ASSESSING THE BIOAVAILABILITY AND TRANSLOCATION EFFICIENCY OF MINERAL ELEMENTS IN *Lycium barbarum* SPECIES FROM R. MACEDONIA AND R. CHINA

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INTRODUCTION

Goji berries or wolfberries (*Lycium barbarum* L.) have been traditionally used as food and a medicinal plant. The interest in the chemical composition of goji berries has intensified because of an increased awareness of their possible health benefits. On the other hand, the toxic elements can also be interacting in the plant tissue through the bio-available pathway of the root-soil system.

The present work reports the results obtained for metals (Na, Mg, K, Ca, Mn, Fe, Cu and Zn) in goji berries by using inductively coupled plasma–optical emission spectrometry (ICP-OES), following digestion using a diluted oxidant mixture in a closed-vessel microwave oven. Determinations of Cr, As, Pb, Cd and Ni were realized using the graphite furnace atomic absorption spectrometer (GFAAS). Mercury quantification was realized on the solid samples by the TDAAS method, with the automated direct mercury analyzer hydra-C.

WHY IS GOJI BERRY (*Lycium barbarum*) A SUPERFOOD?

Size does not matter!

- Goji Berry contains ~500 times more vitamin C than oranges!
- It packs ~15 times more iron than spinach!
- Contains 22 minerals including Zn, Fe, Ca….. and 11 amino acids!!

Benefits for human health

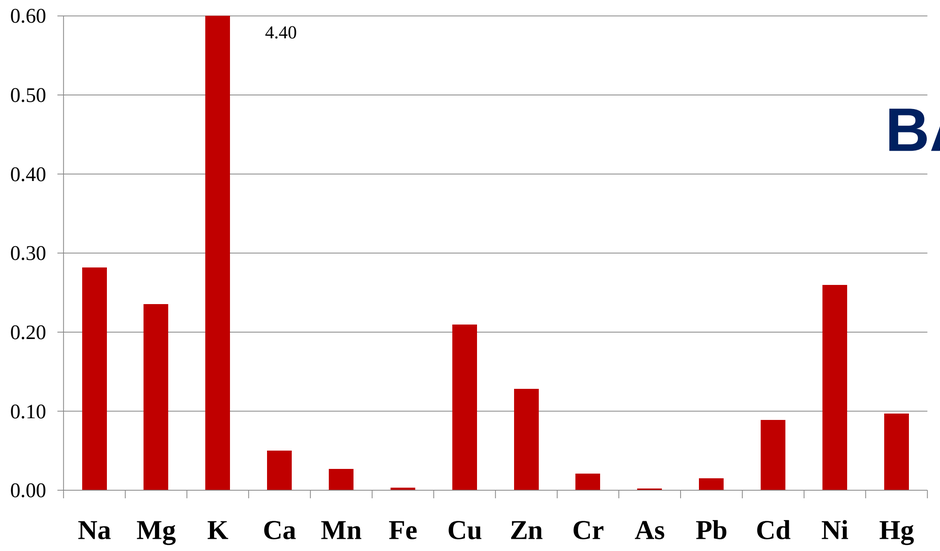
Certain forms of some metals/semimetals can be TOXIC, even in relatively small amounts, and therefore pose -

RISK TO THE HUMAN HEALTH!!!!!

DATA SUMMARY/RESULTS

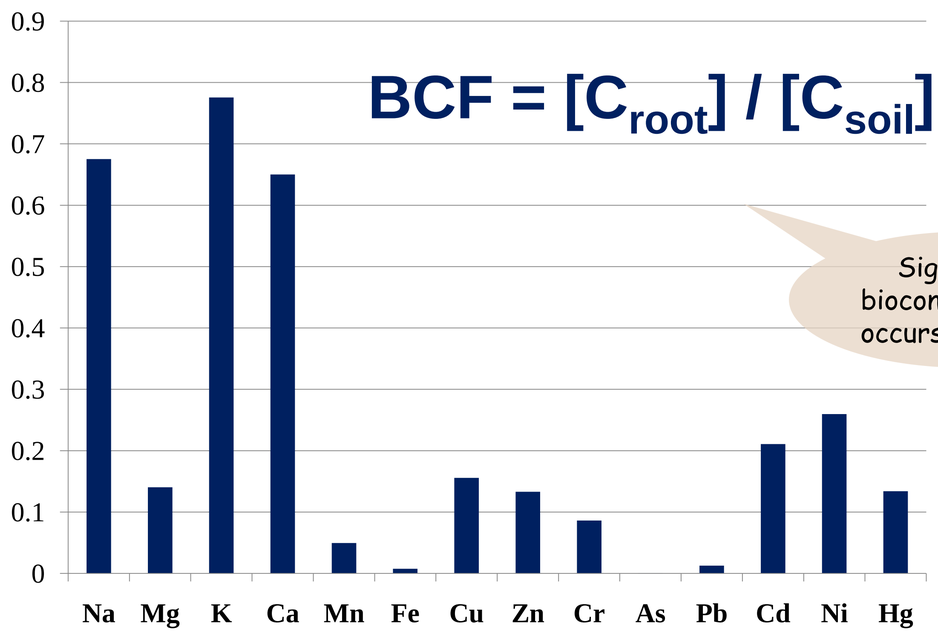
Table 1. Median values for elements contents in soil and plant species (contents are given in mg/kg on dried mass)

