RESEARCH REGARDING THE MINERAL ELEMENTS CONTENT IN SOME HERBAL SEASONING FROM THE BANAT'AREA

CERCETĂRI PRIVIND CONŢINUTUL ÎN ELEMENTE MINERALE A UNOR PLANTE CONDIMENTARE DIN CÂMPIA BANATULUI

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Abstract. *In this paper were studied by comparison the macroelements ((Na, K, Ca, Mg) and microelements (Fe, Cu, Zn, Cd, Ni, Mn, Pb, Co, Cr) content of some herbals seasoning from Banat's geographic area. For this purpose, the mineral elements mentioned were quantified by atomic absorption spectrometry and there arised from the roots and the leaves of: dill (Anethum graveolens), parsley (Petroselinum crispum), lovage (Levisticum officinale) and celery (Apium graveolens). Among macroelements, K and Ca were found in the highest concentration in whole investigated vegetable material mostly in leaves. Regarding the microelements, Fe was detected in high concentration in plant leaves. Co and Cd were not found in any samples analysed.*

Key words: mineral elements, atomic absorption spectrometric, herbal seasoning

Rezumat. *In prezenta lucrare s-a studiat comparativ conţinutul în macroelemente (Na, K, Ca, Mg), respectiv microelemente (Fe, Cu, Zn, Cd, Ni, Mn, Pb, Co, Cr) al unor plante condimentare din arealul geografic al Câmpiei Banatului. În acest scop, elementele minerale menţionate au fost cuantificate prin spectrofotometrie de absorbţie atomică din radăcinile şi frunzele de: mărar (Anethum graveolens), pătrunjel (Petroselinum crispum), leuştean (Levisticum officinale) şi ţelină (Apium graveolens). Macroelementele K şi Ca s-au regăsit în concentraţiile cele mai mari în întreg materialul vegetal investigat, cu preponderenţă în frunze. Dintre microelemente, Fe a fost detectat în concentraţie mare în frunzele plantelor. Co şi Cd nu s-au regăsit în nici una din probele analizate.*

Cuvinte cheie: macroelemente, microelemente, spectrometrie de absorbţie atomică, plante condimentare

INTRODUCTION

Functioning of living organisms can be done optimally only in the presence of adequate amounts of macro and micronutrients (Garban, Z., 1999). Their presence in insufficient quantities or exceeded certain permissible limits can affect the human body due to the emergence of nutrition diseases.

Some microelements: As, Pb, Cd, Hg, even in very low concentrations, has toxic for the human body (Hoog, C.L., 2001). These considerations reveal the

importance to investigate the macro and micronutrients content in different biological and environmental systems. Optimal determining of their can be achieved only using performance analytical methods (Mohamed, A.E., 2003).

This paper presents an evaluation of the content of macro and microelements: K, Na, Ca, Mg, respectively Mn, Fe, Co, Ni, Cu, Zn Cr, Pb and Cd from different spicy herbs by atomic absorption or emission spectrometry. The studies plants have a strong spicy seasoning, being employed as bulbs, roots, leaves, fruits or stems, in food industry for seasoning various dishes.

The dill (*Anethum graveolens* L.), the parsley (*Petroselinum crispum*), the lovage (L. *Koch Levisticum officinale*) and the celery (*Apium graveolens*) were in ancient times a wide use in food, as well as herbs.

On the basis of obtained data it was found that the plant roots and leaves of fresh spices are, by their contribution of macro and micronutrients, an important source of nutrients. In other point of view, due to high levels of heavy metals, of inadequate treatment during cultivation, spicy plants can become potential sources of contamination by toxic elements.

MATERIAL AND METHOD

For analysis of four samples were used for seasoning, fresh herbs: dill, parsley, lovage and celery collected from Gataia, Timis county.

Fresh samples were dried at 105˚C for three hours, were then calcined at 650˚C for four hours. Samples calcined were treated with 5 ml 0.5 N HNO_3 and evaporated to dryness. After cooling mineral residues were dissolved in 25 ml 0.5 N HNO_3, filtered and brought to the mark with distilled water (Gergen, I., 2004).

For determination of macro elements were used diluted 1:100 working solution in distilled water for dilute solutions of potassium and calcium and sodium and magnesium if 1:10. The standard solution of 0.1 mg element / mL Pipette 1-5 mL, 5-25 mL respectively in 100 ml flasks. Add 10 ml of monopotassium phosphate solution to ensure a roughly equal acidity of the. Make the mark with distilled water and mix. Standard solutions stored in sealed bottles (Gogoasa, I., 2004).

Na and K were determined by atomic emission spectroscopy, and Mn, Fe, Co, Ni, Cu, Zn, Cr, Pb, Cd, Mg and Ca by atomic absorption spectroscopy using an atomic absorption spectrometer AA 300 using the following standard working conditions: Flame type: C2H2/aerw; Flame height: 6 mm; Air flow: 568l/h; Acetylene flow: 80l/h for determination of As, 70l/h for Mg, 60l/h for Fe, 50l/h for other minerals.

