Journal of Elementology ISSN 1644-2296

Kiczorowska B., Klebaniuk R., Bąkowski M., Al-Yasiry A.R.M.H. 2015. *Culinary herbs – the nutritive value and content of minerals*. J. Elem., 20(3): 599-608. DOI: 10.5601/jelem.2014.19.4.739

CULINARY HERBS – THE NUTRITIVE VALUE AND CONTENT OF MINERALS

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Abstract

The content of dry matter, total protein, ether extract, crude ash and crude fibre was determined in the plant material. In addition, the BAW was calculated and the content of: Mg, Ca, K, Na, Fe, Cu, Mn and Zn was assessed. The highest (P < 0.05) concentration of nutrients in dry matter was characteristic of fennel flower and green pepper.The highest abundance of minerals in crude ash was found in lovage and marjoram (144.4-116.6 g kg^{-1}), and of total protein – in common basil and lovage (208.8 and 185.4 g kg^{-1}). The highest (P < 0.05) content of crude fat was determined in common juniper, nutmeg, green pepper, marjoram and rosemary (on average 17.18 g kg^{-1}) and of fibre in coriander (107.2 g kg^{-1}), while the highest BAW was recorded in nutmeg, white pepper and rosemary (on average 730.9 g kg^{-1}). The % RDA and AI coverage were estimated for consumers aged 31-50, assuming that the intake of the analysed culinary herbs is equivalent to 1g per day.

The herbs had highly differentiated content of the analysed minerals. Common basil contained the highest amounts (P < 0.05) of macroelements: Mg, Ca, K and Na (79.8, 1278, 2135 and 218.5 μg g^{-1}, respectively) and microelements: Fe, Cu and Mn (26.31, 1.95 and 8.56 μg g^{-1}, respectively). Of all the herbs, fennel flower was the most abundant (P < 0.05) source of Zn (74.53 μg g^{-1}), while juniper and green pepper was the richest in Mg (an average content 86.8 μg g^{-1}), marjoram and lovage – in Ca (1666 and 1041 μg g^{-1} respectively), and red pepper – in K (2114 μg g^{-1}). According to calculations, the consumption of 1 g of the above herbs can cover up to approx. 0.1% of RDA (Mg, Ca,) and AI (K, Na) and up to 0.6% of RDA (Fe, Cu, Mn, Zn).

Keywords: basic chemical composition, minerals, culinary herbs.

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INTRODUCTION

Herbal plants are an irreplaceable food additive. Not only do they enhance the flavour, i.e. the taste and aroma of food, but they also have a beneficial effect on human health. Their properties are shaped by the content of biologically active ingredients such as essential oils, phenolic compounds, tannins, bitter compounds, organic acids and mucilage.Herbs also contain enzymes, vitamins, phytoncides and other active substances (Kazimierczak et al. 2010, Zawiślak et al. 2012).

However, the concentrations of basic nutrients and mineral elements are equally important as the content of bioactive substances for the quality of herbal material (Dzida et al 2015). Levels of nutrients and minerals are affected by several factors, related to the environment (soil and climate) and a plant variety, all giving a product its specific chemical composition, which in turn reflects the product's nutritive and medicinal properties as well as its culinary value (Seidler-Łożykowska et al. 2006).

The study's aim has been to evaluate the content of basic nutrients and selected macro- and microelements in popular culinary herbs available on the market in Lublin.

MATERIAL AND METHODS

The following culinary herbs were chosen for analyses: common basil *(Ocimum basilicum*), fennel flower (*Nigella sativa)*,common juniper *(Juniperus communis*), coriander (*Coriandrum sativum* L.*),* lovage *(Levisticum officinale*), marjoram (*Origanum majorana*), nutmeg (*Myrystica fragrans*), and white pepper, black pepper, red pepper, green pepper *(Piper nigrum)* and rosemary *(Rosmarinus officinalis).* They were purchased in 8 different stores in the city of Lublin.

