

Studies of Trace Element Content in Selected Medical Herbs

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Abstract

This paper presents the preliminary step in studies of trace elements in the eighteen most important medical herbs. The studies have shown some of the important differences in the same herbs collected in different locations.

Keywords: trace elements, medical herbs

This paper presents information about studies conducted by the Department of Ecology and Environmental Protection, Educational University in Kielce, on the subject of element contents in medical herbs. A preliminary step covers the contents of twelve trace elements in eighteen herbs.

The herbs have been collected in Kielce region in non-polluted areas, far from the city and roads.

Trace element content in herbs has been determined using X-ray fluorescent analysis with total beam reflection.

The result based on the conducted studies shows that the contents of the particular trace elements in selected herbs is diversified (see Table 1). The elements found in the smallest amount of the examined herbs are: selenium, zirconium, bromine and lead. The smallest amount of selenium (0.06 ppm) was found in *Veronica officinalis* and the largest content in dead-nettle (*Lamium album*) (0.63 ppm). The smallest amount of zirconium is in comfrey (*Symphytum officinale*) (0.83 ppm) and the largest amount in dead-nettle (*Lamium album*) (1.37 ppm). The smallest

Table 1. Trace element content expressed in ppm in selected medical herbs.

No	Herb species	Ba	Br	Cr	Zn	Zr	Mn	Cu	Ni	Pb	Rb	Se	Sr
1.	<i>Plantago lanceolata</i> L.	62.1	0.9	4.71	13.5	0.81	8.06	10.8	2.09	1.04	5.23	0.15	14.7
2.	<i>Hypericum perforatum</i>	13.2	1.23	5.76	26.4	1.29	4.86	18.8	4.32	0.95	3.38	0.39	7.71
3.	<i>Chelidonium maius</i> L.	21.8	0.45	3.84	15	1.18	18.3	12.8	1.92	1.22	5.08	0.39	37.6
4.	<i>Lamium album</i> L.	24.3	1.11	2.54	30.1	1.37	33.7	29.2	4.24	2.05	2.18	0.63	8
5.	<i>Achillea millefolium</i> L.	8.99	1.63	0.54	10	0.92	15.1	8.99	2.34	0.67	2.35	0.2	4.12
6.	<i>Petasites officinalis</i> Moench.	27.7	0.38	2.34	14.6	1.1	13.3	11.9	2.44	1.48	0.95	0.19	7.64
7.	<i>Thymus serpyllum</i> L.	57.6	1.1	3.25	24.1	1.13	15.8	13.7	2.69	1.58	13	0.15	13.4
8.	<i>Taraxacum officinale</i> Web.	19.1	0.66	2.96	8.51	1.06	6.07	13	1.93	0.8	2.53	0.14	9.81
9.	<i>Juglans regia</i> L.	23.3	0.99	6.62	23.6	1.23	36.6	15.7	5.05	1.32	2.86	0.25	36.2
10.	<i>Artemisia absinthium</i> L.	18.5	1.68	0.72	15.6	1	13.6	15.5	3.1	1.1	1.87	0.28	1.29
11.	<i>Veronica officinalis</i> L.	29.5	0.57	1.16	67.9	1.05	52.3	12.2	4.2	4.67	24.3	0.06	9.78
12.	<i>Galium mollugo</i> L.	17.7	0.65	3.75	37.5	1.51	36.8	33.1	4.71	1.99	1.83	1.02	7
13.	<i>Alchemilla vulgaris</i> L.	16.9	1.67	4.74	16	1.28	37.8	13.5	1.57	0.54	5.45	0.35	9.4
14.	<i>Equisetum arvense</i> L.	14.4	1.43	6.82	37.5	1.33	11.7	23.5	11.3	0.85	6.76	0.59	17.5
15.	<i>Salvia officinalis</i> L.	22.6	0.25	4.46	24.4	0.93	6.62	15	2.99	1.06	4.28	0.25	5.16
16.	<i>Lycopodium odoratum</i>	6.94	0.3	0.51	24.3	1.13	74.6	13.1	1.7	2.45	41.4	0.39	2.32
17.	<i>Epilobium parviflorum</i> Schreb.	28.5	3.35	5.01	18.8	1.12	21.3	13.9	2.11	1.24	5.03	0.16	37.7
18.	<i>Symphytum officinale</i> L.	12.7	2.35	3.38	9.3	0.83	10.8	9.04	2.96	0.89	4.75	0.22	12.9