Element	Goji berries (fruit)	Soil /top layer (0-5 cm)
Na	44.2	157
Mg	1180	5016
K	22100	5016
Ca	841	16860
Mn	19.4	729
Fe	69.4	24290
Cu	11.1	53
Zn	21.4	167
Cr	0.571	27.4
As	0.015	7.53
Pb	0.187	12.4
Cd	0.04	0.451
Ni	2.5	9.63
Hg	0.0063	0.065



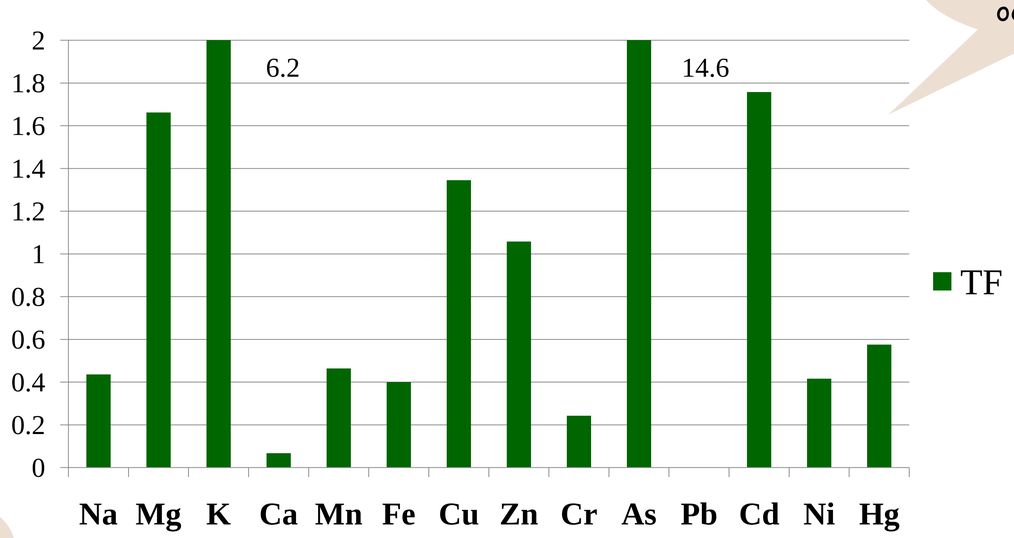
$$BAF = [C_{plant}] / [C_{soil}]$$

Significant bioaccumulations occurs for BAF>1



$$BCF = [C_{root}] / [C_{soil}]$$

Significant bioconcentrating occurs for BCF>1

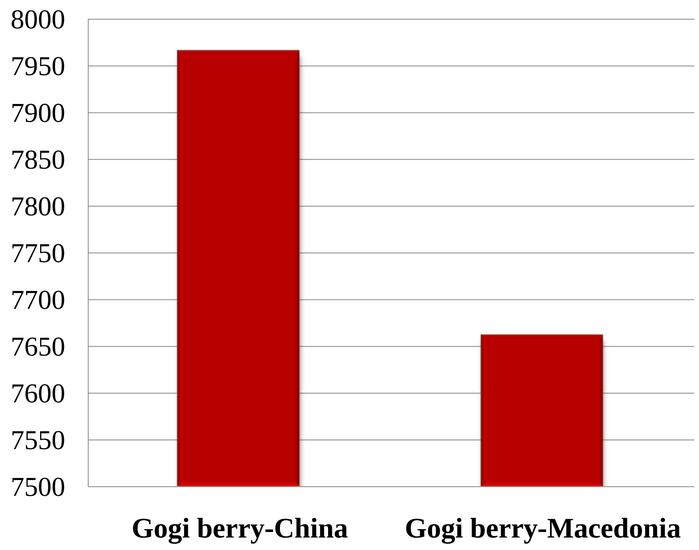


Significant translocation occurs for TF>1

$$TF = [C_{fruit}] / [C_{root}]$$

T-test for Dependent Samples

Element	t	p
Na	7.849	0.001
Mg	8.617	0.001
K	-4.836	0.008
Ca	3.960	0.017
Fe	4.973	0.008
Ni	5.526	0.005
Cu	3.435	0.026
Zn	2.659	0.056
Cr	4.490	0.011
As	-1.044	0.356
Cd	-5.928	0.004
Hg	0.991	0.378
Pb	3.088	0.037
Mn	-1.952	0.123



CONCLUSIONS

- The obtained data report the multi-element characterization of different plant parts, and variation in multi-elements content between Macedonian and Chinese species. Bioaccumulation and bioconcentration factor scores revealed the translocation efficiency of metals and nonmetals across the *Lycium barbarum* plant parts.

- Determination of potentially toxic metals concentration in food products is important for health risk assessment during the food consumption. This kind of study can be used as a tool for the farmers in order to adopt strategies to save the population by minimizing the problems related to metal toxicities. Such assessment for the contaminants is required for the well-being of the population.