Chemical analyses were carried out using ground air-dry material. The content of dry matter, crude ash and total protein, ether extract and crude fibre in the material was determined by means of standard procedures (AACC 2000). The basic chemical composition was used to derive the content of easily hydrolysable carbohydrates in the NFI fraction. The mineral composition was determined by flameless atomic absorption spectrophotometry. The measurements were carried out on a Spectr AA 880 Varian apparatus, with a graphite furnace for atomisation, the Zeeman background correction (309.3 nm, 10 mA, gap – 0.5 nm, argon – flow rate 3 l min^{-1}) as well as pyrolytic graphite coated trays (Ghaedi et al. 2009).

Based on the content of mineral elements determined in culinary herbs, their daily supply was calculated for consumers aged 31-50. The percentage of the coverage the Mg, Ca, Fe, Cu and Zn demand was estimated based on the recommended dietary allowance (RDA) for Poland (Jarosz 2012) at the following levels: 420 Mg mg, 1000 Ca mg, 10 Fe mg, 0.9 Cu mg, 11 Zn mg; for Mn the RDA defined by the European Commission at the level of 2 mg (CD 2008/100/EC 2008) was adopted. In order to determine the level of supply of K and Na in the herbs, their adequate intake (AI) was used (4700 K mg and 1500 Na mg) (Jarosz 2012).

The results were analysed by statistical methods using Statistica 10.0 software (Statsoft Inc., Tulsa, USA).The resulting values were analysed according to the following measures of location: the mean ($\bar{x}$) and the lower (Q25) and upper quartile (Q75) positioned in the group. The spread of values in the groups was determined according to standard deviation (SD), taking the standard error of the mean (SEM) into account. Differences between mean values were identified by a multiple range test (variance analysis Anova, α = 95%; $P < 0.05$), and their significance – by the Duncan's test (post-hoc).

RESULTS AND DISCUSSION

The material had an even level of dry matter (Table 1). Telesiński et al. (2013) recounted that the level of dry matter in herbs preserevd by drying cntinues to stabilise for as long as approximately 240 days. Despite original differences in dry matter from 86% (common basil) to 91% (lovage), similar concentrations of nutrients were recorded in all herbs after 8 months of storage (on average 91.5% of dry weight). Lovage and marjoram proved to be the most abundant ($P < 0.05$) sources of minerals determined in crude ash (respectively 144.47 and 116.6 g kg^{-1}), while the mineral content in white pepper was nearly 6-fold lower.

Significant differences ranging from 208.8 g kg^{-1} (common basil) to 56.84 g kg^{-1} (rosemary) occurred in the total protein content of the analysed herbs, not only due to variety-specific properties affecting the synthesis of this nutrient in the plants but also as a result of the content of nitrates and nitrites. Telesiński et al. (2013) reported that basil is a herb with the highest content of NO_3^- per kg (d.w.). Its concentration depends on numerous factors, e.g. species, variety, fertilizer dose, cultivation region and environment (Rutkowska 2001).

Fat found in culinary plants is mostly composed of esters of glycerol and of higher fatty acids. Higher fatty acid esters are the fundamental flavour compounds in herbs, and their type and amount determine the aroma and taste of culinary herbs (Guimarãe et al. 2013). The most abundant ($P < 0.05$) sources of crude fat were common juniper, marjoram, nutmeg, green pepper and rosemary (average content 17.01 g kg^{-1}). The highest ($P < 0.05$) amount of carbohydrates was recorded in coriander (fibre – 107.2 g kg^{-1}, BAW – 596.1 g kg^{-1}). Herbs wich were the richest ($P < 0.05$) in easily hydrolysable carbohy-

Table 1

The nutrient content (g kg^{-1}) in spice herbs (n = 24)

