THE ANALYSIS OF HEAVY METALS CONTENT IN WHOLE AND CHOPPED PLANTS

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ABSTRACT

This paper presents the results of experimental research performed to analyze the potentially contain of heavy metals in whole and chopped herbs, in order to examine the influence of the cutting process on bioaccumulation of metals in studied plant material.

INTRODUCTION

Herbal plants represent an important class of various traditional medicine systems and, in recent years, they are increasingly used in the primary health care intervention in both developed and developing countries [1].

Herbs are traditionally used for the treatment and prevention of ailments such as stomach pain, headache, diabetes, hypertension, rheumatism, and many others [6].

The toxicity of trace metals on human health and the environment has attracted considerable attention in recent years. Plants are the main link in the transfer of heavy metals from the contaminated soil to humans. Heavy metals have a tendency to accumulate in the food chain. Heavy metals have low excretion rates through the kidney which could result in damaging effects on humans even at very low concentrations. Metals such as zinc, copper, iron, manganese, and chromium are essential nutrients; they are important for the physiological and biological functions of the human body. [4] However, an increase in their intake above certain permissible limits can become toxic [2, 3, and 6].

Sources of heavy metal contamination in herbs could be linked towater used in irrigation, polluted soils, fertilizers and pesticides, industrial emissions, transportation, and harvesting and their processes [5].

High levels of natural heavy metal concentrations in *soil* can result from geological processes, but mostly result from agriculture and industrial activities. *Water* can be an important source of contamination as a result of discharges from treatment plants and pre-treatment activity, discharge of sewage and household wastes. Also, an important source of food contamination by heavy metals may be *contact with machineries, installations or machinery processing machinery.*

The heavy metal content of medicinal plants depends on the ratio of nutrients in the soil, and their bioconversion in plants depending on certain conditions, such as fertilization, climatic conditions and genotype herbaceous species.

MATERIAL AND METHOD

Samples of plants were purchased from market in dry form, in order to process them (chopping and analysis of heavy metals). Heavy metals analysis method in the whole studied medicinal plants and / or cut plants with herb cutting machine, were examined by atomic absorption spectrometry.

The apparatus typically consists of the following: as digestion flasks with a volume of about 120 ml, a tube from polytetrafluoroethylene; a system to make flasks airtight, a microwave oven and an atomic absorption spectrometer equipped with hollow-cathode lamps as source of radiation and a deuterium lamp as background corrector.

Test solution: from about 0, 50 g of powdered product; add 6 ml of heavy metal-free nitric acid R and 4 ml of heavy metal-free hydrochloric acid R. Carry out the digestion in 3

steps with 7 flasks each containing the test solution: 80% power for 15 min, 100% power for 5 min, 80% power for 20 min. At the end of the cycle allow the flasks to cool in air and to each add 4 ml of heavy metal-free sulfuric acid R.

Blank solution: mix 6 ml of heavy metal-free nitric acid R and 4 ml of heavy metal-free hydrochloric acid R in a digestion flask and carry out the digestion in the same manner as for the test solution**.** The test is in complies with the European Pharmacopoeia [7]. The operation has been repeated both for working standard solutions and samples of a sufficient number of times to ensure a reliable average reading for each solution.

RESULTS

Distribution of heavy metals in different whole herbs or cut hearbs is graphically represented in Figure 1.

