadly most physicians believe it is rare and mainly hereditary. In fact, it is far more common and dangerous than many people imagine. A condition in which can be a reason includes diabetes, heart disease, arthritis, Alzheimer disease and cancer, other include chronic infections, hairless, hypothyroidism, hyperactive behavior, violence and much more condition. Copper is an essential trace element that is vital to the health of all living things (humans, plants, animals, and microorganisms)(4). Copper is essential to the proper functioning of organs and metabolic process. Vegetable samples contain Cu in almost samples out of 30 samples, and also Cr is present in only a few samples concentration were found to be Cu as 45 to 244 ppm and Cr as 348 to 917 which is greater than the permissible levels recommended by WHO (Cu as 100 ppm and Cr as 100-200ppm). Copper concentration is slightly higher than the WHO value it affects the human beings, Copper in food taken as large doses normally rejected by vomiting chronic copper poisoning is also very rare, and the few reports refer to patients with liver diseases.

Lead is a soft metal that has known many applications over the years. It has been used widely since 5000 BC for application in metal products, cables, and pipelines but also in paint industries. That lead has the most damaging effects on human health (4). It can enter the human body through uptake of food (65%), water (20%), and air (15%). In this study reveals that vegetable samples found to contain Lead in a range of 24 to 193 ppm. But according to WHO guidelines, the value of lead should be 0.1 mg/kg. The concentration of Lead is increases in vegetable can cause several unwanted effects such as Disruption of the bio synthesis of hemoglobin, A rise in blood pressure, Kidney damage, Miscarriages and subtle abortions, Brain damage, Diminished learning abilities of children's(5).

Table1: concentration of heavy metals in vegetable samples.

<i>sl number</i>	<i>samples</i>	<i>Cr Mg/Kg</i>	<i>Mn Mg/Kg</i>	<i>Fe Mg/Kg</i>	<i>Cu Mg/Kg</i>	<i>Pb Mg/Kg</i>
1	veg	807	ND	6548	ND	36
2	veg	ND	281	20432	91	44
3	veg	ND	706	50794	165	131
4	veg	ND	353	34525	114	88
5	veg	348	412	42567	95	69
6	veg	ND	488	23504	59	77
7	veg	ND	ND	18530	ND	49
8	veg	ND	640	23949	105	86
9	veg	ND	282	13185	ND	55
10	veg	ND	476	15005	ND	36
11	veg	ND	226	7762	ND	59
12	veg	917	336	5610	ND	41
13	veg	ND	691	27314	62	88
14	veg	ND	138	1968	ND	34
15	veg	ND	334	6997	68	63
16	veg	ND	ND	5091	ND	35
17	veg	ND	1959	15554	69	71
18	veg	ND	377	28442	56	133
19	veg	ND	313	19457	172	81
20	veg	ND	ND	6626	ND	46
21	veg	ND	269	19662	110	85
22	veg	ND	ND	1702	80	24
23	veg	ND	666	32078	244	185
24	veg	ND	1890	5751	79	49
25	veg	ND	259	22633	104	193
26	veg	ND	235	7471	45	129
27	veg	ND	247	14166	145	87
28	veg	ND	450	22754	119	143

Table 2: Maximum limits for trace and toxic heavy metals In spices

<i>Macro metals</i>	<i>Micro metals</i>	<i>Toxic heavy metals</i>
<i>Cr</i>	<i>Fe</i>	
	<i>Mn</i>	<i>Pb</i>
	<i>Cu</i>	

<i>Metal</i>	<i>Maximum Permissible Limit (mg/Kg)</i>
<i>Fe</i>	300
<i>Mn</i>	100
<i>Cu</i>	20
<i>Zn</i>	50
<i>Cr</i>	30
<i>Ni</i>	50
<i>Pb</i>	10
<i>Cd</i>	0.2

Table 3- Represent the name the vegetable samples and SI numbers.