Spice herbs	Dry matter	Cude ash	Crude protein	Ether extract	Crude fiber	NFI
Common basil	909.1 ±1.09	89.84^{b} ±0.12	208.8^{a} ±0.07	11.21^{b} ±0.17	45.91^{e} ±0.09	553.3^{b} ±1.06
Q25-Q75	886-927	77-95	189-222	9.4-13.2	41-52	498-608
SEM	25.89	0.56	1.56	0.22	0.68	20.45
AV	5.86	0.78	4.52	4.56	3.45	9.84
Common juniper	873.4 ±1.11	30.83^{e}±0.05	84.54^{d} ±0.04	18.12^{a} ±0.07	78.5^{b} ±0.16	661.4^{ab} ±0.87
Q25-Q75	798-898	25-33	74-91	15.4-20.1	65-81	607-712
SEM	19.58	0.38	0.56	0.34	0.45	25.47
AV	4.44	0.45	10.5	2.89	3.44	6.45
Coriander	923.5 ±0.95	64.24^{c} ±0.07	142.5^{b} ±0.13	13.45^{b} ±0.08	107.2^{a} ±0.91	596.1^{ab} ±0.17
Q25-Q75	888-938	55-69	128-149	10.5-14.8	98-122	554-618
SEM	29.84	0.59	2.56	0.38	1.89	15.98
AV	9.84	0.67	0.89	3.14	9.35	11.78
Fennel flower	929.2 ±0.21	58.12^{c} ±0.08	141.7^{b} ±0.09	7.75^{c} ±0.12	23.38^{f} ±0.05	698.2^{ab} ±1.05
Q25-Q75	878-953	48-69	131-154	6.7-9.1	18-25	658-721
SEM	24.56	0.48	1.56	0.34	0.38	32.51
AV	8.98	0.63	5.48	2.58	4.56	9.48
Lovage	905.8 ±0.15	144.7^{a} ±0.16	185.4^{a} ±0.08	8.76^{c} ±0.18	44.53^{e} ±0.14	522.4^{b} ±0.23
Q25-Q75	876-912	125-168	171-194	7.2-9.5	35-49	498-578
SEM	19.84	1.45	4.35	0.37	0.68	32.15
AV	3.45	4.78	9.89	1.56	2.34	9.47
Marjoram	918.4 ±0.04	116.6^{a} ±0.15	143.9^{b} ±0.07	16.34^{a} ±0.10	38.93^{e} ±0.08	602.6^{ab} ±0.24
Q25-Q75	897-932	106-132	134-49	14.4-17.1	31-45	587-632
SEM	27.45	2.56	2.56	0.48	0.28	13.58
AV	9.48	3.15	5.42	2.45	3.12	6.43
Nutmeg	916.8 ±0.04	27.37^{e} ±0.08	87.65^{d} ±0.16	17.14^{a} ±0.07	59.58^{d} ±0.17	725.1^{a} ±0.64
Q25-Q75	878-933	19-32	74-94	16.2-18.1	51-64	709-756
SEM	15.84	0.38	1.59	0.34	0.38	24.15
AV	2.36	0.59	3.56	1.46	3.19	14.5
White pepper	900.4 ±0.06	21.45^{f} ±0.04	110.6^{cd} ±0.18	6.12^{c} ±0.04	34.56^{e} ±0.04	738.1^{a} ±0.78
Q25-Q75	823-942	16-25	103-115	5.78-6.54	29-38	713-768
SEM	30.45	0.56	1.45	0.24	0.34	14.59
AV	9.04	1.89	3.47	2.45	2.78	5.86
Black pepper	894.5 ±0.10	43.25^{d} ±0.07	127.8^{c} ±0.05	10.74^{b} ±0.047	49.78^{e} ±0.067	662.9^{ab} ±0.34
Q25-Q75	823-912	35-48	117-132	8.79-11.5	40-53	604-706
SEM	14.56	0.23	1.47	0.35	0.58	26.47
AV	4.06	2.56	4.55	4.56	1.87	8.49
Red pepper	873.5 ±0.08	40.5^{d} ±0.17	65.12^{e} ±0.048	9.12b^{c} ±0.07	79.65^{b} ±0.094	679.1^{ab} ±0.47
Q25-Q75	856-897	37-43	51-69	7.98-10.2	69-81	612-706
SEM	21.56	0.89	2.34	0.24	0.94	24.56
AV	4.89	0.78	3.12	3.45	4.78	13.21
Green pepper	934.1 ±0.19	33.89^{e} ±0.07	124.4^{c} ±0.07	17.11^{a} ±0.05	69.8^{cd} ±0.16	688.9^{ab} ±0.87
Q25-Q75	903-978	28-37	117-132	15.3-17.9	56-71	645-723
SEM	24.78	0.35	2.38	0.35	0.68	14.58
AV	6.58	1.56	4.78	2.54	4.56	7.48
Rosemary	914.2 ±0.78	73.14^{bc} ±0.16	56.84^{f}±0.08	16.34^{a} ±0.08	38.47^{e} ±0.05	729.4^{a} ±0.17
Q25-Q75	894-945	64-77	45-61	15.4-17.9	30-45	689-768
SEM	31.25	0.89	0.87	0.45	0.38	19.45
AV	5.45	1.56	1.34	6.51	4.12	7.58