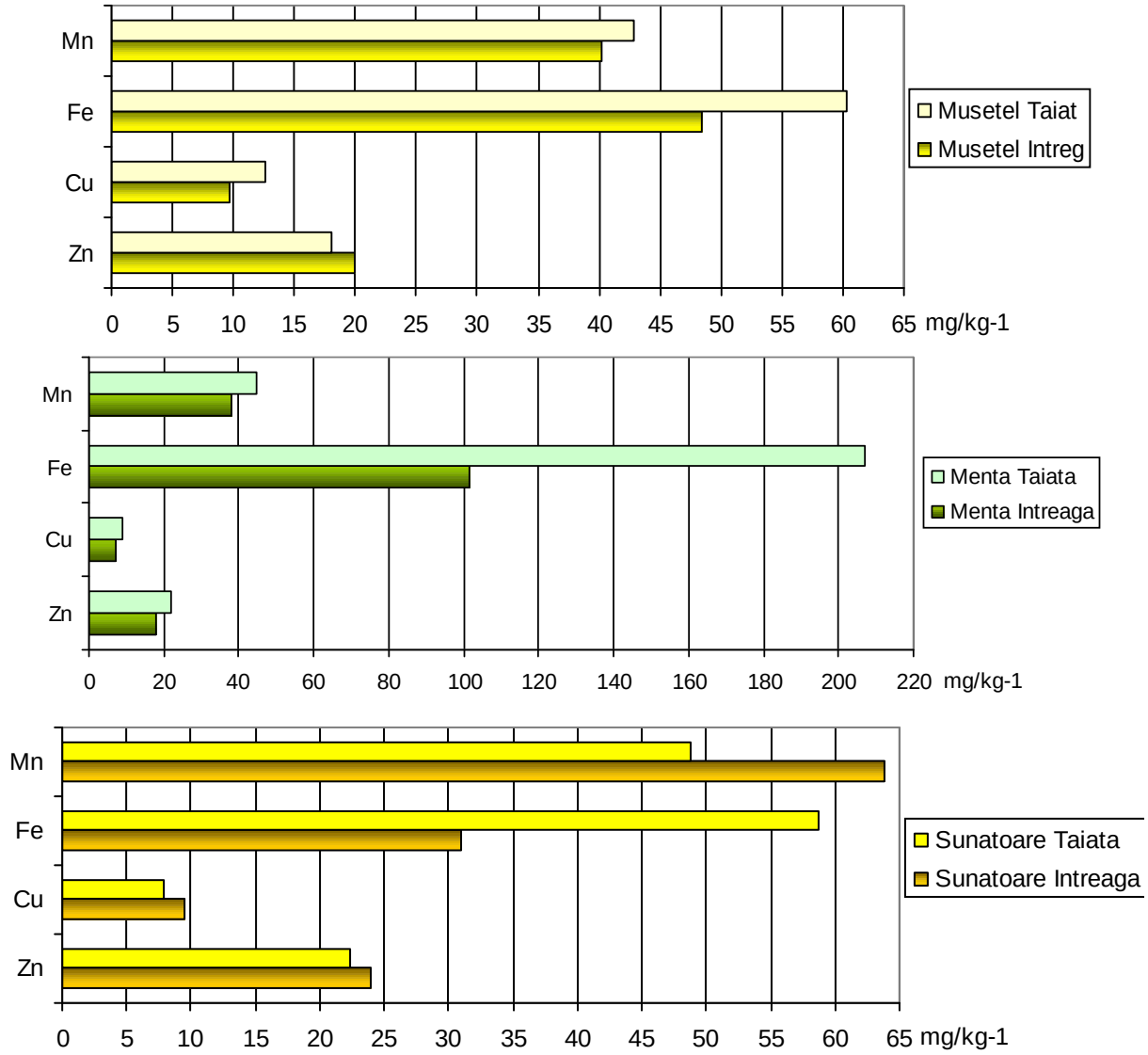

Fig. 1. Distribution of zinc, copper, iron and manganese in various plants Medicinal whole or cut

From heavy metal analysis for the three botanical families can be observed there are significant differences for iron concentrations (Figure 1). Each of the three categories studied (Compositae, Hypericaceae, Lamiaceae) had its own basic profile, depending on the genotype.

CONCLUSIONS

Medicinal plants have pharmacological effects, but can be toxic because of storing heavy metals in their tissues, and therefore should be preventing the collecting of medicinal plants next to roads.

Heavy metal charging over the legislated maximum limits, have negative consequences on soil quality and productivity, assuming any form of remedial generous financial resources and time.

Slow accumulation of heavy metals in the body influence the metabolism and decreases the quality of food resources available to consumers.

In terms of plant contact with machinery, processing facilities and equipment that are an important source of heavy metal contamination of food, for the four elements analyzed, genotype variation was higher than phenotypic variations.

In this context, medicinal plants will always show a greater total iron content when cutting than whole plants.

The metal content of the studied medicinal plants are variable and are due to the following factors: differences between plant species, geographical area where they were collected, exposure to different sources of pollution and the location of harvesting, processing steps and packaging.

Therefore, it is necessary to analyze the content of heavy metals in plants with the aim to reduce the potential toxicity of heavy metals to consumers.

Because selected medicinal plants are used in traditional medicine, there is a potential risk of heavy metal poisoning, where they come from polluted areas or processed improperly, why they should be analyzed to determine the presence of heavy metals, in order to avoid the accumulation of toxic substances in their long-term use.

There are a lot of medicinal species from different botanical families, which can also influence favorable or not, the quality of plant products obtained by bioactive compounds they contain.

It is therefore essential to have a quality control plant of raw material used to prepare various products / herbal preparations to ensure safety and effectiveness.

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