Dominant wavelength (λ) for each chemical elements were: Na - λ = 588 nm, K - λ = 766 nm, Ca - λ = 422 nm, Mg - λ = 285 nm Fe - λ = 248 nm Mn - λ = 279 nm, with - λ = 324 nm, λ = 213 nm Zn, Ni - λ = 232 nm, Pb - λ = 217 nm (Gogoasa, I., 1999).

RESULTS AND DISCUSSIONS

The results obtained in the case of macro-and microelements determining in plant roots and leaves of fresh spices, using atomic absorption spectrometry, are shown in tables 1 and 2.

Table 1

Macroelements content (ppm) in roots and leaves of herbal seasoning R - root; F – leaves

No. crt.	Sample	K (ppm)	Na (ppm)	Ca (ppm)	Mg (ppm)
1	Dill (R)	6370	588	1914	428.25
2	Dill (F)	6820	153	2158	643
3	Parsley (R)	4683	147.65	517	497.85
4	Parsley (F)	7145	180	857	621
5	Lovage (R)	4884	248.55	1508	485.3
6	Lovage (F)	5690	163.4	1641.5	494.55
7	Celery (R)	3878.5	184.45	245	177
8	Celery (F)	6485	458.7	2101	761

Table 2

Content of microelements (mg/kg sample) of roots and leaves of some herbal seasoning (R - root; F – leaves)

No. crt.	Sample	Mn (ppm)	Fe (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	Cr (ppm)	Pb (ppm)	Cd (ppm)
1	Dill (R)	2.38	43.25	-	0.125	1.46	7.94	0.52	0.032	-
2	Dill (F)	8.14	19.17	-	0.115	1.33	9.10	0.25	0.048	-
3	Parsley (R)	1.81	15.07	-	0.116	1.11	5.46	0.56	0.139	-
4	Parsley (F)	2.82	24.38	-	0.125	1.11	8.71	0.41	0.015	-
5	Lovage (R)	1.77	31.16	-	0.171	1.25	9.71	0.59	0.031	-
6	Lovage (F)	2.75	37.85	-	0.118	0.97	5.85	0.45	0.057	-
7	Celery (R)	1.66	4.43	-	0.031	0.95	5.15	0.48	-	-
8	Celery (F)	13.20	101.90	-	0.102	2.70	12.35	-	0.025	-

It appears that the most concentrated mineral elements K and Ca were both roots and leaves as seasoning plants analyzed for K values were within the range 3878.5 -7145 ppm, while that between 517 to 2158 ppm.

Calcium, predominantly minerals element in the body, is found in higher concentrations (2100 - 2160 ppm) in leaves of dill and celery. Other spicy herbs have lower Ca concentrations (245 - 1914 ppm).

Sodium, an important element for human body, is present in relatively low concentrations (147.65 - 588 ppm) from literature data (600 to 1400 ppm) in leaves especially dill, celery and parsley.

Potassium, an important macro element for human cells, is found in concentrations between 5500 and 7150 ppm in the leaves of dill, parsley, lovage and celery, and a lower proportion (from 3800 to 4890 ppm) was determined the roots of parsley, lovage and celery, fennel root exception being a K-rich content (6370 ppm).

Magnesium, essential macro body was found in the limits between 170 to 760 ppm. The lowest values are observed in celery root (below 200 ppm).

Iron was determined in relatively small concentrations (4.43 - 43.25 ppm) than was found for Fe-rich celery leaves (101.9 ppm).

Manganese is well represented in the leaves of celery (13.2 ppm) and the other samples analyzed, manganese was determined in the range 1.60 - 8.14 ppm.

Chromium is the only microelement whose concentrations exceeded the limit of 0.2 ppm in all samples (0.25 - 0.59 ppm).

Nickel is present in very small quantities (less than 0.2 ppm) in all samples analyzed, the lowest amount of nickel can be found in celery root (0.031 ppm). In the cobalt, it is not in any of the samples subjected to spectrometric analysis.

Are listed on potentially toxic metals like zinc and copper micro, if their concentration in plant fresh seasoning to exceed the limit of 5 ppm to 15 ppm Cu and Zn. Since the values obtained for copper is in the range 0.95-2.70 ppm and for zinc 15-12.35 ppm, shows that the analyzed samples are not toxic if used in food.

Lead and cadmium are considered toxic heavy metals, Pb is why the maximum permissible limit is 0.5 ppm and 0.1 ppm for Cd. Cadmium is not in the eight samples analyzed in this paper and the values were below 0.1 ppm in the case of lead.

CONCLUSIONS

In can observed the relatively high concentrations as: Na, K, Ca and Mg, potassium being the highest content macro in all samples. It is noted that highest values of macro and trace elements were found in the leaves of dill, parsley, lovage and celery than their roots.

It appears that celery leaves have the highest content of micro elements: Mn (13.20 ppm), Fe (101.90 ppm), Cu (2.70 ppm) and Zn (12.35 ppm). In samples of leaves and roots of herbal seasoning were analyzed spicy exceeded maximum allowable concentrations for micro, exception being Cr concentrations at which the maximum permissible limit has been exceeded.

The concentrations of micro elements are important in terms of food safety and environmental ecology.

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