NFI – sugars readily hydrolysed, SD – standard deviation, Q25-Q75 – upper quartile - lower quartile, SEM – standard error of mean, AV – analysis of variance, *a*,*b*,*c*, ... – statistical differences (P < 0.05) drates (BAW) were nutmeg, white pepper and rosemary (average content 730.87 g kg^{-1}).

The culinary herbs contained different amounts of macro- and microelements (Table 2). This can be a result of differences specific to plant species but can be also attributed to agrotechnical and weather conditions (Dzida, jarosz 2004, Pytlakowska et al. 2012). In particular, the content of microelements in herbal material can be subject to considerable fluctuations (Suchorska-Orłowska et al. 2006). The most notable of all the analysed culinary herbs is common basil, in which the determined content of Mg, K, Na, Fe, Cu and Mn reached higher values. Basil's high ability to accumulate mineral elements is supported by the studies of Grzeszczuk, Jadczak (2008), Nurzyńska-Wierdak et al. (2012), Siedler-Łożykowska et al. (2006, 2008) and Zengin et al. (2008). The other herbs characterised by a high (P < 0.05) content of indivudual macroelements were common juniper (Mg) marjoram (Ca), red pepper (K), green pepper (Mg) and rosemary (K).

As regards the determination of macroelements, a relatively high (P < 0.05) content of Mg was characteristic of common juniper, green pepper and lovage (89.1, 84.5 and 67.6 μg g^{-1}, respectively). This element participates in the biosynthesis of protein, thermoregulation processes, nerve impulse conduction and cardiovascular regulation. Also, a relationship was proved between a deficiency of magnesium and the development of neoplastic diseases (Bodnar et al. 2008, Lips et al. 2012). Conventional diets satisfy approximately 2/3 of the demand for magnesium (Jarosz 2012). When supplementing this element, a proper Mg and Ca ratio of 1:2 must be maintained (Leśniewicz et al. 2006). Any imbalance in this proportion can cause Ca loss from osseous tissue (Heleniak et al. 2002). Among the analysed culinary herbs, marjoram, common basil, lovage and rosemary were the best sources of Ca (average content 1272 μg g^{-1}).

The highest (P < 0.05) content of potassium in the herbs was characteristic of common basil, red pepper and rosemary (average content 2300 μg g^{-1}). Its presence should be particularly monitored in the diets of people consuming excessive amounts of sodium. Herbs are also recommended by dieticians as an element eliminating table salt, which is the main source of Na in a diet. Excessive amounts of salt in the menu may be an underlying cause of many civilization diseases such as hypertension. On the other hand, sodium must be present in the organism to regulate the function of the nervous, muscle and blood circulation systems (Turban et al. 2013). Among the analysed herbs, the highest (P < 0.05) content of sodium was determined in common basil and green pepper (218.5 and 176.5 μg g^{-1}, respectively), whereas the lowest (P < 0.05) amount was found in marjoram (14.33 μg g^{-1}).

