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Mineral content of two Mentha species (*Mentha spicata* L. and *Mentha arvensis* L.) growing in Kosovo

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Abstract

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Mint (mentha) is a plant that has been used for a long time, due to its healing properties. The plant has historically been cultivated in Egypt, and from there it has spread to Europe. Mint leaves have a pleasant aroma as well as a refreshing taste. Precisely because of its characteristic taste and aroma, mint is widely used in the pharmaceutical, cosmetic and food industries. Therefore, in this paper was investigated the mineral content of *Mentha spicata* L. and *Mentha arvensis* L. grown in Lipjan (a city in the central part of Kosovo). The mineral content of M. *spicata* L. and M. *arvensis* L. was determined in leaves and stems of these plants. Concentrations of zinc, copper, iron, nickel, manganese, chromium, cadmium and lead were determined by the atomic absorption spectroscopy (AAS). Microwave was used to decompose samples. The metal concentrations in the *M. spicata* L. samples are as follows: zinc (24.1-142.81 mg/kg), copper (11.82-97.67 mg/kg), iron (436.58-612.12 mg/kg), nickel (2.63-3.93 mg/kg), manganese (1.5-2.8 mg/kg), chromium (0.22-0.29 mg/kg), cadmium (0.71-0.83 mg/kg) and lead (0-0.034 mg/kg). On the other hand, the concentrations of metals in the samples of *M. arvensis* L. are as follows: zinc (36.95-366.85 mg/kg), copper (24.95-74.78 mg/kg), iron (170.71-1831.27 mg/kg), nickel (2.67-9.80 mg/kg), manganese (3.20-6.89 mg/kg), chromium (0.25-1.9 mg/kg), cadmium (0.67-0.80 mg/kg) and lead (0.0037-0.008 mg/kg). Of all the micronutrients (Fe, Mn, Zn, Cu and Ni), iron had the highest concentration which varies from 170.71-1831.27 mg/kg and then zinc whose concentration ranges from 24.1 mg/kg to 366.85 mg/kg. This study also showed that the Cd and Cu in the mint species were higher than that recommended by the World Health Organization (WHO).

Keywords: Mentha spicata L.; *Mentha arvensis* L.; metal contents; microwave; atomic absorption spectrophotometer

Introduction

For primary health care needs, 80% of world population relies mainly on plant based traditional medicines because according to them, medicinal plants are natural or near to nature and are always safe. The important utilities of many plants have long been published but a large number of them remain unexplored up to now. So, there is a necessity to explore their uses and to conduct pharmacognostic and pharmacological studies to ascertain their therapeutic properties. Plants' diversity has a considerable importance as a source of pharmaceutically active substances (Faiku & Haziri, 2015; Tanmoy & Bhagat, 2010).

Mentha is a genus of aromatic perennial herbs belonging to the family of Lamiaceae. This genus is mainly distributed in the temperate and sub-temperate regions of the world (Arzani et al., 2007; Bhat et al., 2002). Mint species have been exploited by man for more than two thousand years. Peppermint itself has only been used for 250 years (Hornok, 1992; Süleyman et al., 2010). The genus Mentha (Lamiaceae) is composed of 19 geographically widespread species and 13 named hybrids (Chambers & Hummer, 1994).

M. arvensis, the corn mint, field mint, or wild mint, is a species of flowering plant in the mint family Lamiaceae. It has a circumboreal distribution, being native to the temperate regions of Europe and western and central Asia, east to the Himalaya and eastern Siberia, and North America (Muhammad et al., 2020).

M. spicata has formed from cross breeding of *M. longifolia* and *M. rotundifolia*. The leaves, herbs and essential oil of *M. spicata* were used much earlier than those of peppermint (Hornok, 1992).

Mentha species are widely used in conventional medicine, for their antispasmodic, antiseptic and emmenagogue effects (Edris et al., 2003); moreover, their essential oils are used in chewing gums, alcoholic beverages, cosmetics, perfumes, toothpastes and mouthwashes (Baytop, 1984). The plant is mainly used as salad, spice and for tea besides mint herbage used for wool dyeing (Leung & Foster, 2003).