amount of bromine is found in salvia (*Salvia officinalis*) (0.25 ppm) and the largest amount in comfrey (*Symphytum officinale*) (2.35 ppm). The smallest amount of lead was found in *Alchemilla vulgaris* (0.54 ppm) and the largest amount in *Veronica officinalis* (4.67 ppm). Also, relatively small contents of chromium, nickel and rubidium are characteristic, but are distinguished by more diversified values in the particular herbs. So, the amount of chromium ranges from 0.51 ppm in club-moss (*Lycopodium clavatum*) to 6.82 ppm in horsetail (*Equisetum arvense*). There is 1.57 ppm of nickel in *Alchemilla vulgaris* and 11.3 ppm in horsetail (*Equisetum arvense*). The content of rubidium in *Petasites officinalis* is 0.95 ppm and 41.4 ppm in club-moss (*Lycopodium clavatum*). The remaining elements are found in larger amounts.

Strontium shows more diversified contents, from 1.29 ppm in wormwood (*Artemisia absinthium*) to 37.6 ppm in celadine (*Chelidonium maius*). Manganese shows from 4.86 ppm in St. Johns wort (*Hypericum perforatum*) to 74.6 ppm in club-moss (*Lycopodium clavatum*). Less oscillation shows the content of bromine, copper and zinc.

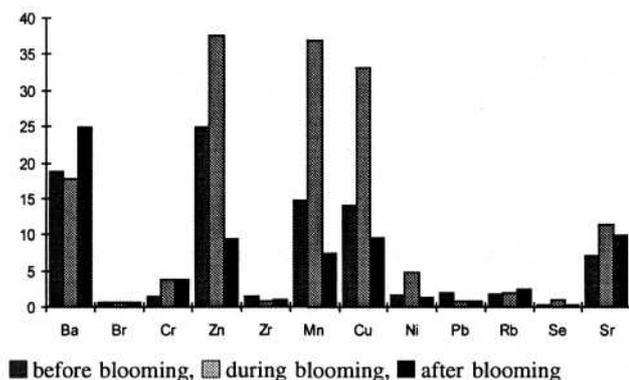


Fig.1. Element content (ppm) collected in *Galium mollugo* at different times.

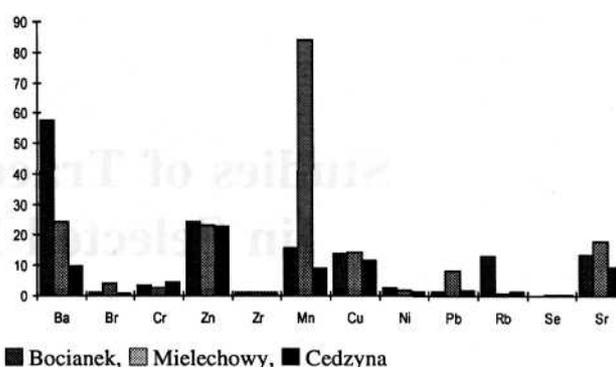


Fig. 2. Trace element content (ppm) collected in *Thymus serpyllum* in different field conditions.

It was determined that trace element contents depend on the plant development stage. The contents of studied elements are considerably different in *Galium mollugo* collected in the same area, but during different period of time; before blooming, during blooming and after blooming. Most of the elements in larger amount are found in plants during their blooming stage (Fig.1).

Trace element content also depends on the area where herbs are growing. The contents of zinc, zirconium, copper, nickel and selenium in *Thymus serpyllum* collected at the same time, but from three different places are similar, but the contents of the remaining elements, especially bromine, manganese, lead and rubidium are considerably diversified (Fig. 2).

References

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