The deficiency of iron in food rations is a common problem. It is most often due to the presence of its poorly assimilable forms in food. Herbal products contain Fe in a form easily available to the organism (Jabłońska et al. 2013). The richest (P < 0.05) sources of iron were common basil and rosema-

Table 2

The content of some macro-and micronutrients (µg g^{-1}) in spice herbs (n = 24)

Spice herbs	Mg	Ca	K	Na	Fe	Cu	Mn	Zn
Common basil	79.8^{a} ±0.25	1278^{ab} ±9.89	2135^{a} ±19.05	218.5^{a} ±1.10	26.31^{a} ±0.19	1.95^{a} ±0.08	8.56^{a} ±0.11	45.14^{b} ±0.16
Q25-Q75	65-81	1148-1289	2045-2300	207-235	21-34	0.9-2.0	7.4-8.9	39-49
SEM	0.56	11.58	14.58	5.58	0.34	0.07	0.07	0.47
AV	4.59	3.48	24.56	3.48	4.56	4.15	4.25	5.48
RDA*/**/AI*** (%)	0.019*	0.128*	0.045***	0.015***	0.263*	0.217*	0.428**	0.410*
Common juniper	89.1^{a} ±0.28	345.4^{d} ±3.106	1374^{d} ±9.067	139.7^{c} 2.86	6.89^{d} ±0.19	0.89^{d} ±0.04	5.89^{b} ±0.06	24.52^{c} ±0.03
Q25-Q75	75-93	324-350	1298-1498	128-149	5.4-7.2	0.4-1.2	5.4-6.0	22-26
SEM	0.64	3.94	34.56	2.48	0.05	0.02	0.06	0.34
AV	3.25	3.27	3.15	6.45	2.87	8.41	1.15	3.45
RDA*/**/AI***	0.021*	0.035*	0.029***	0.009***	0.069*	0.099*	0.295**	0.223*
Coriander	43.8^{c} ±0.19	356.1^{d} ±2.112	1578^{c} ±8.134	49.78^{f} ±0.18	5.75^{e} ±0.07	1.56^{b} ±0.08	8.64^{a} ±0.09	29.43^{c} ±0.14
Q25-Q75	35-45	334-361	1498-1688	40-57	4.5-7.1	1.4-1.6	73.8-8.9	25-31
SEM	0.35	1.78	14.56	0.48	0.09	0.01	0.04	0.37
AV	2.12	1.56	9.45	9.58	3.45	2.15	3.45	5.12
RDA*/**/AI***	0.010*	0.036*	0.034	0.003***	0.058*	0.173*	0.432**	0.268*
Fennel flower	48.4^{c} ±0.17	289.1^{de} ±1.108	1359^{d} ±11.26	87.91^{e} ±0.94	12.57^{b} ±0.07	1.56^{b} ±0.07	4.56^{c} ±0.03	74.53^{a} ±0.49
Q25-Q75	39-51	254-345	1248-1498	75-91	10-14	1.0-1.8	4.3-4.9	65-79
SEM	0.98	2.89	23.84	6.37	0.12	0.03	0.04	0.87
AV	6.89	3.56	7.95	7.48	4.28	1.45	3.01	11.45
RDA*/**/AI***	0.012*	0.029*	0.029***	0.006***	0.126*	0.173*	0.228**	0.678*
Lovage	67.6^{b} ±0.45	1041^{b} ±5.067	1421^{c} ±9.048	39.45^{f} ±0.98	2.51^{f} ±0.12	1.45^{b} ±0.12	6.58^{b} ±0.08	41.25^{b} ±0.08
Q25-Q75	57-69	978-1100	1389-1556	31-45	1.8-2.9	1.1-1.6	6.4-6.9	38-45
SEM	0.38	11.48	23.45	0.67	0.04	0.03	0.06	0.67
AV	5.84	8.79	8.24	4.59	3.15	4.25	4.13	5.41
RDA*/**/AI***	0.016*	0.104*	0.030***	0.003***	0.025*	0.161*	0.329**	0.375*
Marjoram	41.8^{c} ±0.48	1666^{a} ±3.248	1621^{c} ±14.13	14.33^{g} ±0.07	2.54^{f} ±0.04	1.84^{a} ±0.06	7.56^{ab} ±.048	41.24^{b} ±0.16
Q25-Q75	36-44	1489-1759	1568-1745	10-17	1.8-2.7	1.5-2.0	7.3-7.9	37-44
SEM	0.45	23.89	25.84	0.28	0.09	0.04	0.08	0.89
AV	3.56	11.54	8.94	9.45	4.58	2.13	3.45	7.23
RDA*/**/AI***	0.010*	0.167*	0.035***	0.001***	0.025*	0.204*	0.378**	0.375*