Minerals are found in plants in forms of ions, inorganic and organic salts. The content of mineral elements in plants can vary greatly. Changes in plant mineral content come from a number of factors, including plant species, plant age, soil pathological features, climate, and implementation of agrotechnical measures. The human body needs adequate concentrations of these minerals to maintain normal function and maintain life. Deficiencies or excesses of minerals in the diet can lead to various health disorders (Süleyman et al., 2010; Fatiha et al., 2017; Muhammad et al., 2018; Snoussi, 2015; Mohamamd et al., 2011; Murat et al., 2017; Ozcan, 2004). Our research group is interested to analyze the chemical profile of different medicinal plants which are growing in the region of Kosovo and Albania. (Faiku et al., 2017, 2018, 2019).

Mint tea is widely used as herbal tea. Therefore, mineral content of its herbs can meet daily elemental mineral demand of human body when consumed as herbal tea. Geographical origin of plants belonging to the same species can result in different concentrations of elements and their bioavailability, depending on soil characteristics and environmental pollution. The objective of this study was to determine the levels of some minerals like Zn, Cu, Fe, Ni, Mn, Cr, Cd and Pb in leaves and stalks in the plant *M. arvensis* L. and *M. spicata* L. growing in Kosovo.

Materials and Methods

Apparatus and Reagents

The analysis of Zn, Cu, Fe, Ni, Mn, Cr, Cd and Pb content was made with the M Series spectrophotometer type GE650416v1.26 Flame Mode Instrument. The device working parameters (air, acetylene, optics and electronics) were adjusted for maximum absorption for each element. The standard solutions (1000 mg/L) were of analytical grade from Riedel de-Haen (Germany). The ultra-pure grade 65% nitric acid solution was used in experiment (Merck, Germany). All solutions were prepared using deionized water.

The analyzed samples

The aerial part of *Mentha spicata* L. and *Mentha arvensis* L., growing wild in Lipjan (a city in the central part of Kosovo), was collected in May 2021. The plants were dried at room temperature (22°C). So, in this research we have analyzed the mineral content in *M. spicata* L. and *M. arvensis* L. grown in Kosovo in different parts of the plant in leaves and stems.

The digestion of material was done with microwave. For analysis the stalks and leaves samples of around 0.5 g were placed in Teflon digestion vessels; 7 mL HNO_3 65% and 1 mL H_2O_2, 30% were added, and the vessels were capped closed, tightened and laced in the rotor of the Analytikjena microwave digestion. The digestion was carried out with the following programmer: step 1- temperature 180°C, 10 min hold time with power of 500 Wand and 45 bar pressure; step 2- temperature 180°C, 15 min hold time, with power of 500 W and 45 bar pressure. Finally, the vessels were cooled and carefully opened and digests quantitatively transferred into 50 mL calibrated flasks. Quantitative analysis of all samples was performed on the M Series spectrophotometer type GE650416v1.26 Flame Mode Instrument.

Results and Discussion

Minerals are of critical importance in the diet, even though they comprise only 4–6% of the human body (Ozcan, 2004). Their excess or deficiency in organs and tissues leads to diseases. It is very important to know the possible influence of metals on pharmacological properties of herbal infusions (Queralt et al., 2005). The mean concentration levels in *M. spicata* L. and M. *arvensis* L. are summarized in Table 1 and Table 2.

A perusal offs of mineral found data in Table 1 and 2 shows that the mineral contents in analyzed plants are in wide range. However, plant species were rich in essential minerals: Zn, Fe and Cu. These minerals are essential components of tissues due to their multiple roles, importance in the proper functioning of enzyme systems, nerve conduction and muscle function, helping with the transfer of food to cells, providing the framework for tissue and organ regulation functions (Bhat et al., 2010).

Table 1. Quantity of minerals of the *Mentha spicata* L. giving in mg/kg

Parts of plant	Zn	Cu	Fe	Ni	Mn	Cr	Cd	Pb
S_1 (leaves)	24.1 ±0.1	11.82±0.20	436.58±0.10	3.93±0.20	2.8±0.02	0.29±0.11	0.83±0.2	0.002±0.01
S_2 (stalk)	142.81±0.25	97.67±0.15	612.12±0.15	2.63±0.12	1.5±0.01	0.22±0.19	0.76±0.21	0.034±0.05