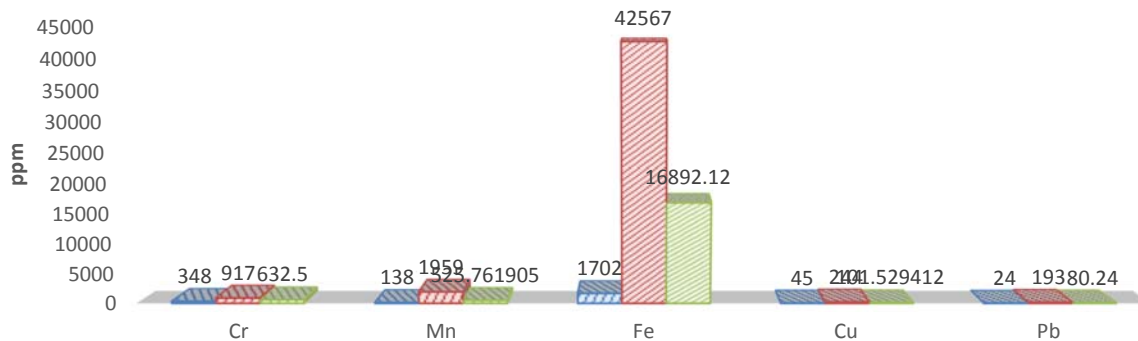
<i>Column1</i>	<i>Column2</i>
Radish	1
	2
	3
Potato	4
	5
	6
Carrot	7
	8
	9
Beet root	10
	11
	12
Menthol	13
	14
	15
Palak	16
	17
	18
coriender	19
	20
	21
Arevesoppu	22
	23
	24
Sabbaki	25
	26
	27
curry leaves	28
	29

Table3: - Represents concentrations of heavy metals in min., max., and avg. Values of vegetable samples collected by different market places.

	Cr	Mn	Fe	Cu	Pb
min	348	138	1702	45	24
max	917	1959	42567	244	193
avg	632.5	525.761905	16892.12	101.529412	80.24

Table4: - minimum, maximum, and average values of vegetable samples.

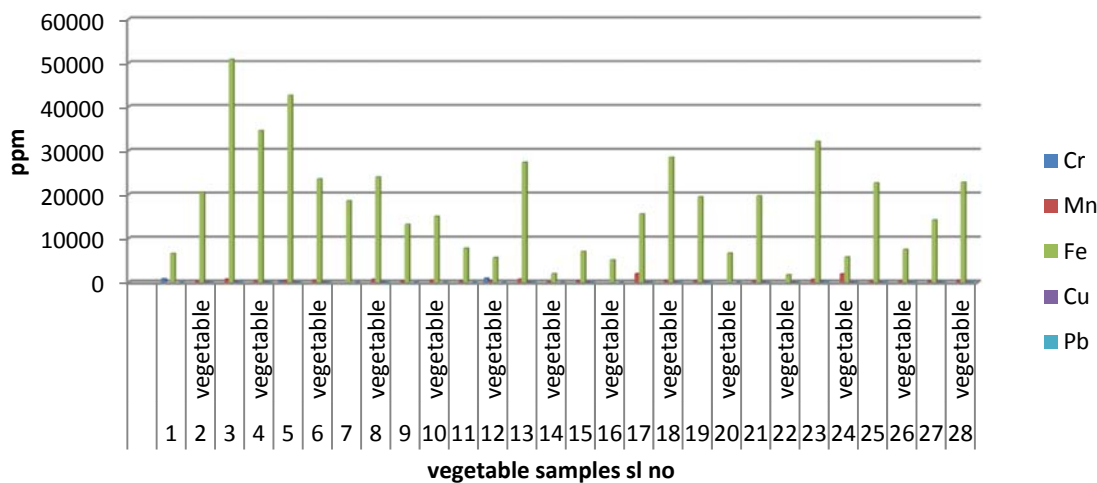
MIN,MAX,AND AVG VALUES OF VEGETABLE SAMPLES



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Table5 : -this is a graph for concentration vegetable samples is collected by different market places.

concentration of vegetable samples



CONCLUSION

From the result, it's clear that Cu, Cr, Mn, Fe, and Pb are present in the sample. These metals show the impending effect to human health and Lead poisoning is another major concern of the scientists in India. Hence it is essential to monitoring of heavy metals in vegetables to prevent excessive take-up of these Metals in vegetables and indirectly affect the human food chain. This the prime time to give awareness to the formers and avoid consumption of contaminated vegetable food stuff.

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