cont. Table 2

Nutmeg	23.7^{e} ±0.18	415.4^{c} ±1.178	1291^{d} ±10.08	118.2^{d} ±0.76	6.83^{cd} ±0.07	1.23^{c} ±0.09	4.56^{c} ±0.09	40.41^{b} ±0.14
Q25-Q75	18-25	398-426	1208-1445	108-125	5.7-7.1	0.9-1.3	4.5-4.8	35-42
SEM	0.23	4.67	32.56	4.48	0.07	0.03	0.03	0.58
AV	9.81	2.68	7.85	3.54	2.16	6.14	1.12	4.12
RDA*/**/AI***	0.006*	0.042*	0.028***	0.008***	0.068*	0.137*	0.228**	0.367*
White pepper	67.3^{b} ±0.34	336.5^{d} ±1.103	1567^{c} ±17.12	117.1^{d} ±0.57	3.41^{f} ±0.08	0.12^{e} ±0.07	1.23^{d} ±0.06	15.23^{d} ±0.13
Q25-Q75	61-73	315-354	1489-1678	110-128	2.9-3.7	0.07-0.19	1.1-1.3	13-18
SEM	0.68	3.38	11.56	5.34	0.04	0.04	0.07	0.47
AV	1.15	8.45	24.2	8.45	9.45	2.15	5.68	9.45
RDA*/**/AI***	0.016*	0.034*	0.033***	0.008***	0.034*	0.013*	0.062**	0.139
Black pepper	25.8^{e} ±0.18	245.4^{e} ±2.048	1345^{d} ±11.78	33.45^{f} ±0.08	9.45^{c} ±0.04	1.56^{b} ±0.13	1.49^{d} ±0.18	14.94^{d} ±0.06
Q25-Q75	23-29	224-268	1278-1468	27-36	8.6-9.9	1.2-1.7	1.4-1.6	13-15
SEM	0.56	2.57	30.56	0.28	0.07	0.07	0.08	0.31
AV	2.45	6.42	8.94	4.34	3.04	3.12	4.35	2.45
RDA*/**/AI***	0.006*	0.025*	0.029***	0.002***	0.095*	0.173*	0.075**	0.136*
Red pepper	20.5^{e} ±0.16	214.7^{e} ±2.102	2114^{a} ±24.38	117.5^{d} ±0.74	7.56^{d} ±0.07	1.48^{bc} ±0.06	1.45^{d} ±0.05	38.71^{b} ±0.03
Q25-Q75	17-22	198-228	2004-2398	104-124	6.4-7.9	1.3-1.6	1.3-1.5	35-41
SEM	0.45	3.56	19.81	4.67	0.07	0.03	0.04	0.45
AV	2.12	3.27	7.45	9.84	4.15	2.45	2.45	7.12
RDA*/**/AI***	0.005*	0.022*	0.045***	0.008***	0.076*	0.164*	0.073**	0.352*
Green pepper	84.5^{a} ±0.30	245.7^{e} ±3.113	1845^{b} ±8.058	176.5^{b} ±0.88	7.45^{d} ±0.09	1.78^{a} ±0.03	1.23^{d} ±0.09	13.45^{e} ±0.075
Q25-Q75	79-87	238-261	1874-1996	164-187	7.1-8.0	1.4-1.9	1.1-1.3	11-14
SEM	0.68	4.38	10.56	3.94	0.04	0.02	0.07	0.25
AV	4.12	7.57	9.78	10.23	1.25	4.38	6.45	3.12
RDA*/**/AI***	0.020*	0.025*	0.039***	0.012***	0.075*	0.198*	0.062**	0.122*
Rosemary	30.7^{d} ±0.16	1104^{b} ±5.061	2651^{a} ±20.54	146.5^{c} ±0.94	25.14^{a} ±0.08	0.12^{e} ±0.08	1.45^{d} ±0.119	23.47^{e} ±0.06
Q25-Q75	27-33	984-1240	2541-2890	138-154	21-27	0.8-0.21	1.3-1.6	21-25
SEM	0.38	23.48	28.94	5.64	0.57	0.04	0.03	0.48
AV	1.24	15.42	5.48	6.48	7.85	3.17	7.12	3.12
RDA*/**/AI***	0.007*	0.110*	0.056***	0.010***	0.251*	0.013*	0.073**	0.213*