Table 2. Quantity of minerals of the *Mentha arvensis* L. giving in mg/kg

Parts of plant	Zn	Cu	Fe	Ni	Mn	Cr	Cd	Pb
S_4 (leaves)	36.95±0.11	24.95±0.14	170.71±0.35	2.67±0.01	3.20±0.01	0.25±0.19	0.67±0.27	0.008±0.1
S_5 (stalk)	366.85±0.25	74.78±0.19	1831.27±0.40	9.80±0.015	6.89±0.014	1.9±0.21	0.70±0.250.30	0.0037±0.5

Zinc is an essential metal for the normal functioning of various enzyme systems. Zinc deficiency, particularly in children, can lead to loss of appetite, growth retardation, weakness, and even stagnation of sexual growth (Saracoglu et al., 2009). The zinc content in the analyzed plant samples ranged from 24.1 mg/kg in the leaves of *M. spicata* L. (Table 1) to 366.85 mg/kg in the stalk of *M. arvensis* L. (Table 2). The stalk of *M. arvensis* has higher levels of Zn (366.85 mg/kg), while the leaves of *M. arvensis* contain lower content (24.1 mg/kg). The amount of zinc found in the leaves of *M. spicata* in our samples was approximately the same as the amount of zinc reported by Subramanian et al. (2012). The amount of zinc reported by Subramanian et al. (2012) for *M. spicata* leaves was 49.76 mg/kg, which according to our findings are in approximate values.

Copper is a vital constituent of many enzymes that catalyze oxidation – reduction reactions and is necessary for iron mobilization and collagen synthesis (Glew et al., 2005). Table 1 shows that the amount of copper in *M. spicata* varies from 11.82 mg/kg on leaves to 97.67 mg/kg on stalks. The amount of copper in *M. arvensis* was in the range from 24.95 mg/kg on leaves to 74.78 mg/kg on stalks (Table 2). Thus, the copper content in the samples of the analyzed plants varied from 11.82 mg/kg in the leaves of *M. spicata* (Table 1) to 97.67 mg/kg in the stalk of *M. spicata*. Thus, the stalk of *M. spicata* shows higher levels of copper (97.67 mg/kg), while the leaves of *M. spicata* contain the lower content (11.82 mg/kg). Subramanian et al. (2012) while analyzing the leaves of *M. spicata* have encountered the amount of 29.833 mg/kg.

Iron is an essential nutrient for all life forms. Iron acts as a cofactor for many enzymes. It is essential for the transport of oxygen and the transfer of electrons. However, daily iron requirements can range between 8-18 mg for humans. Because iron has pro-oxidant activity, it can be toxic in excessive concentrations (Wallace et al., 1992). The amount of iron in *M. arvensis* samples was: in leaves 170.71 mg/kg and stalk 1831.27 mg/kg (Table 2). On the other hand, the concentrations of iron in the plant *M. spicata* were in leaves 436.58 mg/kg and stalk 612.12 mg/kg (Table 1). The iron content in the plant species analyzed was in the range from 170.71 mg/kg in the leaves of *M. arvensis* to 1831.27 mg/kg in the stalk of *M. arvensis*. So, the stalk of *M. arvensis* has higher levels of copper (1831.27 mg/kg), while the leaves of *M. arvensis* shows lower content (170.71 mg/kg). The iron content data of this study in *M. spicata* (436.58 mg/kg) were higher than the data reported by Süleyman et al. in Turkey in 2010 (in trace) and 395.74 mg/kg in India (Subramanian et al., 2012).

Chromium is a heavy metal and is an essential micronutrient needed to stimulate the action of insulin on body tissues so that the body can use sugars, proteins and fats (Richa et al., 2002). Chromium concentrations in *M. spicata* range from 0.22 mg/kg-0.29 mg/kg while in *M. arvensis* it is from 0.25 mg/kg-1.9 mg/kg (Table 1 and Table 2). The highest chromium concentration was in the stalk of *M. arvensis* 1.9 mg/kg while the lowest concentration of chromium was detected in the stalk of *M. spicata* 0.22 mg/kg.

Parman et al. (1993) showed that the medicinal values of some plant species used in the homeopathic system may be due to the presence of Ca, Cr, Cu, Fe, Mg, K and Zn. According to Hooker (1987), Cr, Mg and Zn play important roles in cholesterol metabolism as well as heart disease. The presence of Cr and Mn in plants may be associated with therapeutic properties against diabetic and cardiovascular diseases (Perry, 1972). Deficiency or excess of Cu, Mn, Zn, Cr, Ca, Ca, Mg and K can cause a range of disorders (Ahmed et al., 1994). These elements also participate in neurochemical transmission and also serve as components of biological molecules, as a cofactor for various enzymes, and in a variety of different metabolic processes (Mayer & Vyklicky, 1989).

Manganese is a micronutrient found naturally in plants and animals. However, overexposure to Mn can have neurological effects which usually result from water consumption with very high levels of it (Powell et al., 1998). From the data in table 1 we can see that the amount of manganese in samples of *M. spicata* were as follows: sample 1- leaves (2.8 mg/kg), and sample 2-stalk (1.5 mg/kg). Also, from table 2 and it can be seen that the amount of manganese in samples of *M. arvensis* were as follows: sample 4-leaves (3.2 mg/kg), and sample 5-stalk (6.89 mg/kg. The manganese content in plant samples ranged from 1.5 mg/kg on the stalk of *M. spicata* to 6.89 mg/kg on the stalk *M. arvensis*. The stalk of *M. arvensis* shows higher levels of manganese (6.89 mg/kg), while the stalk *of M. arvensis* contain lower amount (1.5 mg/kg). Manganese in *M. spicata* (1.5–2.8 mg/kg) were lower than data reported by Süleyman et al. in Turkey in 2010 (2.367 mg/kg) and 85.72 mg/kg in India (Subramanian et al., 2012).

Lead is stored in the bones and in smaller parts in the liver, kidneys and soft tissues. Lead poisoning affects the function of the brain and nervous system, reduces the level of intelligence, perception and memory modality. More severe forms can cause death. The concentration of lead in all samples was lower than that of other metals and ranged from 0.002 mg/kg to 0.034 mg/kg (Table 1 and Table 2). The amount of lead (9.89 mg/kg) in the leaves of *M. spicata* analyzed in India by Subramanian et al. (2012) was much higher than the amount of lead in the leaves of *M. spicata* grown in Kosovo (0.002 mg/kg). According to the WHO, the permissible limit for medicinal plants, based on ADI (Acceptable Daily Intake) for Pb, is 10 ppm (Al Moaruf et al., 2004). The herbal plants under investigation accumulated this metal at a level appreciably below the permissible level.

Nickel is known to aid in pancreatic function and insulin production (Sanja et al., 2015). The nickel content in the plant samples analyzed ranged from 2.63 mg/kg per stalk of *M. spicata* (Table 1) to 9.80 mg/kg in stalk of *M. arvensis* (Table 2). *M. arvensis* stalk contain higher levels of nickel (9.80 mg/kg), while *M. arvensis* stalk shows lower content (2.63 mg/kg).

High levels of Cd in the kidneys can cause tissue damage, which further leads to the formation and pressure of kidney stones. Cadmium has an effect on bone structure and bone deformation. Also, cadmium is a carcinogen that has a detrimental effect on the heart and kidneys. The cadmium content in the plant samples analyzed ranged from 0.67 mg/kg – 0.83 mg/kg (Table 1 and Table 2). It should be noted that the highest concentration of cadmium was in the leaves of *M. spicata* 0.83 mg/kg and the lowest in the leaves of *M. arvensis* 0.67 mg/kg.

The amount of cadmium found in the leaves of *M. spicata* in our samples was approximately the same as the amount of cadmium reported by Indian authors Subramanian et al. (2012). The amount of cadmium reported by Subramanian et al. (2012) for *M. spicata* leaves in India was 0.74 mg/kg, which according to our findings are in approximate values.

The WHO maximum permitted levels in plant raw materials for cadmium is 0.3 mg/kg, for chromium 2 mg/kg, and for copper 20 mg/kg (Queralt et al., 2005; WHO, 2005). This study showed that the Cd and Cu content of mint species were higher than that recommended by the WHO (WHO, 2005).

Conclusion

In this research we analyzed the mineral content of two mentha plants, *Mentha spicata* L. and *Mentha arvensis* L. grown in Lipjan (Kosovo). The mineral content analysis has been done on two parts of plants, in leaves and stems. Concentrations of zinc, copper, iron, nickel, manganese, chromium, cadmium and lead were determined by the atomic absorption spectroscopy (AAS). Microwave was used to decompose samples.