SD – standard deviation, Q25-Q75 – upper quartile –l ower quartile, SEM – standard error of mean, AV – analysis of variance, RDA * – coverage of recommended demand (Jarosz 2012), RDA ** – coverage of recommended demand (CD 2008/100/EC 2008), AI *** – coverage of sufficient demand (Jarosz 2012), *a*,*b*,*c*, ... – statistical differences ($P < 0.05$)

ry (26.31 and 25.14 μg g^{-1}, respectively). Copper is an important microelement accompanying iron, an indispensable element of the synthesis of haemoglobin (Sonnweber et al. 2012). The highest levels of Cu were determined (P < 0.05) in common basil, marjoram and green pepper (average content 1.86 μg g^{-1}). Manganese is another microelement increasing the utilization of Fe from food. Particularly rich (P < 0.05) sources of manganese were common basil, coriander and marjoram (8.56, 8.64 and 7.56 μg g^{-1}, respectively).

Fennel flower proved to be the herb which accumulated twice as much of zinc (74.53 μg g^{-1}) as the other herbs. Apart from many catalytic, structural and regulatory functions, this element has a significant effect on the assimilability of basic nutrients (Jabłońska et al. 2013).

It was estimated that the consumption of 1 g of the herbs submitted to our study could cover less than 0.1% RDA or AI of the analysed macroelements for an adult aged 31-50. Regarding microelements, this would equal 0.2-0.3% on average (up to 0.678% RDA of Zn in the case of fennel flower). Even small amounts of herbs in a diet can provide a good source supplementing mineral deficiencies. High bioavailability and optimum proportions of minerals are another good reason for increasing the amount of plant material used as a source of minerals in preventive and therapeutic activities (Zengin et al. 2008).

CONCLUSIONS

The analysed culinary herbs differed significantly in terms of the content of nutrients and minerals. The richest sources of nutrients were lovage, marjoram, nutmeg, green pepper and rosemary. Common basil was characterised by a particularly high content (P < 0.05) of minerals (Mg, Ca, K, Na, Fe, Cu and Mn). Apart from basil, the highest (P < 0.05) accumulation of macroelements was determined in common juniper (Mg), lovage (Mg, Ca), marjoram (Ca) and rosemary (Ca, K). Microelements were accumulated in high quantities by fennel flower (Fe, Cu, Zn), coriander (Cu, Mn), marjoram (Cu, Mn, Zn) and green pepper (Cu).The consumption of 1 g of the above herbs can cover up to approx. 0.1% of RDA (Mg, Ca,) and AI (K, Na) and up to 0.6% of RDA (Fe, Cu, Mn, and Zn).

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