Of all the micronutrients (Fe, Mn, Zn, Cu and Ni), iron had the highest concentration which varies from 170.71-1831.27 mg/kg and then zinc whose concentration ranges from 24.1 mg/kg to 366.85 mg/kg. This study showed that the Cd and Cu content of mint species were higher than that recommended by the WHO. Finally, we suggest that there is a need for more rigorous and consistent controls of the herbal products available in our markets.

References

Ahmed, S., Rehman, A., Qadiruddin, M. & Badar, Y. (1994). Elemental analysis of an herbal drug Intellan, a neuro-energiser. *Journal of Faculty of Pharmacy*, Gazi University, Turkey, *11(1),* 83–90.

Al Moaruf, O. A., Muibat, O. B., Asiata, O. I., Isiaka, A. O. & Nureni, O. O. (2004). Heavy trace metals and macronutrients status in herbal plants of Nigeria. *Food Chemistry*, *85(1),* 67–71.

Arzani, A., Zeinali, H. & Razmjo, K. (2007). Iron and magnesium concentrations of mint accessions (*Mentha* spp.). *Plant Physiology and Biochemistry*, *45*(*5*), 323-329.

Baytop, T. (1984). Therapy with Medicinal Plants in Turkey (Past and Present). Istanbul University Press, Istanbul, 26-27.

Bhat, R., Kiran, K., Arun, A. B. & Karim, A. A. (2010). Determination of mineral composition and heavy metal content of some nutraceuticals valued plant products. *Food Analytical Methods*, *3*, 181–187.

Chambers, H. L. & Hummer, K. E. (1994). Chromosome counts in the Mentha collection at the USDAARS national germplasm repository. *Taxon*, *43(3),* 423–432.

Edris, A. E., Shalaby, A. S., Fadel, H. M. & Abdel-Wahab, M. A. (2003). Evaluation of a chemotype of spearmint (*Mentha spicata* L.) grown in Siwa Oasis, Egypt. *European Food Research and Technology*, *218(1),* 74–78.

Fatiha, B., Madani, K., Chibane, M. & Duez, P. (2017). Chemical composition and biological activities of Mentha Species. Aromatic and Medicinal Plants – Back to Nature. Edited by

Hany El-Shemy Cairo University. 64-65.

Faiku, F. & Haziri, A. (2015). Total lipids, proteins, minerals, essential oils and antioxidant activity of the organic extracts of *Mentha longifolia* L. Growing wild in Kosovo, *European Chemical Bulletin*, *4(9),* 432-435.

Faiku, F., Buqaj, L. & Haziri, A. (2019). Phytochemicals and antioxidant study of *Teucrium chamaedrys* L. plant. *Agriculture & Forestry*, *65(1),* 137-145.

Faiku, F., Haziri, A., Mehmeti, I., Mehmeti, A. & Hoti, Gj. (2018). In vitro antibacterial activity of different solvents extracts of *Achilea millefolium* L. growing wild in Kosovo. *Fresenius Environmental Bulletin*, *27(6),* 3878-3883.

Faiku, F., Haziri, A., Mehmeti, A. & Reçica, B. (2017). Antioxidant activity of the organic extracts of *Origanum vulgare* L. growing wild in Kosovo. *Fresenius Environmental Bulletin*, *26(2a),* 1440-1446.

Glew, R. S., Vanderjagt, D. J., Chuang, L. T., Huang, Y. S., Millson, M. & Glew, R. H. (2005). Nutrient content of four edible wild plants from West Africa. *Plant Foods for Human Nutrition*, *60(4),* 187–193.

Hooker, J. D. (1982). The Flora of British India. *Reeve and Co., III,* 640.

Hornok, L. (1992). The Cultivation of Medicinal Plants. In: Hornok L. (2 ed.). Cultivation and Processing of Medicinal Plants. *John Wiley & Sons,* Chichester 229-230.

Leung, A. Y. & Foster, S. (1995). Encyclopedia of Common Natural Ingredients 2nd Ed. *John Wiley & Sons, Inc.,* New York, 318-319.

Mayer, M. L. & Vyklicky, L. (1989). The action of Zinc on synaptic transmission of mouse neuronal excitability in culture of mouse hippocampus. *Journal of Physiology*, *415*, 351–365.

Mohamamd, A. E., Shahram, E., Seyed, M. N., Seyed, F. N., Akbar, H. M. &Ahmad, R. B. (2011). Estimation of Essential and Toxic Mineral Elements in Mentha Species. *Asian Journal of Chemistry*, *23(4),* 1648-1650.

Muhammad, M. M., Mohd, F. A. B., Ahmed, H. W. & Amina, R. M. (2018). Comparison of Phytochemical, Proximate and Mineral Composition of Fresh and Dried Peppermint (*Mentha piperita*) Leaves. *Journal of Science and Technology*, *10(2),* 85-91.

Muhammad, N., Qurat-Ul-Ain, S., Aamir, N., Shazia, A., Muqarrab, A. & Haseeba, M. (2020). *Mentha arvensis*, a medicinal and aromatic plant, has high nutritional value and several-uses: A review. *Buletin Agrotechnologi*, *1(2),* 37-49.

Murat, T., Tamer, E. & Ali, R. K. (2017). Nutritional properties, minerals, and selected heavy metal contents in herby cheese plants of Lamiaceae. *Applied Biological Chemistry*, *60(1),* 41–47.

Ozcan, M. (2004). Mineral contents of some plants used as condiments in Turkey. *Food Chemistry*, *84(3),* 437–440.

Parman, V. S., Gupta, A. K., Jha, H. N. & Verma, P. N. (1993) Metal content of the medicinal plants *Agave marianum*, *Sambucus nigra* and *Silybum marianum*. *Pharmaceutical Biology*, *39(5),* 384–387.

Perry, H. M. (1972). Hypertension and true geochemical environments in relation to health and diseases. New York: *Academic Press.* 161-162.

Powell, J. J., Burden, T. J. & Thompson, R. P. H. (1998). *In vitro* mineral availability from digested tea: A rich dietary source of manganese. *Analyst*, *123(8),* 1721-1724.

Queralt, I., Ovejero, M., Carvalho, M. L., Marques, A. F. & Llabres, J. M. (2005). Quantitative determination of essential and trace element content of medicinal plants and their infusions by XRF and ICP techniques. *X-Ray Spectrometry*, *34*, 213–217.

Richa, S., Upreti, R. K., Seth, P. K. & Chaturvedi, U. C. (2002). Effects of chromium on the immune system. *FEMS Immunology and Medical Microbiology*, *34(1),* 1-7.

Sanja, M. P., Saša, R. S., Marina, L. D. & Živomir, B. P. (2015). The determination of macro and microelements in chamomile teas (*Matricaria chammomilla* L. *Advanced Technologies*, *4(2),* 37-42.

Saracoglu, S., Tuzen, M. & Soylak, M. (2009). Evaluation of trace element contents of dried apricot samples from Turkey. *Journal of Hazardous Materials*, *16(1-3),* 647-652.

Snoussi, M., Emira, N., Najla, T., Guido, F., Adele, P. & Vincenzo, D. F. (2015). Mentha spicata Essential Oil: Chemical Composition, Antioxidant and Antibacterial Activities against Planktonic and Biofilm Cultures of Vibrio spp. Strains, *Molecules*, *20(8),* 14402-14424.

Subramanian, R., Gayathri, S., Rathnavel, C. & Raj, V. (2012). Analysis of mineral and heavy metals in some medicinal plants collected from local market. *Asian Pacific Journal of Tropical Biomedicine*, *2(1),* S74-S78.

Süleyman, K., Nesrin, H., Veysel, T., Ersin, K. & Uyan, Y. (2010). Mineral content, essential oil components and biological activity of two mentha species (*M. piperita* L., *M. spicata* L.). *Turkish Journal of Field Crops*, *15(2),* 148-153.

Tanmoy, K. & Bhagat, R. M. (2010). Trace elements in tea leaves, made tea and tea infusion: A review. *Food Research International*, *43(9),* 2234-2252.

Wallace, A., Wallace, G. A. & Cha, J. W. (1992). Some modifications in trace metal toxicities and deficiencies in plants resulting from interactions with other elements and chelating agents – The special case of iron. *Journal Plant Nutrition*, *15(10),* 1589-1598.

WHO (World Health Organization), Quality control methods for medicinal plant materials, Revised Draft Update, September 2005, Geneva.

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